

WEST AFRICA.

COMMITTEE ON EDIBLE AND
OIL-PRODUCING NUTS AND SEEDS.

REPORT;

WITH A

DESPATCH FROM THE SECRETARY OF STATE
FOR THE COLONIES.

(Minutes of Evidence are printed separately as [Cd. 8248].)

Presented to both Houses of Parliament by Command of His Majesty.
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COMMITTEE ON EDIBLE AND OIL-PRODUCING NUTS AND SEEDS.

To the Rt. Hon. A. BONAR LAW, M.P., &c., &c., His Majesty's Secretary of State for the Colonies.

SIR,

IN June last you approved the appointment of a Committee to consider and report upon the present condition and the prospects of the West African trade in palm kernels and other edible and oil-producing nuts and seeds, and to make recommendations for the promotion in the United Kingdom of the industries dependent thereon.

The members of the Committee were as follows :—

Mr. A. D. STEEL MAITLAND, M.P., Parliamentary Under Secretary of State
(*Chairman*).

Sir G. V. FIDDES, K.C.M.G., Assistant Under Secretary of State (*Vice-Chairman*).

Sir HUGH CLIFFORD, K.C.M.G., Governor of the Gold Coast.

Mr. L. COUPER.

Professor WYNDHAM R. DUNSTAN, C.M.G., F.R.S., Director of the Imperial Institute.

Mr. C. C. KNOWLES.

Sir FREDERICK LUGARD, G.C.M.G., C.B., D.S.O., Governor-General of Nigeria.

Mr. T. H. MIDDLETON, C.B., Board of Agriculture and Fisheries.

Mr. G. A. MOORE.

Sir OWEN PHILIPPS, K.C.M.G., M.P.

Mr. T. WALKDEN.

Sir W. G. WATSON, Bart.

Mr. T. WILES, M.P.

Mr. T. WORTHINGTON, Director of the Commercial Intelligence Branch, Board of Trade.

Of these members Sir Owen Philipps, Mr. Moore, and Mr. Walkden were appointed on the recommendation of the London, Liverpool, and Manchester Chambers of Commerce respectively.

The Committee much regret that the return to West Africa of Sir Frederick Lugard and Sir Hugh Clifford prevented them from being present at the later sittings of the Committee.

The first meeting of the Committee was held on the 18th of August 1915, and twenty-one meetings have been held. Oral evidence has been received from twenty-six witnesses, representing as far as possible all the interests concerned in the West African trade, and including various members of the Committee.

The Committee now have the honour to present the following report.

REPORT.

I.—SCOPE OF THE INQUIRY.

The subject of the Committee's inquiry is one which perhaps it may be difficult to make generally interesting, but at any rate it is possible to make intelligible. Outside the circle of those immediately interested, the West African trade in palm kernels is not so well known or appreciated as ought to be the case, and therefore the magnitude of the interests involved is first stated. In the next section a brief description is given of the trade and the industries related to it, together with their inter-connection. This description is very simple as contrasted with that of some industries, but, at the same time, such an account seems desirable for the purpose of conveying a comprehensive view of the subject matter with its different parts seen in their proper perspective. The state of the industry at the outbreak of war is next outlined; its international distribution, and the causes which have occasioned such a distribution. It would then seem natural to deal with direct issues as between Germany and this country, examining the advantages possessed by Germany in the past, and the extent to which they can be counterbalanced. The question, however, is complicated in two ways by considerations affecting West Africa, viz.:—(1) Is it likely that the demand for the West African produce will continue as great as, or greater than, it is at present? (2) If so, how far in competition with the United Kingdom is West Africa itself suitable or likely to be a legatee of the German industry? The sixth section describes the course of the trade since the outbreak of war, and the seventh and last portion of the report gives the conclusions and recommendations of the Committee.

It will be noted that while, by the terms of reference, the attention of the Committee was principally directed to the question of palm kernels, yet palm oil, ground nuts (*Arachis hypogaea*), shea nuts (*Butyrospermum Parkii*), benniseed (*Sesamum Indicum*), and other oil-producing nuts and seeds were also within the scope of their inquiry. The Committee have examined witnesses with reference to shea nuts and benniseed, but the condition of the trade does not appear to be such as to warrant prolonged treatment in this report. At the same time it is possible that the trade in shea nuts may become important if the difficulties can be surmounted which hitherto have stood in the way of successfully refining the fat. But in any event, no case has been made out for exceptional measures in this connection. The trade in ground-nuts is different. It is a large and important trade, of which the principal centre is in France, though considerable quantities are imported into other European countries. Its value to West Africa is about one-seventh of that of palm oil and palm kernels. It forms the mainstay of the Gambia (Q. 1518, 5365), both industrially and financially, and there is every sign of a considerable development of the production and export of ground nuts from Northern Nigeria. At the same time, it would appear that very large shipments have been made to the United Kingdom within the last year. There is every opening for a development, if crushers in this country will embrace their opportunity, and the Committee therefore do not wish to recommend that further measures should be taken. As regards palm kernels, the circumstances are entirely different. It is an immense trade, and demands exceptional interest by reason of its size. Not only so, but nearly the whole of the industry of crushing kernels was in German hands. The inquiries of the Committee, reported in the following pages, have therefore been predominantly directed to the problem of establishing in this country the trade in palm kernels and the industries which crush them, or which refine or manufacture the oil thus obtained.

II.—MAGNITUDE OF THE TRADE.

The magnitude of the export trade from West Africa of vegetable oils and oil-producing substances is proved by the fact that in 1913 its value amounted to nearly ten millions sterling. Of that trade palm oil and palm kernels accounted for over eight millions. Analysed according to the country of origin, the exports from British Possessions amounted to 7,519,000*l.*; from French Possessions (in 1912) to 2,782,000*l.*, and from the former German Possessions (in 1912) to 535,000*l.* Nor is this all. Rapid expansion is proceeding. Exports from British Possessions in West Africa have trebled in value in the last decade, and, unless unfavourable conditions, arise this expansion may continue.

Certain of the tables which illustrate the facts are so instructive that they are given here. But it is well worth noting other features which are shown by the three additional tables given in Appendix A. One main and cardinal fact, however, cannot be brought out too clearly. The trade in palm kernels amounted in 1913 to over 5,000,000*l.* sterling, or one half of the total exports from West Africa. Of this great total, over 4,250,000*l.*, or four-fifths of the whole, came from British Possessions. Yet three-quarters of it went to Germany to be milled.

TABLE I.

Exports in 1913 of the principal vegetable oils and oil-nuts from British West Africa to various markets (in thousand £).*

	To United Kingdom.		To Germany.		To France.		To Holland.		To South Africa.		To all Countries.	
	Tons.	£1,000	Tons.	£1,000	Tons.	£1,000	Tons.	£1,000	Tons.	£1,000	Tons.	£1,000
Palm kernels -	35,175	681	181,305	3,314	1,938	28	5,984	80	5,305	97	234,208	4,199
Palm oil -	74,237	1,644	10,426	242	3,203	63	—	—	981	23	88,997	1,977
Ground nuts -	10,323	80	26,559	256	42,942	389	4,440	40	—	—	86,693	797
Shea nuts -	4,781	36	2,988	24	—	—	1,637	10	14	—	9,420	70
Palm-kernel oil -	3,795	129	62	—	—	—	—	—	—	—	3,857	129
Palm-kernel cake -	—	—	5,412	31	—	—	—	—	—	—	5,412	31
† Copra -	12	—	93	2	620	14	—	—	—	—	726	16
Benniseed -	1,039	8	86	—	113	1	—	—	—	—	1,250	9
Total of above products -	129,362	2,578	226,930	3,869	48,816	495	12,061	130	6,300	120	430,563	7,228

* Gambia, Sierra Leone, Gold Coast, and Nigeria.

† It will be noted that the total imports of copra are given here, though West Africa is a very minor source of supply of copra. But the figures are worth consideration, not only because the cultivation of copra in West Africa is increasing, but because coconut oil and palm-kernel oil are very similar in character, and, indeed, for most purposes are interchangeable.

TABLE II.

FRENCH WEST AFRICA.

From "Statistiques du Commerce des Colonies Françaises pour l'année 1912."

Exports (partly estimated) in 1912 of palm kernels, palm oil, and ground-nuts from French West Africa‡ to various markets.

	To United Kingdom.		To Germany.		To France.		To Holland.		To Belgium.		To Portugal.		To all Countries.	
	Tons.	£1,000	Tons.	£1,000	Tons.	£1,000	Tons.	£1,000	Tons.	£1,000	Tons.	£1,000	Tons.	£1,000
Palm kernels	3,459	47	43,089	586	3,604	43	—	—	—	—	—	—	50,174	676
Palm oil -	4,561	101	589	13	13,227	289	—	—	151	3	—	—	18,533	407
Ground nuts	103	1	18,954	169	136,357	1,226	25,238	225	3,297	29	3,201	29	189,570	1,699

‡ Senegal, French Guinea, Upper Senegal and Niger, Ivory Coast, and Dahomey.

TABLE III.

GERMAN WEST AFRICA.

From the "Deutscher Kolonialatlas," 1914.

Production for Export in Cameroons and Togoland of Palm Kernels and Palm Oil, and Copra in Togoland.

	Palm Kernels and Palm Oil.				Copra, Togoland.	
	Cameroons.		Togoland.		Tons.	£1,000
	Tons.	£1,000	Tons.	£1,000		
1906	*	145	*	42	*	*
1907	16,479	206	5,259	68	28	0·6
1908	*	157	*	73	*	0·9
1909	*	182	*	125	*	1·7
1910	16,560	237	11,131	161	133	2·0
1911	18,261	275	17,021	259	186	3·1
1912	19,279	296	14,736	236	160	3·0

* Figures not available.

III.—DESCRIPTION OF THE TRADE AND COGNATE INDUSTRIES.

1. *The different branches of the Trade.*

It is requisite to distinguish the different phases in the commercial history of the palm kernel, as an alteration in any one of them may definitely affect the whole question. On the African coast the cones containing the fruit of the palm are gathered; the fleshy exterior or pericarp of the fruit treated for palm oil; the nuts cracked and the kernels collected and sold to the European trader. Second comes the shipment to Europe. Third, the market. Fourth, when the kernel has been sold and brought to the mill, the palm-kernel oil is obtained by crushing or extraction. Next, the crude oil is refined. This process is, of course, distinct from crushing, but for obvious reasons both are usually conducted side by side under the same management. At this point, two products, oil and feeding-cake (or meal) emerge and go through the last two stages of manufacture and distribution to the consumer. On the one hand, the oil may be made, according to circumstances, either into soap, vegetable lard, or margarine, and the feeding cake or meal is either sold in its existing form as palm-kernel cake or meal, or used as a component of one of the compound cakes now on the market.

The distinction between palm oil obtained from the pericarp and palm-kernel oil subsequently obtained from the kernel is well known to all acquainted with the subject. The former is produced exclusively in West Africa and is dealt with at a later stage. It is with palm kernels and palm-kernel oil that the following paragraphs are concerned.

2. *Two-fold nature of the Product.*

It is important to note that the product of the palm kernel is not single but two-fold, i.e., oil and feeding stuff. The oil is, of course, much the more important of the two, being worth about five times as much as the cake. But even so, where the margin of profit is cut fine as regards the principal product, the value of the secondary product may be decisive. In any case, it is not the price of one article, but the scale of prices obtained for both, that must be considered.

3. *"Crushing" and "Extraction."*

Crushing and extraction are alternative processes for obtaining the oil from the kernel when it has been ground. It is necessary to understand the difference between the two, even if only in the barest essentials, as it is possible that this difference may affect the establishment of the industry in the United Kingdom.

When crushed, the kernel, ground small, is heated, placed in a special press, and subjected to a very high pressure, which makes the oil flow out. It is important to note that the hardness of the kernel necessitates special machinery. Thus a mill that will crush kernels can also (with a slight alteration of the rollers) crush linseed or cotton seed, &c., economically, but not necessarily *vice versâ*. The resultant cake is a feeding stuff, and, as the pressure applied is very great, the cake is proportionately hard.

When the process of extraction is used, the kernel after grinding is placed in a special cylinder and mixed with a solvent, generally benzine or trichlorethylene. The solvent passes through to another receptacle, carrying the oil with it. The solvent is then recovered by distillation and the oil remains. The resultant feeding stuff is a light and fluffy meal (Q. 207, 2527, 3892-94, 5153), unsuitable for use in the open, but capable of being used for making compound cakes, or for indoor feeding in the form of meal for pigs or other animals (Q. 3982-3).

The comparative advantages of the two processes are still somewhat in doubt. The actual cost of dealing with a ton of kernels will differ in either case according to the perfection of machinery and method. But if equal care be used, the cost of handling a ton of kernels by extraction is variously estimated at from 5s. to 10s. a ton more than crushing. Next, it must be remembered that the proportion of oil obtained will differ considerably. If the oil is extracted, the proportion left in the meal may be as low as 1 per cent. In crushing, under the best results at present obtained by the latest machinery, the average percentage of oil left in the cake is seldom less than 6 per cent. (Q. 2376, 3505, 3694) and, with any but the best methods, may easily reach 10 per cent. If the extra cost of handling, therefore, is not excessive, it would thus look as if the advantage would be on the side of extraction, since a higher proportion of the more valuable product is extracted. The value of the feeding stuff is somewhat reduced, but not in a degree corresponding to the advantage in the increased volume of oil obtained. But, on the other hand, the substance of the meal obtained by extraction* presents difficulties from which cake is free, and its usefulness depends on its suitability either for use in compound cakes or the existence of sufficient objects for which it is naturally adapted, *e.g.*, the indoor feeding of pigs and other live stock. Equally or more important, however, is the character of the oil produced. Even in crushing, the heat employed may have an effect on the nature of the oil (Q. 5268, 2425), but otherwise the separation is mechanical. Extraction, however, involves the use of a solvent which may affect the oil (Q. 4140, 5189-91) in some degree, rendering it liable to retain a trace of the taste of the solvent. Any such trace may be removed by the subsequent refining, but the price of the crude oil in any case may be somewhat affected and thus offset the advantage of the larger volume produced.

Keeping in mind, however, the object before the Committee, namely, the establishment in this country of the industry previously conducted in Germany, the material points that arise are two:—

- (a) Will it be more difficult to establish a market in this country for meal obtained by extraction, than for cake, and, if so, is the difference in the price obtainable likely to be serious?
- (b) German mills are already established and are mainly, though by no means exclusively, devoted to crushing. Is the advantage, if any, possessed by the extraction process so clear and so material that by its adoption British mills now being set up, or to be set up, can get a decided advantage?

To the latter question the answer in the present state of knowledge is "No." To the former, the reply is not so simple. Apart from mechanical difficulties due to its fluffiness, there is no hindrance to the use of meal in compound cake, but this fluffiness prevents any such cake containing more than about 10 per cent. of meal and in this way its use, even for that purpose, is limited. Palm-kernel cake, at a little added cost, can be ground and similarly used. For direct use palm-kernel cake has to fight its way to an established use, just like palm-kernel meal, but the difficulties are greater with the meal than with the cake.

* In this report the term "meal" is used to indicate the meal obtained by the extraction process but it is important to remember that the cake produced by crushing is sometimes ground up and sold in the form of a meal.

4. Refining.

When an oil is to be used for edible purposes, it requires to be refined. The problems in refining are mainly chemical, and chemistry in connection with the present question is concerned alike with the preparation of oils by refining, and with the selection and use of the proper oils for manufacture into the product desired, such as margarine, or soap. As regards refining, the removal of any taint or taste and the production of a neutral and tasteless oil are of the first importance. Similarly, in manufacture, it must be remembered that, just as the composition of oils differs both generically and specifically, so does their behaviour at different temperatures or in different combinations. In each class of product certain qualities must be constantly kept in view, as, for example, saponification in soap, and taste, melting point, keeping quality, and texture in margarine. In the former case, the recovery of by-products must be remembered, a matter of no small importance when glycerine is so valuable as at present. Lastly, while all oils differ, some are much more closely allied than others (palm-kernel oil and coconut oil forming a striking instance of close similarity (Q. 5013)), and among such nearly related oils there may, within limitations, be a free choice determined by price. It is thus clear that the chemical process is of an importance equal to machinery, though with a practical difference. It is not an easy thing to keep the nature of machinery secret. But it is possible to keep a chemical process from being divulged. To judge from the information that has reached the Committee, the necessity for first-class chemical assistance is as fully realised by the leading firms in this country as in Germany (Q. 2402, 2942-44, 5009). More important still is the necessity that the whole direction of the industry should be influenced by the conclusions reached on the chemical side. In this respect it is inevitable that some works should be ahead of others, but we have no reason to think that the most advanced British firms are behind the Germans in this respect.

5. *The General Nature of Palm-kernel Cake and Meal.*

Several witnesses have given evidence before the Committee on this aspect of the subject. A number of feeding experiments have already been conducted both with palm-kernel cake and meal. Others have been suggested by the Committee and are being instituted. The main considerations in this branch of the subject will be readily appreciated. Granted that the composition of a feeding stuff is such as to bring it within the range of choice, it will, of course, be seen that quality and price are inter-dependent. The witnesses whom the Committee have had the privilege of examining gave much valuable information, but the opinions given showed considerable variation, and this variation is reflected in the reports which have reached the Committee of the experiments mentioned above.

An account of recent experiments in feeding palm-kernel cake will be found in the memorandum by Dr. Crowther printed as Appendix B. Special attention may be directed to the conclusions drawn from the experiments made on fattening cattle and on dairy cows in this country (pp. 33 and 37); also to the results of an extensive experiment on dairy cows which was conducted by a German agricultural society in 1910 (p. 37). The German experiment emphasises one most important property of palm-kernel cake, viz., its effect on the composition of milk.

Other investigations which had previously been made as to the influence of the diet of the animal on the composition of milk pointed to the conclusion that, given an adequate ration, it is not possible to influence the percentage of butter fat in milk by alterations in feeding (Q. 400-404, 5317). Slight changes in the composition of the milk may follow a change in feeding, but the percentage of fat soon returns to the normal for the particular animal. This extensive German experiment (Q. 173), however, goes to show that palm-kernel cake forms an exception among feeding stuffs, and that it definitely increases the amount of milk fat. If further experiments uphold this conclusion, palm-kernel cake will form a most important addition to the feeding stuffs now at the disposal of the dairy farmer. The increase in milk fat in the German experiment varied with different animals from 0.16 per cent. to 0.34 per cent. The significance of this result will be apparent when it is pointed out that the second figure is equal to about one-tenth of the total quantity of fat present in ordinary milk, and that under certain conditions dairy farmers may have difficulty in

securing even as much as 3·0 per cent. of fat in the mixed milk of a herd of cows. Milk which contains less than 3·0 per cent. of fat is presumed to be adulterated, and there would be a keen demand on the part of dairy farmers for any feeding stuff which was known to improve milk of poor quality; even if the increase amounted to not more than 0·1 per cent. To the maker of butter, the increase in the percentage of fat is also of special importance, for, assuming no change in the yield of milk, an increase of 0·34 per cent. of fat would mean that nine cows would produce as much butter as ten did before. Palm-kernel cake has a further special value to the dairy farmer in its effect on the texture of butter. It produces a firm butter and is thus well adapted for feeding to cows in summer.

There is less evidence as to the value of palm-kernel cake for use in fattening cattle and sheep, since the experiments hitherto made have been of a preliminary character; but enough information has been collected to prove that it is a wholesome food, quite suitable for blending with farm fodders, and it is now being extensively used by cattle feeders, especially in Scotland.

The Committee have received evidence showing that palm-kernel residue, either as cake or meal, is a very suitable food for pigs. This has an important bearing on its future as a feeding stuff in this country, since cotton cake, its chief competitor among the cheaper oil cakes, is unsuitable for pig-feeding.

The Committee have had much evidence to the effect that before the war palm-kernel cake was not appreciated by British farmers and that the small quantity manufactured in this country found its chief market in Germany. The reasons alleged were that British farmers were prejudiced, that the cake was not readily eaten by stock, and that it did not keep well. While all three allegations have some foundation, the Committee are of opinion that none of them would seriously affect the future use of the cake if the crushing trade is established in this country. The conservatism of the farmer has not hindered the development of a great trade in other oil cakes, some of which, *e.g.*, Bombay cotton cake, were regarded with disfavour when first introduced; it was only to be expected that with large supplies of cotton seed, linseed, and other cakes at his disposal, the insignificant amount of palm-kernel cake offered to him by British crushers should have attracted no attention in the past, and with well-tested feeding stuffs at his disposal he was not likely to experiment with a new food offering no advantage in price over those he already knew. Evidence has been laid before the Committee that at the outset live stock show some reluctance to take the cake. But it seems equally clear that before long they eat it readily (Q. 51). If therefore it will produce better milk or cheaper bacon than competing foods, this objection is not likely to prevent it from coming into general use. As regards keeping qualities, there has been evidence that palm-kernel cake keeps quite satisfactorily and at least as well as undecorticated cotton cake (Q. 152). Indeed, a progressive improvement as regards palm-kernel cake is already noticeable. When war was declared very few English crushers had machinery at their disposal which was well adapted for crushing palm kernels. But this was merely a temporary difficulty. Mills with suitable machinery have been and are being erected, so that a cake of satisfactory keeping quality may be anticipated. The Committee have not met with any evidence that its keeping qualities have given trouble to German farmers, with whom it is a very popular feeding stuff.

Professor Wood, of the Cambridge School of Agriculture, has submitted to the Committee the results of an investigation into the causes of rancidity in palm-kernel cake. According to these results, the tendency of palm-kernel cake to become rancid is due to the presence of a fat-splitting ferment, which under suitable conditions (warmth and moisture) is able to decompose the fat left in the cake, liberating fatty acids, which have a rancid odour.

The results show, further, that if the cake is kept cool and dry this rancidity does not occur, and also that the fat-splitting ferment becomes inactive when the cake is heated to 70° Centigrade. Apparently, therefore, all that is necessary to insure that palm-kernel cake shall not develop rancidity on keeping is to see that the heating by steam of the ground kernels (Q. 2536, 4018), which is an essential preliminary in the manufacture of cake, is efficiently carried out, as this will render the ferment inactive and so prevent any development of rancidity from this cause, even if the cake is not very carefully stored.

Two forms of palm-kernel residue are on the market, (i) cake from mills in which the oil is removed by pressure, and (ii) extracted meal from mills where solvents are

used for removing the oil from the kernel. The usual variations in the percentages of the chief constituents are :—

	Palm-kernel Cake.	Palm-kernel (extracted) Meal.
Oil - - - - -	5·5 to 7·5 %	1·75 to 2·25 %
Albuminoids - - - - -	17·0 to 19·0 %	19·0 to 20·0 %
Carbohydrates - - - - -	42·0 to 48·0 %	49·0 to 52·0 %

Typical analyses of palm-kernel residues are given in the table below,* in which the average composition of certain other feeding stuffs is given for comparison.

The commercial value of palm-kernel cake and meal depends partly on the purposes for which they are required and partly on their composition, and there is no reason to suppose that the constituents of palm-kernel cake are intrinsically of any less value than the same constituents in other cakes. Adopting this view, Dr. Crowther in his evidence placed the relative values of one ton of average samples of linseed cake, palm-kernel cake, and Egyptian cotton seed cake at 11*l.*, 7*l.* 13*s.*, and 6*l.* 12*s.*, respectively (see Dr. Crowther's précis of evidence and Q. 268). In his memorandum appended to this Report (see Appendix B.) he has further compared the values of palm-kernel cake with other oil cakes. The values have been arrived at by different methods, which are applicable to the different circumstances in which a purchaser might wish to use the feeding stuffs. Judged by these standards, it would appear that, in proportion to its value as a foodstuff, palm-kernel cake has been selling at a lower price during the past year than the more popular and well-known oil cakes.

The Committee are of opinion that agricultural colleges should be encouraged to make further experiments with both palm-kernel cake and meal. It is particularly important that the specific effect of these feeding stuffs on milk fat should be investigated, with the object of ascertaining the extent to which the composition of milk may be influenced. The effects of palm-kernel cake on fattening cattle also call for closer investigation. Two experimenters have remarked on the "bloom" of the coats of animals fed on palm-kernel cake, and the suggestion that this oil cake may have a favourable influence on the appearance of cattle comparable, for example, with the effects produced by linseed cake should be followed up. Methods of using the meal in pig-feeding, and also the best means of blending it with other foods for cattle, should be studied. Finally, the Committee think that continued attention should be given by crushers to the subject of rancidity in cake. It is clearly desirable that a feeding stuff should stand prolonged storage under the ordinary conditions met with in farm buildings; and the failure of an occasional consignment to keep fresh would much detract from the popularity of a new oil cake. They suggest that if experiments could be arranged by the Cambridge School of Agriculture in co-operation with seed-crushers, very useful information might be forthcoming.

* Average Composition of Palm-kernel Cake and other Feeding Stuffs.

Feeding Stuff.	Moisture.	Albuminoids.	Oil.	Carbo- hydrates.	Fibre.	Ash.
Palm-kernel cake - - -	12 %	17 %	6·5 %	46 %	14 %	4 %
Palm-kernel meal, E. - - -	12	19	2·0	50	11	5
Ground-nut cake, D. - - -	9	47	8·0	25	6	6
Ground-nut cake, U. - - -	10	30	8·5	23	23	6
Ground-nut meal, E., D. - - -	11	49	1·5	24	8	4
Ground-nut meal, E., U. - - -	11	35	1·5	26	23	5
Coconut cake - - - - -	10	21	9·5	41	12	5
Linseed cake - - - - -	11	33	8·5	32	9	6
Cottonseed cake, D. - - -	9	41	9·0	26	8	6
Cottonseed cake, U. - - -	12	20	6·0	33	22	6
Bran (medium) - - - - -	14	15	4·5	53	10	4
Dried distillery grains - - -	8	24	10·5	42	14	2
Maize, River Plate - - - - -	14	10	5·0	69	1	1

E. = Extracted.

D. = Decorticated.

U. = Undecorticated.

6. *Use of Palm-kernel Oil for Soap and Margarine.*

At first, palm-kernel oil was used exclusively for non-edible purposes, of which the principal was soap-making. For such objects it is admirably suited by its high saponification value and other qualities. After 1900 came the extension of the margarine trade. Suitability for edible purposes admits of a higher price being paid than for ordinary non-edible objects, and therefore, at the present time, palm-kernel oil is not so much used as formerly in the manufacture of soaps, though it is still of value because of its lathering qualities.

The future of the kernel trade in this country is intimately connected with the security of the position occupied by the oil. For this reason it is necessary to deal, in general terms, with the composition of margarine.

Although the idea of using animal and vegetable fats on a large scale as substitutes for butter is said to have originated in France early in the nineteenth century, the industry was actually started in Holland about forty years ago, and the use of the name "margarine" was legalised in this country by Act of Parliament, in 1887.

Many improvements in the manufacture have been introduced, especially in the substitution of vegetable for animal fats (Q. 4920-23) and in the addition of certain ferments to the milk which cause the resulting product to approximate more closely in flavour to butter.

At present, palm-kernel oil and coconut oil are largely employed in the manufacture of margarine, and other substances commonly used are "Premier Jus" and oleo (bullocks' fat) and lard (pigs' fat). To these may be added a certain admixture of oils fluid at ordinary temperatures, such as cotton-seed oil and ground-nut oil, according as chemical opinion advised their addition for attaining certain ends. These ends may be briefly summarised as (a) taste, (b) proper melting point, (c) keeping quality, (d) texture.

7. *Possible Competitors with Palm-kernel Oil.*

(a) So far as present conditions indicate, there is not much likelihood of the supply of animal fats from either cattle, sheep, or pigs becoming sufficiently abundant for the price to fall seriously and affect that of palm-kernel oil. Indeed, so far as such fats are concerned, the indications are all the other way. The consumption of fats is steadily and largely increasing, while the world supplies of live stock are likely to fall below, rather than to exceed, the demand.

(b) As regards coconut oil and palm-kernel oil the position is different. Both these oils are similar in composition and properties, and for practical purposes are interchangeable.

Effective competition by one oil of a suitable quality with another does not, of course, necessarily mean that the other will not continue to be used *at a price*, and it is only if the price fell below that of profitable production that the oil would go out of use altogether. As regards coconut oil and palm-kernel oil, the ruling price is affected by both, but predominantly by coconut oil in so far as the present world's supply of the former is double that of the latter. The production of both is increasing, and it would be rash to say which has the greater possibilities. But only if the cost of one or the other is suddenly reduced to a quite different level is it likely to affect the general position, and the Committee do not anticipate that this will take place on a sufficient scale to change the whole nature of the situation within the next decade.

(c) Competition from palm oil produced by improved methods is another possibility, and one of which there is distinct likelihood. The question is dealt with in detail in a later section. So far, however, as the importation of kernels is concerned, an extended use of palm oil obviously implies a supply of kernels. The present difference in price between the two may be altered, but obviously the amount of kernels available is not likely to be diminished as it might be by other competition.

(d) A more detrimental competition is likely to be furnished by some of the oils naturally liquid at ordinary temperatures (Q. 2481-83, 4801-6). The treatment of oils with hydrogen has been introduced with the effect of converting into solid fats those oils which are now liquid at ordinary temperatures, and of raising the

melting point of solid fats. Thus "hardened" cotton-seed oil is already largely used for making "compound lard"—which indeed in some cases contains no lard, properly so-called, at all. In so far, therefore, as any distinctive taste can be removed by refining, or other difficulties overcome, cotton-seed oil, linseed oil, soya bean oil, and even whale oil, may soon become largely used in the manufacture of margarine. Indeed, it is probably the case that whale oil has already been so used on the continent of Europe. It should also be remembered that the immense quantities of linseed and cotton-seed available make such competition formidable, despite their comparatively low percentage of oil.

(c) Lastly, it is possible that new varieties of nuts from other parts of the world may be placed on the market. In Central and South America, the cohune and babassu nuts have lately been engaging attention (Q. 1337-39, 2469-71), and the Committee have been informed that other varieties of oil-producing nuts may become available. At present, owing to the shortage of labour in the countries of its origin, there are difficulties in collecting an adequate supply of the cohune nut, and in the case of both nuts the thick shell requires special machinery for cracking.

Taking the question as a whole, the data do not exist for forming any estimate on which a confident prediction can be based. An increasing use of hydrogenated oils, however, seems certain, and is, indeed, already beginning. Palm oil so improved in quality as to be edible is a distinct possibility, but is not likely to be available in large quantities for some years. The cheaper production of copra is also a possibility. On the other hand, the world's consumption of edible fats is rapidly increasing and is far from satisfied. Moreover, even if oils at present absorbed in non-edible products are made available for edible uses, the demand for the non-edible products is also very great. Hence, in the absence of some new source of supply hitherto entirely unknown or at least untapped, the result may well be that the prices of edible and non-edible products will approximate. But the approximation may take effect partly through a rise in the price of the latter and not wholly through a fall in the price of the former.

The general conclusion of the Committee, therefore, is, that the future for palm-kernel oil appears sufficiently secure to warrant any reasonable efforts to establish the trade in palm kernels in this country.

III.—POSITION OF THE TRADE AT THE OUTBREAK OF WAR.

1. *Import Statistics.*

A glance at the figures given on pages 5 and 6 will reveal the principal features of the situation. The total European import of palm kernels was about 300,000 tons, of palm oil some 200,000 tons, and of ground nuts 670,000 tons. Of palm kernels, three-quarters were crushed in Germany and only a small proportion in the United Kingdom. Of palm oil, the United Kingdom took three-quarters, and the remainder was divided between France and Germany in almost equal proportions. Of ground nuts, France took three-quarters and Germany and the Netherlands nearly all the remainder, Germany taking nearly 100,000 tons and the Netherlands two-thirds of that amount. The European imports of copra amounted to rather under 600,000 tons, and were more evenly distributed, Germany coming first with a third of the whole, and France next with one-fifth.

Of the existing supply of both palm kernels and palm oil, five-sixths come from British Possessions in West Africa, and predominantly from Southern Nigeria.

2. *Shipping.*

Before the war practically the whole of the shipments from British and German possessions in West Africa were carried by two groups of steamship companies, one British and one German (see précis prefixed to Sir O. Philipps's evidence and Q. 6068-73). The British group was under the management of Elder Dempster and Company, Limited, and included the African Steamship Company, the British and African Steam Navigation Company, Limited, and the Elder Line, Limited. The German group consisted of the Woermann Line, the Hamburg-America Line,

and the Hamburg-Bremen-Africa Line. Other lines had occasionally intervened in the trade, but not to any great or lasting extent. Between the two groups mentioned an arrangement had been made by which equal rates were charged and equal rebates given, and this arrangement was still in existence at the outbreak of war. Goods were shipped by the steamers of both groups to Hamburg, Rotterdam, and Continental ports generally, but the United Kingdom was served by the British lines exclusively.

3. *Hamburg as a Market.*

Hamburg was the only great centre for kernels before the war (Q. 2091, 2557, 3593). As contrasted with Liverpool, a buyer for Hamburg could be sure in the season of going into the market and obtaining a price. For Liverpool delivery he could not, and the influence of such a situation on trade is obvious. As part cause and part effect of the foregoing, Hamburg was also the great distributing centre, the vast bulk of the season's produce of kernels being consigned to Hamburg, whether by British, French, or German merchants. There they might be forwarded on transit options to Bremen, Flensburg, or other out-ports (Q. 3780). Or they might be put on lighter or barge, or possibly rail, for conveyance to the mills.

4. *Milling before the War.*

Just as Hamburg was the general centre for distribution, so Germany was the principal milling country, and while some nuts and seeds were forwarded to the interior of Germany or to Austria, the great centres of the milling industry are at places such as Harburg, not far from Hamburg, and Emmerich, near the Dutch frontier, which possessed facilities for water-carriage to and from the mill.

5. *Margarine.*

In contrast to the milling trade, the greatest trade in margarine is probably centred in Holland. As has been already stated, the margarine industry was first started in Holland about the year 1870. The tariff imposed on margarine imported into Germany has caused the erection of works in that country to supply the home market, and the same course has been followed by most other Continental nations. But the industry in Holland is on an immense scale and supplies the greater part of the export trade as well as the home market. The United Kingdom is the greatest purchaser. In 1913, the importations of margarine amounted to 1,518,297 cwts., of a value of 3,917,701*l.*, and of these totals 1,483,417 cwts., worth 3,810,409*l.*, came from the Netherlands.

6. *Reasons for the Condition of the Trade in 1914.*

(a) *Origin.*—Seeing that the great bulk of the produce comes from British possessions, it may seem very remarkable that, from the outset, the trade should have been with the Continent, notwithstanding that the general milling industry in the United Kingdom was as highly developed as in any country. One factor in producing this result has probably been the influence of the German firm of Messrs. Gaiser & Company (Q. 1677, 1693, 1741). This company was one of the oldest of those engaged in the West African trade. Its principal branch in West Africa was at Lagos, a great centre for kernels, and at one time the company not only acted as importer but also conducted a crushing business in Germany. It has also been the fact that, while the value of oil-cakes for feeding purposes was recognised both in Germany and the United Kingdom, that of palm-kernel cake has been particularly appreciated in Germany.

Even when an industry has taken root in a particular place, it may be transferred to another seat from one of the two following causes. As the trade develops it may become more widely distributed owing to influences natural or artificial, such as cost of carriage, or a tariff. Again, the natural advantages of another centre may be recognised as so distinctly superior as to cause a transference. But, in the absence of such influences, it frequently happens that the growth and development of a

trade tend to gather round the original centre even though it may not have possessed any overwhelming advantages in comparison with similar places. As with the jute trade of Dundee, or the toy trade of Nuremberg, so with the palm-kernel industry in the neighbourhood of Hamburg. Once thus established, the *vis inertiae*, or, more strictly, the *vis momenti*, of such a trade is difficult to overcome, especially when, as in the present instance, it possesses, not a single, but a two-fold product, each part of which has cut its own trade channels and established its own market.

(b) *Secret Freight-Rebates and other Facilities*.—It has already been stated that the British and German shipping companies charged similar freights and gave similar rebates. Suggestions have been made to the Committee that, in addition to the published rebates, the Woormann line secretly gave extra facilities to merchants shipping to Germany by their steamers (Q. 1408, 1829-31, 2195, 2774-77, 2842, 3543). Though, however, the statement has often been made as a matter of belief, no proof has in fact been forthcoming (Q. 3544, 5899), but, even if secret facilities have not been directly given, this does not negative the possibility of a stimulus to importations to Germany being indirectly applied. In fact, the habitual practice of some of the great German banks, possibly not unconnected with the German Government, both in financing traders and in influencing the course of trade, makes such a supposition quite possible and, indeed, probable.

In another respect, however, the existence of a large trade in Hamburg gives that port a considerable advantage, owing to the greater proportion of kernels that can be shipped there in bulk. A number of witnesses gave evidence on this point, and the advantage of shipping in bulk, including the saving in bags, is estimated at from 3s. to 5s. per ton.

(c) *The Question of Outports*.—Transshipment or transit to an outport may in a question like the present be a matter of considerable importance. Thus, in the United Kingdom, although the primary centre of the West African trade is at Liverpool, it may be that other ports present special advantages. Liverpool is a dear port for this purpose. Again, inland carriage by rail is expensive for an article like cake, the value of which is low in proportion to its weight, and this fact, *ceteris paribus*, makes proximity to an agricultural hinterland an advantage. Not only so, but the local influence of mills and milling companies in a matter like this is very considerable. Therefore, in contemplating the establishment of the industry in the United Kingdom, Liverpool must not only or preponderantly be considered, but such important centres of crushing as Hull, or such ports as London, Bristol, or Leith (Q. 2570, 2707, 3775). The opinion was not infrequently expressed by witnesses that the system of transit options was much more favourable to the miller in the German than in the British outport (Q. 3777), and it is true that, on shipments to Hamburg, options to Bremen or Rotterdam were granted free, but, apart from these two cases (which in the circumstances are quite natural), the Committee do not find that there was any difference in the charges made. It is not, however, the rate of charge that is alone of importance. There is also the feasibility of utilising the option as a matter of regular business, and it is probably in this difference between British and German outports that a real advantage lay with the German miller.

(d) *Port Charges and Delivery Costs*.—Evidence has also been submitted on the question of port charges. The comparative cheapness of Hamburg as contrasted with Liverpool has, in our opinion, been clearly established by the figures furnished to us. According to the calculations of one witness, the difference between Hamburg and Liverpool, exclusive of delivery costs, amounted to 2s. 7d. per ton in favour of Hamburg, and we think this figure approximately represents the facts as they existed at the outbreak of war. It must be remembered, however, that the figure above-named applies to kernels landed on the quay in Liverpool as compared with the general practice of discharge into lighters in Hamburg.

It is important in this connection to consider what are the charges made at other British ports where the crushing of palm kernels has been, or might be, carried on. As a result of inquiries made on this subject, we have compiled the following tables showing the approximate pre-war charges and costs of delivery at certain British ports (A) for mills alongside water, and (B) for mills not alongside water. As Liverpool was the only port where palm kernels were handled prior to the war, the charges quoted for the other ports are those applicable to oil seeds

in general, but they may be taken as approximately correct for palm kernels in original bags :—

(A) *Comparison of Approximate Port Charges and Costs of Delivery to Mills alongside Water. (On pre-War basis.)*

	Port Dues on Palm Kernels.	Overside Charges to Craft.	Lighterage to Mills.	Total.
	s. d.	s. d.	s. d.	s. d.
London - - - - -	0 4	1 4	1 9	3 5
Liverpool - - - - -	No mills alongside water at Liverpool.			
Manchester - - - - -	3 3	0 9	0 6	4 6
Hull - - - - -	Nil	0 11	1 1	2 0
Sharpness - - - - -	1 0	0 9	1 4	3 1
Bristol - - - - -	0 8	1 3	Nil	1 11
Leith - - - - -	No mills alongside water at Leith.			
Glasgow - - - - -	1 3½	1 2	2 6	4 11½
Ipswich - - - - -	0 3	0 9	1 3	2 3

(B) *Comparison of Approximate Port Charges and Costs of Delivery to Mills not alongside Water. (On pre-War basis.)*

	Port Dues on Palm Kernels.	Landing Charges to Quay.	Haulage to Mills.	Total.
	s. d.	s. d.	s. d.	s. d.
London - - - - -	All mills alongside water in London.			
Liverpool - - - - -	1 1½	2 9	1 8	5 6½
Manchester - - - - -	3 3	1 0	0 6	4 9
Hull - - - - -	Nil	2 6	2 0	4 6
Sharpness - - - - -	All mills alongside water at Sharpness.			
Bristol - - - - -	0 8	1 6	0 6	2 8
Leith - - - - -	0 6	1 4	0 3*	2 1
Glasgow - - - - -	1 3½	1 10½	1 9	4 11
Ipswich - - - - -	0 7½	0 7½	1 6	2 9

* Rate for existing mills—rail rate for new mills would depend on site.

It may be true that this table does not tell the whole of the story. Part of the greater cost in some ports may be due to heavier working costs or greater expense in the equipment of the port, but in part, no doubt, expenses that are met in one port from charges on merchandise may in another be defrayed out of general revenues. Such revenues have to be raised somehow, and they are, therefore, a burden on industry indirectly, if not directly borne. The Committee did not feel justified in the time at their disposal in inquiring further into this point, and in general they do not think that the extra cheapness of some ports, as compared with others, can be seriously denied.

(e) *The Value of a constant Market.*—The advantage of having a continuous free market will be readily apparent and has been already mentioned. Merchants hitherto have been unwilling to consign palm kernels to Liverpool unless the goods are sold to arrive (Q. 2357-65). It is not easy to put a money value on the drawback which the absence of a constant market represents, but it is none the less real.

(f) *Inland Carriage.*—Inland waterways confer a great advantage on the continental industry, as the lighter into which the kernels are discharged can proceed straight to Harburg or Emmerich and there deliver direct into the mill. The whole charge in the case of Harburg did not amount to more than one mark per ton. There is, however, no reason why this fact should continue to constitute an advantage in favour of Germany, as conveyance by lighter in the United Kingdom is not more costly than in Germany under similar conditions, and the establishment of river-side or dock-side mills in the principal British ports is perfectly practicable.

(g) *Cost of Milling and Refining.*—The Committee have examined the principal points involved in connection with milling and oil-refining. Special machinery plays an important part in this connection, and at the outbreak of war it is probable that the amount of milling machinery in this country which was as efficient for dealing with kernels as that of the best German mills was small (Q. 1296, 2721, 3502-6, 3694). In oil-refining there was little difference between the most modern mills in the two countries. In respect of working costs there does not appear to be much difference. In the opinion of those who have reliable sources of information, the labour cost in Germany was as great as here. The burden of taxation differs, of course, in different localities, but a statement furnished to the Committee with reference to a typical factory indicates that it is at least as heavy in Germany as in Great Britain.

(h) *Carriage from the Mill to the Margarine Factory.*—Hitherto the British market for margarine has been supplied partly by home production, but predominantly from Holland. As regards the question of the comparative cost of transport, the Committee have been informed that the freight on oil from the Continent to works in this country was approximately 30s. per ton (Q. 1494, 4816), including expenses in re-coopering when casks are used, or, in the case of drums, the cost of return carriage. On the Continent, on the other hand, the oil is taken by water in a tank barge direct from the refinery to the margarine factory, and the cost would not, at most, exceed 5s. per ton. The extra cost of the subsequent carriage of margarine from Holland to this country over that of the distribution here of British-made margarine must be remembered, but it does not fully offset the previously mentioned disadvantage.

(j) *Duties.*—An important element in the location of the trade has been the question of duties, which has already been briefly mentioned. A table of the principal duties in force in different European countries on oils and margarine is given in Appendix C.

(k) *General Considerations affecting the Continental Trade.*—A general idea will have been gathered from the foregoing of the trade in Germany and Holland so far as it affects this country; but no idea can be adequate without some appreciation of the general control of the industry. The bulk of it is in the hands of two large companies first established in Holland, but in which, in one case at least, important British shareholding interests are concerned (Q. 4800). When import duties were imposed in Germany on edible oils and on margarine, the two companies in question erected factories in Germany, and are believed to control about 70-75 per cent. of the internal margarine trade in that country as well as to possess large interests in some of the principal milling companies. It should be added that the same companies have powerful interests in some of the largest retail organisations in the United Kingdom (Q. 4821), and the importance of these facts, in relation to the problem before the Committee, cannot be ignored.

(l) *Feeding Stuffs.*—The trade in palm-kernel cake and meal had been thoroughly established in Germany for some years before the outbreak of the war. While its value for general purposes is high, its adaptation for special uses, e.g., feeding of milch cattle, made it particularly favoured in Germany. In other words, it commanded an "affektionspreis" (Q. 250) and would sell for slightly more than is warranted by an estimate of its value based on its composition, just as may be the case with linseed cake in this country. The same was true of meal, and, despite its poorness in oil, it has gradually approximated in Germany to cake in price (Q. 91), and, indeed, has been known to surpass it.

7. Outlook for British Trade before the Outbreak of War.

The foregoing paragraphs show how considerable were the difficulties that militated against any attempt to utilise palm kernels extensively in this country up to the summer of 1914. They were the more serious since the average margin of profit, whether to the importer or the crusher, in the trade was not large (Q. 1305-6, 2681-2, 3734). The clearest view, however, would be obtained if the inquirer were to endeavour to place himself in the position of the chairman of a British milling company, and consider whether he would have been justified in risking the shareholders' money in a venture into the palm-kernel trade. He would have to face the possibility that, with the mill in existence and standing charges running, he might find himself unable to obtain kernels on the best competitive terms at a given moment, while no such

apprehension need be entertained by his German competitor. But, given that kernels were obtainable, it is as likely as not that they would come to Liverpool in bags, and an additional cost be thereby entailed, while to this must be added the extra sum payable in port dues and charges in Liverpool as compared with Hamburg. Suppose, however, that the British mill was in some outport. In that case, though transit options to given ports might indeed be identical *viâ* Hamburg or *viâ* Liverpool, yet this fact would be cold comfort, as the British miller might very probably wish to crush in Hull, to which the transit option was 6s. 3d., whereas his German competitor would either be in Bremen, for which no further charge would be made, or in Harburg, in which case the carriage would cost only a mark or a little more. Such would be the difficulties in the way of getting raw material. They would be no less in disposing of the products. For the oil the British miller might, indeed, till quite recent times look for a sale to one or two large British companies, but, apart from small consumers, he would find that his market lay with quite a few firms which possessed alternative sources of supply. In the matter of cake, his difficulty would be different though as considerable. A fair chance might exist that the manufacturer of compound cakes would buy it as an ingredient, at a price. There would be little hope of a direct sale to farmers, who were not familiar with it, and were not prepared to pay a price which would compete with that which it fetched in Germany.

The difficulties enumerated in the foregoing paragraph are formidable and yet, on examination, it will be seen that none of them is due to any natural disability in the British position. They are simply the result of an industry having developed along certain lines and in certain places. Trade channels once dug tend to deepen, unless some special circumstances arise, whether of design or not, to arrest the flow in the old direction or to give a special impetus along a new course. Once a market is created in the United Kingdom, the security of supplies should be as great as in Germany. If kernels were carried there in bulk, they can be carried here in bulk. Port and other dues may be high in Liverpool, but they may be decreased through handling by elevators and by lighterage, or the cargoes can come to other British ports where the charges before they reach the mill should be no higher than they were in Germany. What is true of the raw material is also true of the products. Palm-kernel cake has been unfamiliar to our farmers, and the farmer is said to be a conservative person. But there are indications that if he has good reason to believe that there is value in a new article he will give it a trial, and what has happened with Bombay cotton cake and soya bean cake may quite well happen too with palm-kernel cake or meal. If the difficulty of the cake is surmounted, the crux of the situation seems to be in the market for the oil. It is too valuable to be largely used for other than edible purposes, and in 1914 the margarine industry in this country was not great enough to absorb a large supply, while an export to Holland was unlikely in competition with protected oil carried by canal from Germany. Such was the state of affairs when the war supervened. There was a bar to this industry in the United Kingdom, which was due, not to natural disadvantages, but to a *vis inertiae* which was a result of circumstance, and which a special stimulus could overcome.

V.—WEST AFRICA.

1. *Points of interest excluded from this Report.*

The Committee have heard a number of witnesses who have had long experience, official or commercial, of West African conditions, and much interesting information was placed before the Committee. The following were among the subjects discussed :—

- (a) Methods of trading, both as regards collection and exchange.
- (b) Produce inspection.
- (c) The desirability of a system of grading kernels.
- (d) The practicability of elevators at the ports, and the conditions under which they could successfully be erected and worked.

Consideration was given to these and kindred questions, since it was felt that such enquiry might reveal facts affecting the judgment of the Committee on the subject of their investigation. In so far, however, as the enquiries made did not reveal any data having direct bearing on that subject, they are not further discussed in this

report. The Committee feel, at the same time, that even in such cases their investigation into these points has not been wasted, since the questions, even if not material to the present issue, are still of great importance to West Africa and to West African trade generally.

The Committee are of the same opinion with regard to the questions which naturally interest merchants in connection with shipping. As with other points of importance affecting the trade, some latitude was allowed to enquiries connected with freights. It became apparent, however, that the conditions investigated applied equally to imports to Germany as to the United Kingdom. Bearing in mind, therefore, that their enquiry is directed to the establishment in the United Kingdom of industries dependent on palm kernels and other oil seeds, the Committee do not consider that it is their duty to deal with questions of rebates, or of the advantages or disadvantages of a liner service, as contrasted with the use of tramp steamers.

2. Nature of the Oil Palm.

The nature of the oil palm and its oil-producing properties has a very direct bearing on the enquiry. Two very important questions depend upon it—the possible increase in the supply alike of palm oil as of palm kernels, and the production of palm oil of better quality for export in quantity.

It is not necessary to give here an elaborate description of the oil palm. It is sufficient to say that the fruits are attached to the core of a conical-shaped cluster or fruithead about the size of a football, from which they are easily detached when fully ripe or verging on over-ripe. Some witnesses expressed the view that the oil-palm itself should not really be treated as a wild tree (Smart, Trevor) but rather as one suitable for cultivation in an orchard or plantation, and stated that the yield of fruit per acre will vary from half a ton to three or even four tons (Q. 3026), according to the state of cultivation. Except, however, in one or two special localities, it cannot be said that the palm receives proper cultivation at present. But if the yield per acre of fruit varies largely, so does the yield of oil from given fruits. In some of the varieties the shell of the nut is thin, and the yield of kernels small, but the amount of palm oil in the pericarp is unusually high. The facts are recorded in the following table, which is taken from the report of the Imperial Institute ("Bulletin of the Imperial Institute," 1909, pp. 357-394).

Nigerian Palm Fruits.

Variety.	Palm Oil in Fruits as received at the Imperial Institute.	Kernels in Fruits as received at the Imperial Institute.	Approximate Thickness of Nut Shells.
	Per Cent.	Per Cent.	Inches.
Ope-pankora Western Province	19	19	0·10
Udin Central Province	16	13	0·20
Ak-por-ro-jub or Ok-po-ruk-pu Eastern Province	26	Moist, 11·0 Dry, 10·5	0·15
Ivioronmila Central Province	17	15	Nuts from small fruit, 0·05; large fruit, 0·20.
A-sog-e-jub or Au-su-ku Eastern Province	48	Moist, 9·0 Dry, 7·0	0·06
Ogiedi Central Province	35	8	0·07* 0·15†
Af-fia-ko-jub or O-ju-ku Eastern Province	38	Moist, 11·5 Dry, 7·8	0·08

* Small sample of broken shells received from S. Nigeria. † Shells of nuts extracted from fruits received from S. Nigeria.

The percentage of palm oil in the fruits is seen to vary from 16 to 48, and of kernels in the fruits from 7 to 19. The percentage of oil in the kernels (dried at 100° C.) is fairly constant, ranging between 51 and 57, and the yield of kernel oil will therefore depend on the percentage of kernels in the fruit, which is shown to be subject to great variation. The differences exhibited in the table are immense, and their importance can hardly be over-estimated. They affect the entire question of the future production of palm oil and palm kernels in West Africa. An improvement,

therefore, at once in the yield and quality of fruit, may reduce the area necessary to a fraction of what might otherwise be required. But a reduction in area may lead also to a reduction in the distance over which fruit must be transported to the mill, and, as will be seen from a later section, such a reduction may perhaps determine the practicability of local manufacture of palm oil by better methods than at present.

In these circumstances, it is important to know whether the trees yielding the better class of fruit are distinct and stable varieties that will breed true. On this point Mr. Farquhar* refers to results obtained in planting the seeds of the Lissombe variety in the Cameroons, in which about fifty per cent. came true to type, and expresses the opinion that by careful cultivation and selection the useful characteristics of this variety could be made more permanent. But the evidence on the point is not conclusive. The question is so important that the Committee are of opinion that the investigations previously conducted in West Africa with the co-operation of the Imperial Institute should be systematically continued and extended, and that the experimental plantations established by the Government should be further developed with this end in view.

3. *Proportion of the Crop at present gathered.*

The increase of future supplies is also directly affected by the proportion of the crop which is at present left ungathered, but which could be utilised. What this proportion is has only been vaguely estimated. On the evidence obtainable, therefore, the Committee do not feel justified in adopting any precise figure, though in any case it is considerable.

4. *Milling in West Africa: Advantages and Drawbacks.*

Evidence (Knowles, Smart, Trevor) has been placed before the Committee as to the advantage or otherwise of establishing mills in West Africa. It is said that the rate of wages paid for unskilled labour would be lower than in Europe, while the fruit would be near at hand, and the opinion was expressed by one witness that it would be possible to treat the pericarp as well as the kernels in the same mill. Further consideration, however, makes the difficulties appear more formidable, and this is in accordance with the actual experience of those who have attempted to work mills on the Coast. In the first place, although the charge for labour *per capita* may be low, yet there is a difficulty in getting and retaining a native staff for continuous work, and the cost of supervision by white foremen is high. Fuel, again, is said to present difficulties, although the development of the coal deposits in Southern Nigeria may remove these. Nor does carriage show a saving, but rather the reverse. In the absence of a local market for cake, the whole product must be carried to Europe, and it would be cheaper to carry the kernels in their original form than to convey the oil and the cake separately. Not only so, but for economical working a minimum quantity of kernels is required, and if there is local competition by merchants buying for the Home market, it may be difficult to secure this.

5. *The Local Manufacture of Palm Oil.*

The drawbacks just mentioned apply to the manipulation of palm kernels. But, in any final judgment, the question of palm oil is at least equally important. If palm oil of high quality could be produced, its texture and other qualities will probably make it at least as valuable for margarine as coconut or palm-kernel oil.

Through defects in the native methods of production, the amount of free fatty acids in palm oil has been as high as eighty per cent. and has seldom fallen below fifteen per cent., though for their own edible purposes a better quality is produced by the natives. If palm oil could be produced containing not more than six per cent. of free fatty acids, it would be available for edible purposes and might prove a serious competitor with palm-kernel oil. It has now been shown that it is possible to produce palm oil containing as little as six per cent. of free fatty acids (Q. 5428), though it has not hitherto been done on a large scale. But to attain this object it is essential to treat the fruit when absolutely fresh, before rancidity develops. The commercial success of the preparation of edible palm oil, therefore, depends on getting a

* The Oil Palm (1913), pp. 8-10.

continuous supply for treatment in a fresh condition. If for this purpose the fruit has to be brought to a central factory, facilities of carriage both as regards speed and cost are all-important. Clearly then, the less the area over which collection has to be made, the more economical is the working. In reducing the size of the area needed, also, the quality and the quantity of fruit, the nature of the collecting rights, and control of the labour supply, are all factors of importance. Similar considerations would make plantations of some shapes better than others, so as to economise head-carriage and yet not have a greater length of tramway than is necessary. Moreover, discussion of acreage, control of labour and the rest, pre-supposes ownership of the land discussed. It will be remembered, however, that in British Colonies and Protectorates in West Africa there is no such thing as vacant land (Q. 5553) which is in the bestowal of the Crown. The whole question of the tenure of land in British West Africa is under the consideration of another Committee. While, therefore, the Committee considered it within the scope of their inquiry to ascertain, as far as present information goes, the conditions under which local manufacture would succeed, they did not feel at liberty to inquire into questions of tenure of land, concession laws, and the like, which are the direct subject of investigation by another Committee, and only incidental to the present inquiry. A new factor in the situation will arise if any of the smaller machines now in the experimental stage prove commercially practicable by which it is hoped that natives will be able to make palm oil of good quality.

In the present state of knowledge, any forecast that can be formed must necessarily be tentative in character. It seems probable that good edible palm oil will be manufactured in West Africa in increasing quantities. On the other hand, it is not likely that palm kernels will be crushed in West Africa on a scale sufficiently large to affect European milling seriously, at any rate within the next few years.

VI.—THE TRADE DURING THE WAR.

In the foregoing sections the Committee have dealt with the historical and descriptive parts of their subject, and have endeavoured to give at least an outline of the position of the trade in palm kernels from West Africa up to the time of the outbreak of war in the autumn of 1914. Before passing to their conclusions and recommendations as to what must, in their opinion, be done in the future in order to ensure the permanent retention of this industry in Great Britain, it is necessary to state briefly what practical measures have already been taken, and what has actually been accomplished during the war, in the direction of establishing the industry in this country.

The initiation of this movement was undertaken, in the first place, by the West African Sections of the Chambers of Commerce of London, Liverpool, and Manchester, whose members naturally realised at once the serious results to be apprehended from the closing of the principal market for the produce of the West African Colonies. The problem before them was to find a fresh outlet for the crops of palm kernels and other nuts and seeds already awaiting shipment, and a new market for the produce which would be coming forward during the war period. Efforts were directed to create widespread interest in the whole subject throughout the country, and, in particular, representations were made to the millers and crushers, the margarine manufacturers, and agriculturists.

As a result, several of the largest crushing concerns—more especially those in the neighbourhood of Hull—took the matter up from a practical standpoint, and commenced to import palm kernels and to crush them for the first time in their mills, adapting their existing machinery for the purpose. This adaptation did not give the best results in practice, and new plant has been ordered to deal with palm kernels by the most up-to-date methods. Very considerable quantities, however, have been, and are still being, dealt with by the existing machinery.

To meet the new demand for the delivery of palm kernels to Hull, the shipping interests concerned arranged to deliver kernels at Hull at the same ocean rate of freight as to Liverpool (Sir O. Philipps' précis, § 6 (b)), by themselves defraying the cost of on-carriage from Liverpool to Hull, so as to encourage the commencement of the new industry. Since the beginning of 1915 they afforded direct facilities from West Africa to Hull. During the year 15 steamers arrived at Hull direct from the West African coast, and these vessels discharged at that port 42,549 tons of palm

kernels, valued at 681,408*l.* In addition, three steamers brought kernels to London in 1915, the quantity discharged being 8,729 tons, valued at 146,245*l.*

These figures indicate the extent to which palm kernels are now being handled in Hull and the surrounding district, although prior to the war no palm kernels were delivered to this port and none had been crushed in that neighbourhood.

As regards Liverpool, 178,060 tons were discharged in 1915, compared with 73,187 tons in 1914, and 36,012 tons in 1913. The figures for the total imports of palm kernels into the United Kingdom were :—

1913	-	-	-	-	-	-	-	36,012 tons.
1914	-	-	-	-	-	-	-	74,797 „
1915	-	-	-	-	-	-	-	233,249 „

At the same time, satisfactory as these figures are in themselves as indicative of the progress which is being made in taking up the industry in this country, allowance must be made for the fact, brought to the notice of the Committee in the course of their inquiry, that considerable quantities of kernels delivered at British ports during the war have either been stored on account of companies operating in neutral countries or have been re-shipped to neutral ports.

With regard to the disposal of the oil and cake resulting from the increase in the quantity of palm kernels imported and crushed in this country, very satisfactory progress has also been made. The palm-kernel oil, instead of going to the soap-makers, as the British-crushed product formerly did, has been in keen demand by the margarine manufacturers, to replace the oil they formerly imported from the Continent. Moreover, owing to the high price of butter, and perhaps also to its improved quality and more attractive character, the popularity of margarine is rapidly increasing, and the public demand is growing. This is a fortunate circumstance in connection with the crushing of palm kernels in this country, and in itself is encouraging the erection of new factories, which will absorb an increasing quantity of edible oil.

As regards the disposal of the cake, it was anticipated that this would present the greatest difficulty in connection with the establishment of the industry in the United Kingdom. In the autumn of 1914 the interest and support of the agricultural authorities throughout the country were enlisted, and experimental tests were carried out at 14 or 15 different centres. The result of these tests was more satisfactory than could have been anticipated. By this means, and by the assistance of the press, the Board of Agriculture, and the Imperial Institute, the attention of farmers was drawn to what was to them a new feeding material. In this respect also the industry has been singularly assisted by the fact that there has been a great increase in the cost of the other foodstuffs commonly used by farmers, and thus a specially favourable opportunity was given to palm-kernel cake and meal. As a result, there has been no difficulty in disposing of all the cake and meal produced, and this feeding material has thus been widely introduced to farmers.

By the spring of 1915 a stage had been reached at which those concerned considered that individual effort had done all that was possible in the circumstances, and it was felt that the movement would be greatly reinforced and strengthened if the Government were to take it up. As a result of resolutions of the Chambers of Commerce of London, Liverpool, and Manchester, the Secretary of State for the Colonies appointed this Committee to inquire into the whole subject and to report as to the measures necessary for the permanent establishment of the industry in Great Britain. Since the appointment of the Committee steady progress has been and is being made, and the evidence which they have received has shown that large quantities of kernels are being crushed here and the products satisfactorily disposed of to British manufacturers and farmers.

VII.—CONCLUSIONS AND RECOMMENDATIONS.

For reasons already explained, the Committee have concentrated their chief attention upon the trade in palm kernels. Two points were known to them from the beginning: firstly, the magnitude and value of the trade; and secondly, the fact that, with the exception of the small fraction which came to the United Kingdom, all exported kernels during the last thirty years went to Germany. In other words, the question at issue is between Germany and the United Kingdom.

As a result of their investigations, the Committee have satisfied themselves on some further points. Ample capacity can be provided in the United Kingdom for crushing the whole of the kernel crop. Mills with the most modern machinery and equal to any in Germany have been erected and are in process of erection. As with machinery, so in the matter of chemical methods, the most modern British mills are not behind their German competitors. As regards the product, all the oil produced should soon find a ready sale, and, even if this country could not absorb it all, there would be a good export market. As with the oil, so with the cake. Once established, there is no reason to doubt that it would keep a permanent place in the list of British feeding stuffs.

But while this is so, the Committee are still convinced, from the evidence before them, that the bulk of the trade will revert to Germany in the absence of specific measures to the contrary. On this point the Committee are quite clear. The trade will not have become sufficiently rooted in this country by the end of the war to overcome successfully the competition which it will then have to meet. The question before the Committee, therefore, is to decide what specific measure or measures can be suggested to establish and retain the industries in this country, having due regard to the interests alike of the native in West Africa and the consumer in the United Kingdom.

The need for such measures is reinforced by more general considerations, and it is well to mention these explicitly. The question is one between this country and Germany. For many years before the war, German traders in British Colonies in West Africa, as throughout the rest of the world, have enjoyed—and abused—British hospitality. Just as German trade has been fostered by the German Government, so German traders have in their turn been the political instruments of that Government. When the war is over, they may be expected to return and carry on trade, as before, if they are allowed to do so. Already discussion is taking place in Germany as to the reorganisation, when peace returns, of her commerce and industry “in anticipation of a fresh war.”² Unless and until, therefore, there is a decisive change in the national policy of Germany it is to be hoped that never again will the opportunity for such commercial preparation be given to that country, so far as the Dominions and Colonies under the British Crown are concerned. Australia has already broken the hold of the German over the base metal industry. It can, and should, be broken also in West Africa in the case of the trade which has been the subject of investigation by the Committee.

Three methods of attaining this object have been suggested. The first is by a Government grant to the industries concerned in the United Kingdom. This expedient they consider to be out of the question under present conditions.

The Committee next considered the imposition of an import duty on margarine and edible oils. On this point they do not make any recommendations. At the conclusion of hostilities the whole question of the trade relations of the United Kingdom may need consideration in the light of the new condition of affairs created by the war. They are of opinion, therefore, that the consideration of import duties in this connection can be left until the whole question can be treated in its entirety.

The case is different as regards an export duty on palm kernels on leaving the country of origin, and the Committee recommend the imposition at an early date in the several West African Colonies of an export duty of not less than 2*l.* per ton on all palm kernels exported from British West Africa, the duty to continue during the war and for five years afterwards, and to be remitted on all kernels shipped to and crushed in any part of the British Empire. If a duty of 2*l.* per ton be found insufficient to divert the trade to this country, the amount should be raised until the duty is adequate to effect its purpose, and this determination should be made clear from the outset.

The foregoing proposal involves, let it be noted, no new departure in general principle. A similar differential charge has been imposed for some years in the Federated Malay States on exported tin ore, and it is understood that the same step as regards tin ore is contemplated in Nigeria.

In the case of palm kernels the Committee are alive to the objections that may be raised. The natural tendency of any restriction of the market for a commodity is to depress the price of that commodity, and it has been suggested that the imposition of an export duty, with the consequent loss of the German market, may

* “Cologne Gazette,” November 1915.

thus depress the price paid for kernels to the native or prevent the increase that might otherwise occur. As against the loss of the German market, however, must be set the great expansion of the British home market which is taking place as well as the increasing demand for edible oils throughout the world, factors which *per se* operate against any tendency to lower prices for palm kernels resulting from the limitation of the market. In any event the Committee are of opinion that whatever risk there is in this matter is worth taking for the proposed term of years in view of the objects to be attained. Sir Frederick Lugard has expressed the same opinion to the Committee, and sees no objection to the duty proposed. If, as the Committee believe, the effective demand for palm-kernels in the United Kingdom will be equal to the supply, competition among importers, in the absence of a ring or trust, will keep up prices, and the native will suffer no hardship.

It has been represented, however, that the existence of an export duty may create a tendency to combinations among merchants or among crushers in this country. If such a ring among crushers should be formed, the obvious answer would be to repeal the duty, but it may at least be said with confidence that no such combination has hitherto existed (Q. 1334). An agreement between merchants in the West African trade presents a different problem. But is a durable combination at all a likely contingency? The trade is such that if profits are excessive outsiders will come in and buy (Q. 4061). Past experience points to the same conclusion. Pools have been known before the war (Q. 811, 1285, 1670), but they have never lasted long, and complaint has more generally been made of the "insanity" of the competition (Q. 876, 1467). The Committee agree with Sir Frederick Lugard in believing that, while the risk may exist, it is not very serious. Subject, therefore, to the right of the Colonial Governments concerned to reduce the duty or abolish it altogether, if advantage is being taken of it to depress the prices paid to the native producer, the risk is worth taking in view of the object to be attained and of the advantages enjoyed by the native under British administration.

The Committee do not apprehend that there would be any serious difficulty in carrying out their recommendation. Action by the Revenue Departments in this country would not be necessary. As regards the West African Colonies, the number of ports is large, but the Governments possess competent Customs Departments, and the present staff ought to be able to cope with the extra work involved, without any new machinery being necessary. It should also be possible, in the case of kernels crushed in the United Kingdom, to obviate the inconvenience to traders which would occur if the duty is first paid and then refunded. This could be effected by the merchant, on exportation, giving a bond to the satisfaction of the Colonial Government, for the payment of the export duty. The bond would then be cancelled on the production, within a fixed period, of a certificate from a seed crusher to the effect that the kernels had been delivered to him for crushing in the United Kingdom.

In estimating the amount of the duty proposed, the Committee have had regard to the products of the kernel and the prices which they commanded in Germany prior to the war. One ton of kernels will produce approximately half a ton of oil and half a ton of cake. For a considerable period before the war the half-ton of oil would have fetched at least 10s. more (Q. 2198, 2205, 2325, 2413) in the German home market than in this country, and the half-ton of cake 10s. to 15s. more (Q. 250, 3833) than here. A ton of kernels, therefore, is convertible into products which, taken together, were worth at least 1l. to 1l. 5s. more in Germany than in the United Kingdom. The conclusions thus reached agree with the opinions submitted to the Committee in evidence, and for these reasons they suggest that an export duty of 2l. per ton be placed on kernels in the first instance. It must be remembered that there is an appreciable danger of State aid on a lavish scale being used in Germany to retain such an industry as palm kernel crushing, and the British Colonies concerned must be prepared to adopt a resolute policy if they are to avert the danger of the trade returning to its pre-war channel. The Committee, therefore, have suggested a tax of 2l. per ton as a tentative measure. If it proves inadequate it should be raised.

The object to be kept in view, however, is not merely to bring the trade to the United Kingdom. It must be retained in British hands. Accordingly, although the imposition of an export duty for a year or two would give a temporary advantage to the British seed-crusher, yet it would not afford a reasonably secure prospect which would justify the installation of powerful modern plant specially adapted to deal with kernels. The Committee consider, therefore, that the suggested export

B 4

duty, once imposed, should remain in force for the period of the war and for five years after. At the end of this period the position could be again reviewed and a decision reached as to the advisability of continuing the export duty.

It will have been realised that the Committee attach great importance to the provision of a market for palm-kernel cake in this country. They recognise the difficulty of establishing a new food-stuff, but they think it probable that, if judiciously brought to the notice of agriculturists, the cake will before long acquire a place for itself among the feeding stuffs in general use. Much excellent work has already been done in this direction both by the Board of Agriculture and by Agricultural Colleges throughout the country, and the Committee recommend that the efforts to extend the knowledge and use of palm-kernel cake amongst farmers should be continued.

The Committee have already expressed their belief in the capacity of the market for oil in the United Kingdom. This capacity, however, will chiefly depend on the expansion of the British manufacture of margarine. Palm-kernel oil will always be used to a limited extent in the manufacture of certain soaps, but its principal use will without question be for edible purposes and predominantly for making margarine. The consumption of margarine in this country is rapidly increasing, and the Committee believe that British industry will be benefited if it be made legal to add the words "British made" to the word "margarine" on the statutory wrapper. For this purpose a slight amendment will be required in the Food and Drugs Act, and the Committee recommend that the Act should be amended accordingly.

There is one more recommendation which the Committee wish to propose. Looking to the future, they desire to place on record the fact that they are impressed with the desirability of extending not only the British demand for, but also the production of, palm kernels. Evidence has been adduced to show that there are several varieties of the oil palm, which differ considerably in the amount of palm oil which they contain, in the proportion of the kernel to the whole fruit, and in the thickness of the shell. They consider it advisable that the Agricultural and Forestry Departments of the West African Colonies should take measures for the careful investigation of the properties of the several varieties of oil palm in each Colony, and of the best methods of cultivation of the species which are considered most suitable for economic purposes, *i.e.*, for the production of palm oil and of palm kernels. These measures should be taken in co-operation, on the scientific and technical side, with the Imperial Institute, by which admirable work has been done in the past in connection with the oil palm, and to which much of the existing knowledge of the palm and its economic products is due (see précis of Dr. Henry's evidence).

One of the members of the Committee, while concurring in this Report, desires to put forward a further suggestion which, in his opinion, would help to divert the trade in palm kernels from Germany to the United Kingdom. Mr. Moore's views, which must not be taken as representing those of the Committee, are stated in his memorandum printed as an Appendix.

In conclusion, the Committee wish to express their sincere appreciation of the services rendered to them by Mr. J. E. W. Flood as Secretary.

A. STEEL-MAITLAND,
G. V. FIDDES,
LESLIE COUPER,
WYNDHAM R. DUNSTAN, ²
C. C. KNOWLES,
T. H. MIDDLETON,
G. A. MOORE,
OWEN PHILIPPS,
T. WALKDEN,
W. G. WATSON,
T. WORTHINGTON.

J. E. W. FLOOD,
Secretary.
5th May 1916.

REPORT BY MR. T. WILES, M.P.

It is impossible for me to sign the Majority Report, as I am unable to agree with the recommendation of an export duty of 2*l.* per ton on palm kernels exported from British West Africa, such duty to be remitted on all kernels shipped to and crushed in any part of the British Empire. While admitting that it may be necessary for Great Britain to alter her present fiscal policy in a drastic manner in the near future owing to the War, the evidence placed before the Committee is not convincing that such proposal will have the desired effect. It would appear to me wiser if the whole question of the rearrangement of tariffs and duties within the British Empire were postponed until the conclusion of the War. They could then be considered as a whole, in consultation with our self-governing Dominions and Colonies, and perhaps to our mutual advantage with the Allies who are now fighting with us. It is known that in France there is a committee of experts now deliberating on oil seeds, so that to deal with the matter piece-meal in this fashion opens up a long vista of difficulties.

No evidence was placed before the Committee showing that similar duties have been imposed in other Colonies. The Secretary of State for the Colonies stated in the House of Commons, on February 22nd last, that "No export duties on the exportation of ore from the Straits Settlements are imposed," but he went on to say, "Royalties on tin and tin-ore and other ores are imposed in the Federated Malay States." Therefore, I consider it an absolutely new departure which should not be taken without the full knowledge and sanction of Parliament.

The following points, shortly summarised, appear to me good reasons for not recommending the proposed export duty :—

- (a) The depression of prices which is likely to follow the elimination of foreign competition in the buying of kernels must be greatly to the disadvantage of the native producer. Also, as the trade in purchasing kernels is in the hands of comparatively few firms, it follows that there would be considerable temptation for buyers to confer together and arrange prices.
- (b) Evidence was given that British crushers and extractors were contracting for machinery and plant to deal with palm kernels before the War, showing that they had faith in their power to compete with the German manufacturer even without receiving any tariff assistance. To place the British crushers in a position of having 2*l.* per ton duty in their favour (probably at the expense of the native producer) would doubtless cause general dissatisfaction amongst the unprotected British manufacturers, and might create friction with our French Allies, who are such important consumers of edible oil. There would also be danger of commercial reprisals from friendly neutral countries, who before the War received large quantities of kernels through German ports.
- (c) There appears nothing to prevent mills on the West African Coast which are now closed from being reopened, or new factories being erected there; these would be in a position partially to prepare the kernels or manufacture oil and feeding cakes and to export them to Germany or other foreign countries, thus avoiding the incidence of the duty on kernels altogether.
- (d) Before the War one British and one German line of steamers served West African ports, both charging nominally the same rates of freight. With the elimination of foreign purchasers of kernels it appears likely that the British line would obtain a monopoly, and consequently charge higher freights; and as the "primage" system is in vogue, competition from tramp steamers would be almost impossible.

The Majority Report states that if merchants or crushers combine to take advantage of the duty, the "Colonial Government shall have the right to review it from time to time;" but, should the abuse arise, it will be a very difficult matter to decide whether it is the merchant or the crusher or the shipowner who is to blame. Should the duty be abolished or reduced, the position of the British crusher, whose trade it is intended to foster, and who had been induced to make large capital outlay based on the imposition of the duty, would be very seriously jeopardised.

Pending the consideration by Parliament of the whole fiscal system of the British Empire at the conclusion of the War, I suggest the following recommendations should at once be put into force :—

- (1) Greater attention should be given to the cultivation of the oil-palm, more care devoted to the manner in which the fruit is gathered, and further substantial financial assistance provided for this purpose by strengthening and increasing the Agricultural and Forestry Departments of the West African Colonies.
- (2) The native should be supplied with better means of cracking the kernels and obtaining oil. Steps should also be taken to organise native industry by co-operation.
- (3) Maximum rates of freight between West African ports and British ports, as well as port dues and dock charges, should be fixed by the Board of Trade on application from merchants, shippers, or manufacturers. Export business to West Africa has been largely in the hands of Germany, thus finding constant return freight on her steamers; this seems a favourable time for British enterprise to capture it, provided adequate shipping facilities are obtainable. Improved methods for handling kernels should be established by the provision of elevators in the larger West African and British ports.
- (4) Legislation should be set in motion to amend the Food and Drugs Act, thus allowing "British made" to appear on the statutory wrapper in which margarine is sold.
- (5) A Standing Committee should be formed, consisting of both scientific and commercial experts, who will assist in the development of the industry in all its branches, and also watch the flow of trade.
- (6) If the above recommendations should be found inadequate to attract the trade to Great Britain, a Government grant might be considered on the same principle as that made to British Dyes, Limited.

5th May 1916.

THOMAS WILES.

Appendix A.

TABLE IV.

Exports in Years shown of Group of Products detailed in Table I. from British West Africa to various Markets
(Values in thousand £).

	To United Kingdom.		To Germany.		To France.		To Holland.		To South Africa.		To all Countries.	
	Tons.	1,000l.	Tons.	1,000l.	Tons.	1,000l.	Tons.	1,000l.	Tons.	1,000l.	Tons.	1,000l.
1895	90,219	960	84,118	657	29,581	266	410	3	—	—	206,844	1,900
1900	76,741	809	97,142	1,018	44,488	396	2,312	14	—	—	226,063	2,261
1905	87,164	1,046	128,271	1,301	29,927	206	4,414	34	—	—	250,260	2,597
1910	108,925	2,200	207,093	3,110	55,867	403	10,930	113	—	—	383,004	5,825
1911	123,123	2,242	204,229	3,097	45,349	441	10,226	112	219	3	383,532	5,903
1912	129,310	2,267	206,580	3,232	54,377	453	24,079	253	6,039	107	425,481	6,352
1913	129,362	2,578	226,930	3,869	48,816	495	12,061	130	6,300	120	430,563	7,228

TABLE V.

Exports in Years shown of the principal Vegetable Oils and Oil Seeds from British West Africa to all Countries
(Values in thousand £).

	Palm Kernels.		Palm Oil.		Ground Nuts.		Shea Nuts.		Copra.		Benniseed.		Total of foregoing.	
	Tons.	1,000l.	Tons.	1,000l.	Tons.	1,000l.	Tons.	1,000l.	Tons.	1,000l.	Tons.	1,000l.	Tons.	1,000l.
1895	119,744	866	76,774	974	2,905	56	—	—	—	—	421	4	206,844	1,900
1900	120,973	1,104	68,438	927	35,805	222	—	—	368	3	481	5	226,063	2,261
1905	146,984	1,440	64,086	965	37,399	176	1,356	12	351	3	84	1	250,260	2,597
1910	230,678	3,353	87,610	1,965	59,451	405	4,462	85	755	13	48	3	383,004	5,825
1911	237,527	3,465	88,794	1,898	49,110	465	6,358	64	780	13	963	8	383,532	5,903
1912	255,480	3,866	86,849	1,837	68,403	536	7,706	73	620	14	884	6	419,441	6,352
1913	234,208	4,199	88,997	1,977	86,693	797	9,420	70	726	16	1,250	11	430,563*	7,228*

* Including palm-kernel oil and palm-kernel cake.

TABLE VI.

Exports in 1913 of the principal Vegetable Oils and Oil Seeds from the various British West African Territories
(Values in thousand £).

	From Gambia.		From Sierra Leone.		From Gold Coast.		From Nigeria.		From British West Africa.	
	Tons.	1,000l.	Tons.	1,000l.	Tons.	1,000l.	Tons.	1,000l.	Tons.	1,000l.
Palm kernels - - -	545	9	49,201	921	9,744	159	174,718	3,110	234,208	4,199
Palm oil - - -	—	—	2,468	57	3,440	66	83,089	1,854	88,997	1,977
Ground nuts - - -	67,404	622	—	—	1	—	19,288	175	86,693	797
Palm-kernel oil - - -	—	—	—	—	—	—	3,857	129	3,857	129
Palm-kernel cake - - -	—	—	—	—	—	—	5,412	31	5,412	31
Shea nuts - - -	—	—	—	—	—	—	9,420	70	9,420	70
Copra - - -	—	—	—	—	629	14	97	2	726	16
Benniseed - - -	—	—	36	—	—	—	1,214	9	1,250	9
	67,949	631	51,705	978	13,814	239	297,095	5,380	430,563	7,228

Appendix B.

MEMORANDUM ON THE RESULTS OF FEEDING EXPERIMENTS WITH PALM-KERNEL CAKE, COCONUT CAKE, AND GROUND-NUT CAKE.

By CHARLES CROWTHER, M.A., Ph.D., Professor of Agricultural Chemistry and Director of the Institute for Research in Animal Nutrition in the University of Leeds.

PART I.—*Preliminary Memorandum on the Criteria of Reliability in Feeding Experiments and the Interpretation of Results.*

Before the results of a feeding experiment can be accepted as conclusive with respect to the specific issue that the experiment was designed to test, it is necessary first to enquire how closely certain criteria of reliability have been satisfied in the planning of the experiment and what degree of variability has been displayed in the records of the individual animals.

In experiments such as those dealt with in Part II., consisting of comparisons of the effects upon live-weight or milk production of various foods of similar general character, the essential points to be considered in an analysis of the results are the following:—

- (1) The extent to which variable factors other than the one whose effect is to be measured have been eliminated in the plan and conduct of the experiment.
- (2) The number, kind, and condition of animals employed.
- (3) The nature and amount of each feeding-stuff included in the ration, with special reference to the nature and nutritive value of the "basal ration" to which the foodstuffs under comparison have been added.
- (4) The duration of the experiment.
- (5) The "probable error" of the final average for each group of animals, this being a measure of the degree of closeness with which the records of the individual animals within the group conform to the average.

The significance of each of these factors is briefly as follows:—

Adequacy of Plan of Experiment.

1. The ideal experiment is obviously one in which the only variable factor is the one under test. This ideal is unattainable in food comparisons with animals, mainly owing to the disturbing complex of inherent or acquired differences between different animals, even of the same breed, which may be collectively referred to as "individuality." This factor is dealt with more fully in the following paragraph. Other possible variable factors such as housing, equality of basal ration for each group, hours of feeding, &c., are more closely under the control of the experimenter, whilst others, such as illness or fluctuations of appetite of individual animals, are more difficult to foresee and prevent. In experiments on milk-production, a further uncontrollable variable factor is introduced by the natural shrinkage in milk-flow and change in composition of the milk with advance of lactation, quite apart from any variations in food supply. Variable factors such as these cannot be entirely eliminated, but their influence upon the final result can be greatly minimised, and it is a necessary preliminary, therefore, in considering the results of any particular experiment, to examine how closely variable factors, other than the one to whose influence the results obtained are ostensibly due, have been eliminated.

Number, kind and condition of Animals.

2. No two animals are exactly alike. Even were two exactly alike, say in live-weight, at one particular moment, this is no guarantee that they will be alike at

a later period, even if subjected to identical feeding and general treatment throughout the interval.

According to statistical investigations made at Cambridge and elsewhere, it is an even chance that at the later period they would show a difference in live-weight of about 14 per cent. in the case of cattle, or 10–12 per cent. in the case of pigs.

Expressed in different fashion, if for a feeding test two animals (bullocks) of equal weight be selected, the one receiving ration "A" and the other ration "B," it must be borne in mind at the end of the test that any difference in live-weight of the order of 14 per cent. of the average live-weight may just as legitimately be attributed to differences of "individuality" as to the difference in feeding and the experiment must thus be regarded as inconclusive. The greater the difference recorded above 14 per cent. the greater become the odds in favour of the difference in live-weight increase being actually attributable to the difference of feeding, but they do not reach the practical certainty represented by odds of, say, 30 to 1 until the recorded difference in live-weight amounts to about 50 per cent. In other words, if we take the odds mentioned as our standard of the desired degree of certainty in experimental work, assuming that we have only two animals at our disposal, we can only safely compare the merits of two foods if the one is some 50 per cent. superior to the other. We could compare foods of widely different character, say straw and oil-cake, but we could not detect with certainty the differences between different foods of the same class.

The reliability of the experiment can be increased either by repetition or by increasing the number of animals used, or by a combination of the two expedients. According to Professor Wood, in order to measure with certainty a 10 per cent. difference between the fattening effects of two rations supplied to cattle, each group ought to comprise at least 29 animals. This is usually an inconveniently large number, and in practice the desired precision is more conveniently obtained by repeating the trial several times with smaller numbers. Single trials with four or five animals in each group cannot be depended upon to give a reliable measure of differences in feeding value of less than about 25 per cent.

The "condition" of the animals at the outset of the experiment may be a factor of importance affecting the result of the feeding, since an animal in lean condition will offer more scope for nutritive effects than one in moderately fat condition. Such differences will usually be eliminated as far as possible by careful selection of the animals at the outset of the experiment. Similar considerations apply also to the stage of lactation and of pregnancy of cows used in tests of the effects of foods upon milk production.

3. The nutritive effect of a given ration cannot be ascribed to any particular feeding-stuff included in the ration, but must be regarded as due to the ration as a whole. This effect is determined by—

- (a) the amount of digestible protein (or albuminoid) included in the ration;
- (b) the total digestible matter supplied;
- (c) the ease with which the ration is masticated and digested;
- (d) certain factors only definable with difficulty, such as palatability or possible specific stimulant effects of certain ingredients of the ration.

The supply of digestible protein is fundamentally important since by it alone can certain requirements of the animal be met. Until the requisite minimum amount of protein has been included in the ration, this ingredient remains the "limiting factor" determining the success of the feeding, but this special importance of the protein rapidly diminishes once the supply has been brought above the necessary minimum. In the case of fattening adult animals there is evidence that the value of protein given in excess of the minimum requirements is barely equal to that of carbohydrates. This fact may have an important bearing upon the outcome of a feeding experiment, where the two foods compared differ greatly in protein-content (e.g., palm-kernel cake and decorticated cotton cake). If the "basal ration"—the part of the ration which is the same for each group of animals—be particularly poor in protein the chances are that the results of the experiment will favour the cake that is richer in protein. On the other hand, if the shortage of protein to be made good by the added cake is relatively small, the results of the tests will be determined more by the relative feeding merits of the oil and carbohydrates—or possibly other less prominent ingredients—of the two cakes.

In considering the results of a feeding trial it is thus obviously necessary to scrutinise closely the protein supply. It is also necessary to examine how nearly the total food supply is adapted to the needs of the animal. Generally speaking, the heavier the "basal ration" the less will be the effect of any addition of food, whatever its character. The fact that two foods when added to the same ration produce the same effect does not necessarily mean that they have the same general nutritive value, unless it is clear that the "basal ration" by itself is insufficient to develop fully the capabilities of the animals.

It will rarely happen in experimental work that the "basal ration" is so heavy as to exclude the possibility of further feeding effects by increase of food supply, but it is not infrequently the case that the margin available for results is small. The relative merits of different foods will be brought out most clearly when the "basal ration" is relatively scanty. Similarly the amount of added food must be sufficiently large to ensure a measurable effect under the conditions of the experiment.

In the foregoing the view is implied that the feeding value of a ration is determined by its content of digestible protein, oil, and carbohydrates. This is not strictly correct, since further account must be taken of other factors, for example, of the relative ease or difficulty with which the food is masticated and passed through the alimentary canal. Nutritive matters that are incorporated with tough fibrous material produce less effect than if fed apart from the fibre, since in the former case an appreciable amount of the food is used up to supply the energy required for the passage of the fibrous material through the body. In considering food values, therefore, it is obviously necessary to take into account the fibre-content of the foods where this is a significant quantity, say 10 per cent. or upwards.

Lastly, under this heading it is necessary to draw attention to certain other factors, as yet not fully explored, which may possibly exercise a determinative influence upon the results of a feeding trial. One such factor is the known inadequacy of the proteins of certain food materials (e.g., maize) to meet fully the demands of the animal for protein. A further possibility is the absence from the food of certain ingredients known to be essential, though only in very small amounts, for certain nutritive purposes. So far as "concentrative foods" are concerned, either of these factors is only likely to be operative in practice in cases where the diet consists of only one foodstuff, which itself is only a portion of a natural product (e.g., white flour). Such a case might occasionally be met with in pig-feeding, but would be rare even with pigs, and would never happen in the case of cattle or sheep. The greater the number of different foodstuffs included in the ration the less are complications due to these causes likely to arise.

In experiments with growing animals or milking animals it is also sometimes necessary to examine the supply of lime and phosphoric acid in the rations owing to the relatively large amounts of these materials used up in bone-formation and milk-production respectively.

Duration of Experiment.

4. The duration of the experiment is an important factor for much the same reasons as necessitate the use of relatively large numbers of animals. If daily records are kept it is found that fluctuations occur from day to day which cannot be attributed to differences in feeding. The experimental period must hence be made sufficiently long to ensure that the averages for the period are not seriously affected by these adventitious fluctuations. It is difficult to fix precise limits, but in fattening experiments the period of comparison should probably be not less than six weeks, whilst in experiments on milk-production a period of three weeks will usually suffice.

"Probable Error" of Result.

5. In all experiments the final results should always be accompanied by a statement of the probable degree of reliability which attaches to them. This can be approximately gauged by mathematical computation from the records of the individual animals in each group, and is usually expressed in the form of "probable error." Thus, in a fattening experiment it might be found that Ration A. had given a live-weight increase of .15 lb. per animal per day greater than Ration B. Before we can accept this result as significant we must have some assurance that the adventitious fluctuations due to factors other than the difference of feeding might not have produced a difference similar to that observed. It is this purpose that is served by the estimate of "probable error." Supposing the "probable error" of the above-mentioned difference (.15 lb.) were found to be $\pm .25$ lb., this would indicate an *even chance* that if the experiment were repeated on the same lines, the result would fall somewhere between .10 lb. against Ration A. and .40 lb. in favour of Ration A.—in other words, that the experiment by itself is quite inconclusive as to the relative merits of the two Rations A. and B. If, however, the "probable error" were found to be $\pm .07$ lb. it can be shown that this would imply that the chances were about 5 to 1 against the result being due to normal variations, i.e., factors other than the difference in feeding—a much more conclusive result, but still not representing a very high degree of certainty. It is only when the "probable error" falls below about one-third of the result that we secure the high degree of certainty represented by odds of 20 to 1 or 30 to 1 against the result being due to errors of experiment. In other words, if the "probable error" of our hypothetical experiment prove to be but $\pm .04$ lb., we may feel reasonably safe in concluding that the indicated difference of .15 lb. represents a real superiority of Ration A. over Ration B.

Briefly summarised, the essential points to be reviewed in considering the results of feeding experiments may be re-stated as follows:—

- (1) The general soundness of plan of the experiment.
- (2) The number of animals used, and the degree of uniformity in kind and condition at the outset.
- (3) The duration of the separate periods of the experiment.
- (4) The nature and amount of the "basal ration," and of the total ration, with special reference to protein-content, total food supply, and general suitability for the purpose of the experiment.
- (5) The records of the individual animals, with special reference to their bearing upon the reliability of the final results.

PART II.—Experiments with Palm-Kernel Cake.

(a) Experiments with Fattening Cattle.

Experimental Centre.	Foods used for Comparison.	Number of Animals in each Lot.	Duration of Comparison.
Norfolk Agricultural Station.	Linseed cake	10	Weeks 8
Cambridge (Howe Hill Farm).	" "	17 and 18.	8
Aberdeen University	" "	10	12
" "	Decorticated cotton cake.	9 and 10.	12
West of Scotland College, Glasgow.	" "	4	14
" "	Bran	4	14
University College, Aberystwyth.	Undecorticated cotton cake.	4	9
East of Scotland College, Edinburgh.	Undecorticated cotton cake (Bombay).	8	16
" "	Dried distillery grains.	8	16

Comparisons with Linseed Cake.

(1) Norfolk Experiment (Winter 1914-15).

Description.

This experiment consisted of a comparison of equal weights (3-3½ lbs.) of linseed cake and palm-kernel cake respectively, when fed along with a basal ration (per animal per day) of 90 lbs. swedes, 7 lbs. hay and straw chaff, and 3 to 3½ lbs. undecorticated cotton cake.

The average gain in weight per animal for the eight weeks was as follows:—

	Lbs.
Linseed cake group - - -	125 ± 12
Palm-kernel cake group - - -	123 ± 6·4
Difference in favour of linseed cake	2 ± 13·6

The difference in favour of the linseed cake is so much smaller than the probable error of the experiment that it cannot be regarded as significant, and hence the conclusion is drawn that, as nearly as they could be measured in this experiment, the two rations had the same feeding value. It is reported that the animals fed on palm-kernel cake "made slightly more per cwt. live-weight than those fed on linseed cake, for the reason that they looked better in their coats and butchers bid very freely for them."

Commentary.

The initial evenness of the two groups of animals was apparently determined by selection, without any preliminary period in which both lots were fed alike and periodically weighed. The lower probable error of the average for the palm-kernel cake group indicates that the individual records of the animals in this group agreed more closely than in the linseed cake group. The records show that the individual gains in the latter group ranged from 66 lbs. to 233 lbs., whilst in the palm-kernel cake group the range was from 77 lbs. to 173 lbs. It is impossible to say, however, whether this difference operated in favour of, or against, the linseed cake. The probable error (± 13·6 lbs.) of the difference (2 lbs.) in average live-weight increase of the two groups implies an even chance that if the experiment were repeated the result would fall between the limits of 11·6 lbs. (or 9 per cent.) in favour of palm-kernel cake, and 15·6 lbs. (or 12½ per cent.) in favour of the linseed cake. A substantial margin of uncertainty is thus still left for further experiments to elucidate.

Assuming average composition for each food used, I estimate that the average daily food supply per

animal would have roughly the appended composition:—

	Digestible Protein.	Digestible Oil.	Digestible Carbohydrates and Fibre.
Linseed cake group -	Lt. s. 1½	Lb. ¾	Lbs. 11½
Palm-kernel cake group.	1½	¾	12½

The supply of digestible protein, even to the linseed-cake group, is appreciably lower than commonly-used feeding "standards" suggest as desirable for animals such as were used in this experiment, but the satisfactory rate of growth of the animals (2½ lbs. per day) is a sufficient indication that the rations used were adequate. Doubtless any deficiencies in the supply of true protein were well covered by the non-protein nitrogenous matters in the liberal allowance of swedes included in the rations.

The amount of oil in the palm-kernel cake ration is just about the amount which I have previously indicated to the Committee as the limit beyond which no special advantage is to be expected from increasing the oil supply, as distinguished from the supply of carbohydrates.

From the foregoing data for the composition of the two rations, and using the method devised by Kellner, I estimate that theoretically the two rations should have practically the same fattening effect, viz., an effect equivalent to that of 12·5 lbs. of starch. Thus, the result of this experiment, though perhaps surprising to the practical man, is quite in harmony with the indications of present day methods of assessing food values.

(2) Cambridge Experiment (Howe Hill Farm; Winter 1914-15).

Description.

In this experiment, 2 lbs. of linseed cake per animal per day were compared with 2 lbs. of palm-kernel cake, each being fed with the same basal ration, viz., 100 lbs. (approx.) "roots," 10 lbs. straw chaff, and 2 lbs. of cotton-seed cake. The linseed cake group comprised 18 animals and the palm-kernel cake group 17 animals.

In eight weeks the former gave an average increase in live-weight of 9·2 stones per head, and the latter 7·9 stones. A difference of 1·3 stones, or roughly 18 lbs. per head in favour of the linseed cake, is thus indicated. In other words, the linseed cake result is about 15 per cent. better than that achieved with the palm-kernel cake.

Commentary.

In the absence of data as to the gains in live-weight made by each individual animal it is impossible to estimate the "probable error" of the result. In a private communication, however, Professor Wood states that "the bullocks were a very miscellaneous lot of all colours, breeds, and sizes, and the probable error was very high indeed." With regard to the figures, he says, "I do not place any sort of reliance on their accuracy. I think the only lesson to be learned from the experiment is that palm-nut cake is a healthy food, which produces no ill effects on fattening cattle."

In face of this expression of opinion it is almost superfluous to discuss the experiment. Taking the figures as they stand, however, it may be pointed out that the average gain of the palm-kernel cake group, amounting to 7·9 stones per head in eight weeks, or slightly under 2 lbs. per day, is only moderate, and may be indicative of a slight shortage of digestible protein in the ration of this group. Assuming average composition for the foodstuffs used, the supply of digestible protein to this group would be about 1 lb. per head per day, whilst the linseed cake group would receive about ½ lb. more. The element of uncertainty involved in the lack of precise knowledge as to the value as "protein substitute" of the non-protein nitrogenous

ingredients of the swedes (amounting probably to fully 1 lb. of these substances in 100 lbs. swedes) makes it impossible to assert definitely that there was an actual shortage of protein, but the supplies of protein are so much below commonly advocated standards as to justify the suggestion that this may have been the cause of the inferiority of the palm-kernel ration.

(3) *Aberdeen Experiment (Winter 1914-15).*

Description.

In this experiment equal weights of palm-kernel and linseed cakes were compared with groups of 10 animals, each group being made up of four bullocks and six heifers. Cut swedes and straw were fed to each group in equal amounts, which, however, are not clearly

defined in the report. The heifers got about 12 lbs. less turnips per head per day than the bullocks. The concentrated foods were given as follows:—

*Period I. (4 weeks).—*Bullocks, 5 lbs., and heifers 4 lbs. per head per day of a mixture of 3 parts of cake to 2 parts of locust bean meal.

*Period II. (4 weeks).—*Bullocks 8 lbs., and heifers 7 lbs. per head per day of a mixture of 5 of cake to 3 of locust bean meal.

*Period III. (4 weeks).—*Bullocks 9 lbs. and heifers 8 lbs. per head of a mixture of 5 of cake, 2 of locust meal, and 2 of oats.

The increases in live-weight for each individual for each period of the experiment are given in the report issued by Professor Hendrick. The average gains per animal for each group are as follows:—

	Period I. (4 weeks).	Period II. (4 weeks).	Period III. (4 weeks).	Whole Experiment. (12 weeks).
	Lbs.	Lbs.	Lbs.	Lbs.
Linseed cake group	58.5	45.9	50.5	154.9 ± 4.9
Palm-kernel cake group	56.2	60.3	48.0	164.5 ± 7.6
Difference in favour of linseed cake	2.3	-14.4	2.5	-9.6 ± 9.0

It will be noticed that a slight difference in favour of linseed cake is indicated in Periods I. and III., but a marked difference in favour of palm-kernel cake in Period II. This last-named phenomenon is accounted for largely by two animals in this group, which during Period II. showed abnormally large gains. Apart from these two animals the gains in Period II. were relatively low in each group, and it is suggested in the report that this was due to the very poor quality of the turnips used in this period.

If this period be excluded entirely, a difference of 4.8 lbs. per head in favour of the linseed cake is shown for the remaining 8 weeks. Taking the gains over the whole experimental period of 12 weeks, a difference of practically 10 lbs. (or 6 per cent. of the increase) in favour of palm-kernel cake is shown. "Considering, however, the great variations in live-weight increase to be found even among animals of the same lot, the small differences between the live-weight increases from the different lots do not warrant us in drawing hard and fast conclusions as to the relative feeding value of the cakes. As the differences could quite well be covered by the experimental error, the most we can say is that the foods have given practically the same returns in live-weight increase, and that the choice of the one or the other must be largely a matter of cost." The net cost of food per cwt. live-weight increase is given as 51s. 6d. for the linseed cake ration, and 43s. 4d. for the palm-kernel cake ration, or a difference in favour of the latter of 8s. 2d. It is concluded that, when fed in the same quantities, palm-kernel cake may be expected to give equally as good a return in live-weight increase as linseed cake, and "at present prices" it gives a better monetary return than the latter. (The prices used in the report are:—Linseed cake, 9l. 17s. 6d. per ton; palm-kernel cake, 6l. 10s. per ton.)

It is further concluded, that, when fed in mixture with locust bean meal, palm-kernel cake "is taken readily by stock, and no difficulty need be experienced in storing cake containing a comparatively large percentage of oil."

Commentary.

Little need be added to the expression of opinion as to the significance of the results which is quoted above. Without the separate data for the consumption of roots and straw it is impossible to form an opinion as to the suitability of the ration, but assuming common Aberdeenshire practice in feeding roots and straw to have been followed, it is probable that the rations were ample in every way.

The bullocks made better gains than the heifers, the separate results in each group being as follows:—

	Total Increase per Head during Experimental Period (12 weeks).	
	Bullocks.	Heifers.
	Lbs.	Lbs.
Linseed cake group	174.0	142.2
Palm-kernel cake group	193.5	145.0
Difference in favour of palm- kernel cake	19.5	2.8

In each case the palm-kernel cake group shows to advantage, although in the case of the heifers the difference is very small. The much larger difference shown in the case of the bullocks is almost entirely explained by the high increase recorded by one individual, the average of the other three being only 181 lbs.

The linseed cake used was relatively poor in protein, containing only 26.12 per cent. Assuming average digestibility for the two cakes, I should estimate from the analyses given that when incorporated in a ration supplying *in toto* sufficient digestible protein, 100 lbs. of palm-kernel cake as used in this experiment would be equal in nutritive value for fattening purposes to 103-106 lbs. of the linseed cake used, which would imply a difference of only about 1 per cent. in the estimated effects of the two rations. The results taken as they stand are in fair agreement with this assessment.

*General deductions from comparisons with Linseed
Cake.*

Of the three experiments reported upon, two (Norfolk and Cambridge) have given a result in favour of linseed cake, and the third (Aberdeen) in favour of palm-kernel cake, but in each case the differences are so small in comparison with the probable error of the experiment that the only conclusion that can legitimately be drawn is that the two cakes have proved of substantially equal value for the fattening of cattle. If there were actual differences in feeding value, they were too small to be detected by single experiments.

with groups of ten animals. If we assume the three experiments to be of equal accuracy and average the results, we find that, whereas 38 animals fed on rations containing linseed cake gave an average live-weight increase per head per week of 14.9 lbs., 37 animals fed on rations identical with the foregoing, but for the replacement of the linseed cake by an equal weight of palm-kernel cake, gave an average increase per head per week of 14.3 lb. If the relatively unreliable Howe Hill Experiment be excluded, the averages for the remaining two are 14.27 lbs. per head per week for the linseed cake, and 14.54 lbs. per head per week for the palm-kernel cake.

The conclusion as to the general equality of the two cakes, when given in satisfactory rations, is in harmony with the estimates of the agricultural chemist based

upon the most recently developed methods of assessing food values from chemical composition.

Comparison with Decorticated Cotton Cake.

Aberdeen Experiment (Winter 1914-15).

Description.

This test was carried out simultaneously with the above-described comparison with linseed cake, a third group of 9 similar, carefully selected animals (4 bullocks and 5 heifers) being used for the purpose. The feeding was exactly the same as for the other groups, except for the substitution of decorticated cotton cake for the linseed or palm-kernel cake. The average gains per head for each group were as follows:—

	Period I. (4 weeks).	Period II. (4 weeks).	Period III. (4 weeks).	Whole Experiment. (12 weeks).
	Lbs.	Lbs.	Lbs.	Lbs.
Decorticated cotton-cake group	64.2	43.9	59.0	167.1 ± 7.7
Palm-kernel cake group	56.2	60.3	48.0	164.5 ± 7.6
Difference in favour of decorticated cotton cake.	8.0	-16.4	11.0	2.6 ± 10.8

Commentary.

The results for the whole period show a slight difference, which, however, cannot be regarded as significant, in favour of the cotton cake. This is borne out by the averages of the 1st and 3rd periods, but the puzzling irregularity in Period II., referred to in discussing the comparison with linseed cake, is apparent also in this comparison with decorticated cotton cake. If this period be excluded a difference of 19 lbs. per head in favour of the cotton cake is shown for the remaining eight weeks.

The separate results for bullocks and heifers in each group were as follows:—

	Total increase per head during Experimental Period (12 weeks).	
	Bullocks.	Heifers.
	Lbs.	Lbs.
Decorticated cotton cake group.	186.8	151.4
Palm-kernel cake group	193.5	145.0
Difference in favour of decorticated cotton cake.	-6.7	6.4

It will be seen that the records of the bullocks show a difference in favour of palm-kernel cake, whilst the heifers show better results with the decorticated cotton cake.

We can only agree with Professor Hendrick in disregarding the actual differences recorded and in regarding the experiment simply as a demonstration of the substantial equality in feeding value of the two cakes when used, as in this case, as ingredients of an ample ration. In such a ration the cakes used, assuming average digestibility and the composition given in the report, might be expected to show a difference in feeding value of about 10 per cent. in favour of the palm-kernel cake. Such a difference could not be measured with certainty in a single experiment with groups of ten animals. With only this single experiment to guide us we cannot say, therefore, how closely this expectation might be realised in general practice. We can only say that the one test made favours the idea that the two cakes are, under certain circumstances, of practically equal value.

Comparison with Mixture of Decorticated Cotton Cake and Oats.

Glasgow Experiment (Winter 1914-15).

Description.

This experiment, and the comparison with bran, described next, were conducted at the farm of the Crichton Royal Institution, Dumfries, by Professor Paterson, of the West of Scotland Agricultural College.

At the outset, 16 Ayrshire bullocks were weighed and fed for four weeks on a ration of turnips, hay, straw, crushed oats, palm-kernel cake, and decorticated cotton cake. "The twelve animals that appeared to be most suitable for reliable experimental work" were then selected and divided into three groups of equal live-weight. A daily basal ration of hay, straw, turnips, 2 lbs. decorticated cotton cake, and 2 lbs. crushed oats was fed to each animal, with the following average additions:—

Lot I.—1 lb. decorticated cotton cake + 2 lbs. crushed oats.

Lot II.—3 lbs. palm-kernel cake.

Lot III.—4 lbs. bran.

Throughout the 14 weeks of the experiment proper the cattle were weighed fortnightly. "Being horned cattle they were tied in stalls" for the feeding. The comparison of Lots II. and III. is dealt with in the next section of this memorandum.

The average live-weight gains per head for the whole period of Lots I. and II. are as follows:—

	Lbs.
Lot I. (Decorticated cotton cake + oats)	155.5 ± 10.3
Lot II. (Palm-kernel cake)	113.0 ± 7.2
Difference in favour of Lot I.	42.5 ± 12.6

Commentary.

This may be regarded as a decisive result for the animals and rations compared. In his report Professor Paterson draws attention, however, to the comparatively small gains recorded, these averaging only 1.58 per head per day for Lot I. and 1.15 lbs. per head per day for Lot II., the average weight of the animals being about 7½ cwt. per head.

This may be indicative of deficiencies in the food supply, but no opinion can be formed as to this without detailed information as to the amounts of hay, straw and turnips consumed, which is not given in the report.

Professor Paterson further points out that "although this experiment was conducted under ideal conditions, too great stress should not be put upon

"the results till they have been confirmed by other experiments, as only a small number of animals were employed. Nevertheless, there is good reason for believing that the results obtained indicate fairly well the approximate relative values, as measured by beef production, of the feeding-stuffs employed." The "good reason" is not very obvious. The only safe conclusion to draw from this experiment is that whilst there is little doubt that the better result obtained with the cotton cake and oats was due to the difference in feeding of the two groups, the number of animals used was far too small to warrant any general conclusions being drawn as to the average merits of the two foods, and still less as to their "approximate relative values."

It should be noted, however, that the Aberdeen experiment agrees with this in indicating a difference in favour of decorticated cotton cake, although in the latter case the difference is much less.

Comparison with Bran.

Glasgow Experiment (Winter 1914-15).

Description.

Details of the general plan of experiment and of the feeding have been given in the preceding section. The average live-weight gains per head for the 14 weeks were as follows:—

	Lbs.
Lot II. (Palm-kernel cake) - - -	113.0 ± 7.2
Lot III. (Bran) - - -	101.25 ± 3.7
Difference in favour of Lot II. -	11.75 ± 8.1

Commentary.

A difference of roughly 10 per cent. in favour of the palm-kernel cake ration is indicated, but the probable error is relatively so high that there is no great certainty that the same result would have been obtained again by repeating the experiment even with the same animals. It should be noted, however, that only 3 lbs. of palm-kernel cake was fed as against 4 lbs. of bran, so that there can be no doubt as to the real superiority of palm-kernel cake over bran in this test. Here again, however, the test is on far too small a scale to be used as a basis for generalisation as to the relative merits of the two foodstuffs.

Comparisons with Undecorticated Cotton Cake.

(1) Aberystwyth Experiment (Winter 1914-15).

Two lots of four cattle each were used. After five weeks they showed an average difference in live-weight increase per head of 38 lbs. in favour of the cotton cake, and four weeks later the gains for the whole period of nine weeks showed a difference of 26 lbs. per head in favour of the cotton cake.

It will be clear from the foregoing discussion of experiments conducted on a much larger scale that it would be unwise to attach much significance to the actual numerical results obtained with groups of four animals. What this experiment has demonstrated is that palm-kernel cake is a useful feeding-stuff suitable for fattening cattle. Taken by itself this experiment cannot be used as proof of the superiority of undecorticated cotton cake over palm-kernel cake.

(2) Edinburgh Experiment (Winter 1914-15).

In this experiment a uniform basal ration of 100 lb. swedes, 7 lbs. oat straw and 3 lbs. medium wheat bran was used, with which was fed to the one group (8 bullocks) Bombay undecorticated cotton cake at the average rate of approximately 4½ lbs. per head per day, and to the other group (8 bullocks) palm-kernel cake at the average rate of approximately 4½ lbs. per day. The experimental period, during which monthly weighings were made, lasted for sixteen weeks, and was preceded by a preliminary period of four weeks during which the respective groups received the experimental rations.

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The average gains in weight per head for the sixteen weeks were as follows:—

	Lbs.
Bombay cake group - - -	197.5 ± 5.9
Palm-kernel cake group - - -	228.4 ± 8.0
Difference in favour of palm-kernel cake - - -	30.9 ± 9.9

The estimates of financial returns show a substantial difference in favour of the palm-kernel cake.

Commentary.

The difference in live-weight increase recorded is so substantial and so much greater than the probable error of experiment as to leave little doubt of its significance, although it may not be a precise measure of the order of magnitude of the real difference in nutritive value between the two cakes. In other words, this experiment may be taken as demonstrating clearly that the palm-kernel cake used was superior in feeding value to the Bombay cake, but it is not equally certain that the difference in nutritive value was precisely that represented by the 30.9 lbs. (or, roughly, 15 per cent.) difference in average gains. It may have been more, or just as possibly less. The superiority of the palm-kernel cake is all the more obvious in that slightly less of it was fed.

On the basis of the chemical composition of the cakes, as given in the report, assuming for them average digestibility and also average values for the other foods used, I should estimate that the palm-kernel cake ration would produce 15-25 per cent. better results than the Bombay cake ration. The results of the Edinburgh experiment bear out this assessment fairly well, but further experiments are needed to fix more precisely the relative values of these two cakes. The same applies even more to the case of the Egyptian cotton cake, for which we have as yet only the small Aberystwyth experiment.

Comparison with Dried Distillery Grains.

Edinburgh Experiment (Winter 1914-15).

Description.

This test was carried out simultaneously with the above-described comparison with Bombay cotton cake, a third similar group of 8 bullocks being used for the purpose. The feeding of the two groups was precisely alike, except for the palm-kernel cake and dried grains, which were used in equal quantities (4½ lbs.) in their respective rations. The average gains per head for each group for the sixteen weeks were as follows:—

	Lbs.
Palm-kernel cake group - - -	228.4 ± 8.0
Dried distillery grains group - - -	226.4 ± 7.4
Difference in favour of palm-kernel cake - - -	2.0 ± 10.9

In this case the difference is so small in comparison with the probable error of experiment that we can only describe the result, as is done by Mr. Bruce in the report, as indicating practical equality of the two rations. From the chemical composition of the rations a difference of 6 to 12 per cent. in favour of the palm-kernel cake might have been expected. Such a possibility is not excluded by the above results, but remains to be tested by further experiments.

Summary of Conclusions from Experiments with Fattening Cattle.

The following conclusions with regard to the merits of palm-kernel cake for fattening cattle may safely be drawn from the combined results of the experiments summarised in the foregoing pages:—

- (1) It is a suitable food for the purpose.
- (2) When fed along with adequate amounts of roots, hay, or straw (or both), and corn (or other concentrated food) it is capable of giving results roughly equal to those given by the same weight of linseed cake, decorticated cotton cake, or dried distillery grains, and

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definitely superior to those given by the same weight of Bombay cotton cake or bran.

- (3) In rations supplying only relatively scanty amounts of digestible protein it will probably prove inferior to linseed cake and decorticated cotton cake. For this reason the results of comparisons with these foods are likely to vary greatly.
- (4) The evidence available is not sufficient to enable a statement of the precise relative feeding-values of these foods to be given.

(b) Experiment with Sheep.

Description.

A comparison of palm-kernel cake with linseed cake for sheep-feeding was carried out at the South-Eastern Agricultural College, Wye, for nine weeks from November 9th, 1914, to January 11th, 1915. Two uniform lots, each of 11 Kent wether tegs, were used. For the first four weeks both lots were folded on kale and received in addition (per head per day) $\frac{1}{2}$ lb. dried grains and $\frac{1}{2}$ lb. of linseed cake (Lot A.) or $\frac{3}{4}$ lb. of palm-kernel cake (Lot B.). For the last five weeks both lots were folded on yellow turnips and received slightly greater amounts of the concentrated foods. The average consumption of the cakes per head per day was .79 lb. of linseed cake (Lot A.) and .87 lb. of palm-kernel cake (Lot B.). The sheep were weighed at the outset, again after four weeks, and finally at the end of the ninth week. The total live weight increases per sheep for the nine weeks were as follows:—

	Lbs.
Lot A. (Linseed cake)	33.45
Lot B. (Palm-kernel cake)	28.65

Difference in favour of linseed cake 4.80 = 15.4 % of average live-weight increase.

Commentary.

In the absence of data for the increases of the individual sheep it is impossible to assess the probable error of the result, but if we assume the degree of unavoidable error to be similar to that observed in cattle-feeding experiments we must accept the result as probably significant of a real difference in favour of linseed cake.

It may be pointed out, however, that the circumstances of outdoor feeding experiments, where the animals are exposed to the vagaries of the climate, are such as to give full play to differences of individuality between the animals, and moreover it is impossible to obtain a reliable check upon the actual food consumptions especially as regards the green food consumed. Moreover this lack of precise information as to the total food consumption makes it impossible to form an opinion how far the superior results obtained with linseed cake may be attributed to its greater richness in protein, rather than to other possible specific merits.

(c) Experiments with Dairy Cows.

Experimental Centre.	Foods used for Comparison.	Number of Cows in each Lot.	Duration of Experiment.
Hutton Farm, Lanos. C.C.	Decorticated cotton cake.	6	9 Weeks.
Harper-Adams College.	Decorticated cotton-seed meal.	2	6
Armstrong College	Bombay cotton cake.	5	16
Leeds University	Egyptian cotton cake.	4	6
University College, Bangor.	Egyptian cotton cake.	8	12

Comparisons with Decorticated Cotton Cake or Meal.

(1) Lancashire Experiment (Autumn 1914).

Description.

This experiment consisted of a comparison of palm-kernel cake with decorticated cotton cake, using quantities of each of equal cost, after making due allowances for difference in manure value. Each lot consisted of six recently-calved cows. The general course of the experiment was as follows:—

	Lot A.	Lot B.
1st week—	Identical rations including both cakes.	
2nd week—	Transition to 3rd week's rations.	
3rd week—	5 lbs. decorticated cotton cake.	7 $\frac{1}{2}$ lbs. palm-kernel cake.
4th week—	Transition to 5th week's rations.	
5th week—	7 $\frac{1}{2}$ lbs. palm-kernel cake.	5 lbs. decorticated cotton cake.
6th week—	Transition to 7th week's rations.	
7th week—	4 $\frac{1}{2}$ lbs. decorticated cotton cake.	6 $\frac{1}{2}$ lbs. palm-kernel cake.
8th week—	Transition to 9th week's rations.	
9th week—	6 $\frac{1}{2}$ lbs. palm-kernel cake.	4 $\frac{1}{2}$ lbs. decorticated cotton cake.

Thus the experiment comprised a preliminary week of equal treatment, and four subsequent fortnightly periods in which the two cakes were contrasted. In the first and third fortnights, Lot A. received the cotton cake and Lot B. the palm-kernel cake, whilst in the second and fourth fortnights the feeding was reversed. In each fortnight the greater part of the first week was taken up with the transition from the one cake to the other. During the first month (2nd week to 5th week) the daily rations per cow consisted of 20 lbs. roots, 5 lbs. mixed meal, 5 lbs. decorticated cotton cake (or 7 $\frac{1}{2}$ lbs. palm-kernel cake) and hay *ad lib*. During the second month, the meal for each lot was reduced to 4 $\frac{1}{2}$ lbs. per day, the cotton cake to 4 $\frac{1}{2}$ lbs. and the palm-kernel cake to 6 $\frac{1}{2}$ lbs., the rest of the ration remaining unchanged. The allowance of meal and cake was mixed for the whole group and then divided amongst the animals according to their milk-yield. The yield of milk was noted at each milking. The yields of milk during the preliminary week, when the two lots received identical rations, including a mixture of the two cakes, were as follows:—

	Lbs.
Lot A	1,162 $\frac{1}{2}$
Lot B	1,220

Difference in favour of Lot B 57 $\frac{1}{2}$ or practically 5%.

It is claimed that any normal advantage of Lot B was eliminated by the method of alternating the feeding of each lot, so that any difference in the total amounts of milk obtained by the use of the two cakes may be taken as indicative of difference in their nutritive values without correction for this inequality between the lots. The total amounts of milk produced during 8 weeks were:—

	Lbs.
From cotton cake	8,852
From palm-kernel cake	8,743 $\frac{1}{2}$

Difference in favour of cotton cake 108 $\frac{1}{2}$ or slightly over 1%.

In view of the fact that for the first week of each fortnight the feeding was transitional, an alternative assessment of the milk-yields is given in the report, by taking the second week's yield in each fortnight, multiplying by two, and regarding the totals thus got as corrected totals for 8 weeks. These "calculated yields" were as follows:—

	Lbs.
From cotton cake	8,767
From palm-kernel cake	8,609 $\frac{1}{2}$

Difference in favour of cotton cake 157 $\frac{1}{2}$ or slightly under 2%.

Special attention is directed to the fact that a change to palm-kernel cake resulted in every case in a decreased milk yield; whilst a change to cotton cake increased the yield in two cases and decreased it in two others when a different consignment of cake was used.

Determinations of fat and solids-not-fat in the milk of each cow were made once daily in composite samples representative of the two milkings. For the eight weeks the averages were as follows:—

	Fat.	Solids-not-Fat.
	%	%
From cotton cake	3.88	9.09
From palm-kernel cake	3.85	8.98

These differences in composition are regarded as "not material." Two churning tests were made and revealed no appreciable difference in the effects of the two cakes upon the quality of the butter.

Commentary.

Judged by the total yields and average quality of the milk the differences recorded in this experiment are too small to be accepted as significant in view of the magnitude of the probable experimental error. The periods of comparison are very short and leave practically no margin for the elimination of "after-effects" of one ration before the next period is entered.

The milch cow requires liberal supplies of protein, and since the decorticated cotton cake contained practically 40 per cent., whilst the palm-kernel cake contained barely 19 per cent., the cotton cake ration, despite the smaller allowance of cake, supplied the needs of the cows for protein more liberally than the palm-kernel cake ration. The extraordinary richness of the cotton cake in oil (17 per cent.; palm-kernel cake, 6.9 per cent.) also favours the cotton cake ration. The fact that so little effect upon the secretion of milk was produced may perhaps indicate that the rations were heavier than required for milk-production solely, and contributed rather to gain in live-weight. No records of the live-weights of the animals are given.

The amounts of cake used, especially of palm-kernel cake (7½ lbs.), are far higher than would be recommended in practice, but it is interesting to note that the cows ate even this high allowance of palm-kernel cake—though not with the keenest relish—when introduced gradually, and that the quality of the butter was no worse than that obtained by feeding cotton cake.

(2) Harper-Adams Experiment (Winter, 1914-15).

Description.

This experiment consisted of a comparison of 2 lbs. decorticated cotton-seed meal with 3 lbs. (equal cost) of palm-kernel cake, using two pairs of cows of similar milk yield. After three weeks the feeding of the two pairs was reversed and the comparison continued further for three weeks.

In the whole six weeks the yields of milk were as follows:—

	Lbs.
From palm-kernel cake	3,412
From cotton-seed meal	3,471
Difference	59 or barely 2%

The palm-kernel cake had no detrimental effect upon the colour, taste, or smell of the milk, nor did it affect either the churning qualities of the cream or the texture or flavour of the butter. The butter, however, did not keep so long.

Commentary.

This experiment can only be regarded as a demonstration of the general suitability of palm-kernel cake for dairy cows. It is on too small a scale to enable a reliable estimate of the relative merits of the two foods to be formed.

Comparison with Bombay Cotton Cake.

Armstrong College Experiment (Winter 1914-15).

Description.

This experiment consisted of a comparison of equal weights (6 lbs.) of Bombay undecorticated cotton cake and palm-kernel cake, using two lots of five cows each, selected carefully after preliminary trials. The comparison extended over sixteen weeks, the rations being reversed during the second half of the period. The basal ration consisted of 56 lbs. swedes, 12 lbs. meadow hay, 6 lbs. oat straw, 2 lbs. malt combs, 3 lbs. soya cake, and ½ lb. oat straw chaff. The cows were milked three times daily. The average yield and fat-content of the milk of each group of cows was precisely the same for a preliminary period of three weeks, during which both groups were fed alike. The average results, per lot per day, for the first eight weeks (Period I.) were as follows:—

	Yield of Milk.	Fat.	Solids-not Fat.
	Pinta.	%	%
Lot I. (palm-kernel cake)	105.81	3.78	8.71
Lot II. (Bombay cake)	98.19	3.41	8.66

For the second period of eight weeks (Period II.) the results were as follows:—

Lot I. (Bombay cake)	100.75	3.67	8.79
Lot II. (palm-kernel cake)	88.31	3.71	8.76

The effects upon the live-weight of the cows were as follows:—

	Average Gain (+) or Loss (—) in Live-Weight per Cow.	
	Period I.	Period II.
	Lbs.	Lbs.
Lot I.	— 20.4	+ 20.6
Lot II.	— 12.6	+ 29.8

It is recorded that the cows receiving palm-kernel cake had a better "bloom" than those receiving Bombay cake.

Commentary.

The outstanding fact in the results of this experiment is the gross discrepancy between the indications of the two periods as to the ostensible effects of the two cakes upon the yield of milk. Period I. taken by itself indicates as regards effect upon milk-yield a marked difference in favour of the palm-kernel cake, while Period II. points just as strongly to the opposite conclusion. From this and from observations in the report as to irregularities of individual cows it is clear that any differences in nutritive effects of the two cakes have been completely overshadowed by the disturbing factor of individuality. This disturbance must have extended also to the composition of the milk, so that the significance of the apparent improvement in fat-content by the use of palm-kernel cake must be regarded as extremely doubtful. The experiment demonstrates the general suitability of palm-kernel cake as food for milch cows, but more cannot be claimed for it.

Comparisons with Egyptian Cotton Cake.

(1) Leeds Experiment (March-April 1915).

Description.

This experiment, conducted at the Manor Farm, Garforth, consisted of a comparison, using two groups

of four cows each, of equal weights of palm-kernel cake and Egyptian cotton cake, fed along with soya cake, roots, hay, and straw. The number of cows available being very limited it was not possible to secure quite evenly matched groups, and for this reason, and others which led to a premature termination of the experiment, no great weight is attached to the actual numerical results obtained.

The allowance of palm-kernel (or cotton) cake varied from 2 lb. to 4 lb. per cow daily according to the milk-yield. In the first period of three weeks the cows were fed alike, the cake allowance consisting of one part soya cake and two parts Egyptian cotton cake. In the second period of three weeks one lot received palm-kernel cake in place of the cotton cake, a clear week, in which the change was effected, intervening between the two periods. The milk was weighed at each milking and on five days each week samples were taken for the determination of fat. The results are briefly summarised as follows:—

Period I. (Equal feeding):

Group A. gave per day
142.1 lbs. (\pm .54) milk
containing - - - 5.053 lbs. (\pm .037) fat.
Group B. gave per day
142.7 lbs. (\pm .55) milk
containing - - - 4.757 lbs. (\pm .061) fat

Period II.:

Group A. (cotton cake)
gave per day 130.4 lbs.
(\pm .40) milk containing 4.692 lbs. (\pm .028) fat
Group B. (palm-kernel
cake) gave per day
136.4 lbs. (\pm .57) milk
containing - - - 4.516 lbs. (\pm .037) fat.

Fall in milk-yield (Period I.)

—Period II. :—

Group A. = 11.7 lbs. \pm .67 lbs.
Group B. = 6.3 lbs. \pm .79 lbs.

Difference in favour of
palm-kernel cake - = 5.4 lbs. \pm 1.04 lbs.

Fall in yield of fat :—

Group A. = 0.361 lbs. \pm .046 lbs.
Group B. = 0.241 lbs. \pm .071 lbs.

Difference in favour of
palm-kernel cake - = 0.120 lbs. \pm .085 lbs.

Commentary.

The data as they stand show a slight difference in favour of palm-kernel cake, but it would be unwise to attach much significance to them, especially the difference in fat yield, which is barely greater than the probable error. The experiment demonstrates the general suitability of palm-kernel cake, and suggests that the differences between the two cakes are such as can only be measured by large-scale experiments.

(2) *Bangor Experiment (Summer 1915).*

Description.

No report on this experiment has yet been published, but Professor White has kindly supplied the following information:—“Two lots of eight cows each, as equal as possible in weight, milk-yield, period of lactation, and age, were selected, and for a preliminary period of a fortnight were fed on a mixture of Egyptian cotton cake and palm-nut cake. One lot was then gradually changed on to a ration of cotton cake alone, the other on to palm-nut cake alone. Both lots had for some little time previously been out at grass, and, except for milking and feeding periods, were out at grass the whole time. After being fed in this way for three weeks the rations were reversed, a period of ten days being taken to effect the exchange. The feeding was then continued for a month.

“The milk was weighed every night and morning and tested once a week. The quantity of cake given was in each case $1\frac{1}{2}$ lbs. for every 10 lbs. of milk produced. This was a liberal allowance, but was necessitated by the shortage of grass. The grass was of good quality, but the cows were thickly stocked.

“I have examined the results from every point of view, and the only conclusion I can arrive at is that any differences between the two cakes were well within the limits of experimental error, but any difference that did exist was slightly in favour of the palm-nut cake.”

Commentary.

It will be observed that this is a comparison of the two cakes when used to supplement pasturage. In the absence of information as to the milk-yields obtainable on grass alone, it is impossible to form an opinion whether the allowance of cake was excessive or not. If excessive, it is to be expected that the groups would give practically equal yields of milk, whatever the nature of the cake used. To get a full measure of the relative effects of the cakes the “condition” of the cows would need to be taken into account.

General Conclusions from Experiments with Dairy Cows.

The foregoing experiments with dairy cows demonstrate clearly that palm-kernel cake is a suitable food for dairy cows, but in no case do they furnish any reliable guidance as to its precise value in comparison with the other foods used. Taken as a whole, the results available show little evidence of any appreciable specific influence of the palm-kernel cake upon the production of milk-fat. On the other hand, they by no means exclude the possibility of such influence being exerted. In order to decide these points the experiments need to be repeated upon a very much larger scale and with a variety of rations.

Where observations have been made on the quality of the butter produced during the feeding of rations containing palm-kernel cake, even up to $7\frac{1}{2}$ lbs. a day, no appreciable detrimental effect has been noted.

Observations on Palatability of Palm-kernel Cake.

Practically all the various experimenters record that palm-kernel cake is at first not greatly relished by cattle and needs to be introduced gradually into the ration. In the Aberdeen experiment (page 31) the difficulty was successfully avoided by an admixture with locust bean meal. In the majority of cases it is reported that although the cattle soon ate the cake freely, they did not do so with the same evident relish as is displayed towards linseed and cotton cakes.

The evidence as to experience with sheep is conflicting. At Wye (page 34) no difficulty was experienced, whereas at Aberystwyth (page 33) the sheep refused to take palm-kernel cake for more than a fortnight.

A German Experiment with Palm-kernel Cake.

The following co-operative experiment was carried out in 1910 at the instance of the German Agricultural Council (“Landwirtschafts-Rat”) by nine experimental stations, following a uniform plan. In all, 186 cows of different breeds were included, and about 17,000 samples of milk were analysed. At each centre groups of at least 10 cows each were employed, except in a few cases where a different procedure was adopted involving the use of only one group of 20 cows. In this latter method the experiment was divided into three periods, the feeding being identical in the first and third. The results for these two periods gave a measure of the normal changes due to advance of lactation, which could then be allowed for in considering the results for the second period, in which the palm-kernel cake was used. In all other cases the experiment followed the usual lines of group tests.

The general conclusions are summarised as follows:—

1. Palm-kernel cake and the meal prepared from it, when compared with a mixture of earthenut cake and maize meal supplying the same amounts of digestible nutrients, proved capable of increasing not only the percentage of fat in the milk, but also the total output of fat, without causing, however, any appreciable increase in the yield of milk.

2. This specific effect of the palm-kernel cake was clearly discernible with the great majority of the cows, but varied greatly in amount. In general the cows giving the highest yields of milk showed the

greatest effects. The highest gain in milk-fat amounted per cow per day to 62-64 grammes (= roughly 2 oz.), whilst the lowest was 13-15 grammes (= roughly ½ oz.). The increases in the percentage of fat ranged from 0·16 per cent. to 0·34 per cent.

The effect was usually discernible very shortly after the palm-kernel cake was introduced into the ration, but the maximum effect was usually not attained until from ten to twenty days had elapsed after the change, since the preceding ration exercised an appreciable after-effect upon both the yield and the fat content of the milk.

3. The palm-kernel cake effected appreciable changes in the character of the milk-fat, such as would be consistent with the passage of certain constituents of the palm-kernel oil into the milk.

4. Where practical conditions render necessary the purchase of foods rich in carbohydrates, the use of palm-nut cake and meal at the rate of about 4 lbs. per day per 1,000 lb. live weight is to be recommended if the price be suitable.

The large scale upon which these experiments were conducted makes the results worthy of close attention, and a statistical study of the individual records, to which I have not access at present, is highly desirable.

PART III.—Experiments with Coconut Cake.

(a) An Experiment with Fattening Cattle.

This experiment was carried out in the winter of 1911-12 by Mr. W. Bruce, of the Edinburgh and East of Scotland Agricultural College, with the object of comparing the feeding value of coconut cake, wheat bran, and linseed cake. For the purpose, 42 cattle were divided as equally as possible into six lots, each containing 7 cattle. "The cattle, which were Irish-bred, were two-year old bullocks, blacks, blue-greys, reds, and roans, evidently the progeny of good shorthorn and Aberdeen-Angus bulls mated with ordinary-grade

"cows." Lots I, II, and V, consisted of black and blue-grey bullocks, while Lots III, IV, and VI consisted of red and coloured cattle of shorthorn type. During a preliminary period of 17 days each lot received a basal ration (per head per day) of 90 lbs. turnips, 12 lbs. oat-straw, and 4 lbs. Bombay cotton-cake; in addition, Lots I and IV, received 2 lbs. linseed cake, Lots II and III, 2 lbs. coconut cake, and Lots V and VI, 2 lbs. medium bran. Subsequently, during the experimental period proper, 4 lbs. each of the cakes and bran were fed. The bran alone was increased to 5 lbs. at the end of the second month and to 6 lbs. at the end of the third, or an average allowance of 4½ lbs. for the four months. After four months' feeding many of the cattle were fat, and equal drafts were made from each lot and sold. The rest were kept on the experimental diets for another month, but the experiment was regarded as completed at the end of the fourth month (112 days). The coconut-cake was steeped in twice its weight of water, and thereby reduced to a soft condition. All the cattle ate it readily in this form except one bullock "which could not be induced to touch it, although he took his allowance in the dry form quite readily and turned out one of the best." "It seems doubtful whether this precautionary measure of steeping in water is at all necessary where bullocks are getting plenty of turnips; indeed, in the circumstances the additional water may retard productive processes." The animals were weighed at the start and close of the preliminary period, and subsequently at monthly intervals.

The red and coloured cattle of shorthorn type did uniformly better than the blacks and blue-greys.

Comparison with Linseed Cake.

The results obtained with the lots receiving coconut cake and linseed cake respectively are summarised below:—

Average Increase in Live-Weight per Head.

Fattening Period.	Black and Blue-Grey Cattle.		Red and Roan Cattle.	
	Coconut Cake (Lot II).	Linseed Cake (Lot I).	Coconut Cake (Lot III).	Linseed Cake (Lot IV).
1st month - - - -	Lbs. 56·1	Lbs. 63·0	Lbs. 69·1	Lbs. 53·1
2nd month - - - -	47·1	55·9	58·3	80·7
3rd month - - - -	43·1	69·4	58·7	73·7
4th month - - - -	50·1	46·3	44·1	62·6
Total (112 days) - - - -	196·4±5·9	234·6±10·7	230·3±10·8	270·1±12·9
Difference in favour of linseed cake -	38·2±12·2		39·8±16·8	

Both types of cattle indicate a marked superiority (roughly 20 per cent.) of the linseed cake over the coconut cake, and moreover the probable errors are so relatively low as to indicate a high degree of certainty not only that the recorded differences are to be ascribed definitely to the differences in feeding, but also that results of the same order would be obtained on repeating the experiment.

Judged by chemical composition, assuming average digestibility, and employing the method of assessment used elsewhere in this memorandum (Kellner's starch-equivalent method), it might have been expected that the coconut cake ration would have given slightly better results than the linseed cake ration. The discrepancy between this expectation and the result actually obtained is not easily accounted for, but may possibly be associated with the protein supply. The method of assessment postulates that the protein supply of the ration shall be ample for the needs of the animal. As suggested by Mr. Bruce, the mode of feeding the coconut cake may also have contributed to lower its effectiveness. In order to evaporate completely at the temperature of the body the 8 lbs. of water in which the coconut cake was soaked a quantity

of heat would be required equivalent to more than one-third of the energy which the 4 lbs. of coconut cake was capable of yielding to the animal. In actual fact the water would not be completely evaporated, but there are obvious possibilities of appreciable inroads being made in this way upon the nutritive matters of the coconut cake. It may therefore have been no mere chance that the one bullock which received the coconut cake in the dry state "turned out one of the best." It will be safest therefore to interpret the result of the experiment as indicating a superiority of the order of 20 per cent. of linseed cake when fed dry over coconut cake fed wet—in both cases along with a liberal allowance of roots.

From the results of the experiment Mr. Bruce estimates that, with good average linseed cake at 9l. per ton, the value of coconut cake is 6l. 1s. 8d. per ton. On the same basis, if linseed cake cost 11l. per ton, coconut cake should be worth 7l. 7s. 9d.

The average prices per cwt. realised on the animals sold were 42s. 8d. for the linseed-cake lot, and 42s. 10d. for the coconut cake lot. "The returns show at least that the foods under trial were not inferior to linseed cake in putting a finish on the cattle." No distinction

could be made in the quality of the beef, which was uniformly high. It is estimated that the coconut-cake feeding was 5s. 3d. per head less profitable than the linseed-cake feeding.

Comparison with Bran.

The results of the comparison of coconut cake with bran are summarised below:—

Average Increase in Live-Weight per Head.

Fattening Period.	Black and Blue-Grey Cattle.		Red and Roan Cattle.	
	Coconut Cake (Lot II.).	Bran (Lot V.).	Coconut Cake (Lot III.).	Bran (Lot VI.).
	Lbs.	Lbs.	Lbs.	Lbs.
1st month - - - -	56·1	69·4	69·1	65·7
2nd month - - - -	47·1	50·6	58·3	51·0
3rd month - - - -	43·1	52·0	58·7	56·7
4th month - - - -	50·1	48·0	44·1	59·7
Total (112 days) - - -	196·4±5·9	220±8·0	230·2±10·8	233·1±6·1
Difference in favour of bran - - -		23·6±9·9		2·8±12·4

The comparison with the black cattle shows an apparently fairly decisive result in favour of the bran, but the result with the red cattle is quite indecisive. Moreover, the records of the individual cattle in the black cattle groups show abnormalities in the case of the coconut cake group which tend to depress the average increase, since in the third month one animal (No. 6) gained only 5 lbs., whilst in the fourth month another animal (No. 5) showed no gain at all. If the averages for the other animals in the lot be taken as more reliable averages for these months the average per head for the lot for the whole period is raised to 211 lbs., so that the apparent superiority of the bran lot is then brought almost within the region of the probable error. There were no corresponding abnormalities amongst the bran-fed animals during the periods referred to.

On the whole, therefore, we are impelled to the conclusion that whilst the experiment has given presumptive evidence of a slight superiority of 4½ lbs. bran over 4 lbs. coconut cake, it cannot by itself be regarded as conclusive on the point. It must be recalled also that the coconut cake was fed wet and the bran presumably dry.

From the chemical composition of the two foods it might have been expected that the coconut cake would give appreciably better results than the bran.

The average price per cwt. realised on the bran-fed animals sold was 48s. 4d., and it is estimated that the bran-feeding was 6s. 5d. per head more profitable than the use of coconut cake. No appreciable difference could be detected in either the general appearance of the lots or the quality of the beef.

(b) *Experiments with Dairy Cows.*

Comparison with Linseed Cake.

Midland Experiment (March—April 1911).

Description.

This experiment was carried out at the Midland Agricultural and Dairy College, using two lots of four cows each. At the outset each lot was receiving a daily ration per cow of 56 lbs. mangels, 7 lbs. straw chop, 14 lbs. hay, 2 lbs. mixed meal (bran, sharps, dried grains), and 5 lbs. undecorticated cotton cake. After one week on this ration the cotton cake was replaced for one lot by 4½ lbs. of linseed cake and for the other lot by 5 lbs. of coconut cake. This feeding was continued for fourteen days and then the rations were exchanged. A fortnight later the linseed and coconut cakes were again replaced by 5 lbs. undecorticated cotton cake, so that the initial and final weeks' rations were identical. The rations proved satisfactory in respect of maintenance both of milk-yield and of live-weight. The cows were weighed every fortnight. Composite samples of the milk of each lot were made

up at each milking and tested weekly. The results are briefly summarised below:—

Yield of Milk:

All cows two weeks:—	Lbs.
1st and 6th weeks on cotton cake - =	2,428½
2nd and 5th weeks on linseed cake - =	2,472½
2nd and 5th weeks on coconut cake - =	2,429

Live-Weight Increase:

	Lbs.
Average gain per cow in two weeks on coconut cake - - - - - =	15·4
Average gain per cow in two weeks on linseed cake - - - - - =	4·5

Average Percentage of Fat in Milk:

	Average of four Weeks.	
	Morning.	Evening.
Linseed cake - - -	3·76	4·06
Coconut cake - - -	3·70	4·05

The samples of butter were somewhat variable in appearance, texture, and taste, but "if anything, the coconut cake fed butter was the firmer." A special chemical examination of the butter was made weekly and led to the conclusion that the coconut cake caused an increase in the ingredients which distinguish butter-fat from other fats. This butter also appeared to have better keeping properties than those possessed by linseed-cake butter.

Commentary.

In view of the small number of cows employed, the shortness of the experimental periods, and the rapidity with which the rations were changed, little significance can be attached to the actual numerical differences in milk-yield and composition recorded. In these respects the experiment shows little more than that "both linseed cake and coconut cake gave satisfactory results when fed in a mixed ration to dairy cows." The changes in the composition of the fat were sufficiently sharply defined to warrant the conclusion drawn with reference to this point.

Comparison with Undecorticated Cotton and Soya Cakes.

Wye Experiment (April—May 1911).

Description.

In this experiment, conducted at the South-Eastern Agricultural College, three cows were fed for two weeks on a normal ration, then for two weeks on a ration containing coconut cake, and finally for two weeks longer on the normal ration. The basal ration was the same for each cow, except for the cake, which

for one cow consisted of 5 lbs. cotton cake, for another 4 lbs. soya cake, and for the third 3 lbs. soya cake and 2 lbs. cotton cake. During the second period the cakes were gradually replaced by coconut cake in amounts increasing from 2 lbs. to 6 lbs. per day. The coconut cake was soaked in twice its weight of water for four or five hours before use.

Commentary.

The data obtained are set out in the report, but it need only be stated that they show no indication of any marked change being caused by the use of coconut cake. The experiment is made up really of three comparisons, using one cow for each. It is obvious that a very great degree of uncertainty must attach to differences noted under such conditions. More reliance may be placed upon the observation that "the butter obtained was of satisfactory quality, and was distinctly firmer than that from the normal rations."

Comparison with mixture of Decorticated Cotton Cake and Oats.

Newton Rigg Experiment (Early in 1915).

Description.

This experiment was conducted at the Newton Rigg Farm School, using two lots of three cows each. The rations fed were estimated to supply equal weights of digestible matter at equal cost, and differed only in that one lot received 3½ lbs. decorticated cotton cake and 3½ lbs. crushed oats, whilst the other received 5½ lbs. coconut cake and 2½ lbs. crushed oats. The actual comparison was thus that of 5½ lbs. coconut cake with a mixture of 3½ lbs. decorticated cotton cake and 1½ lbs. crushed oats. The experiment lasted for twelve weeks, divided into four periods of three weeks each, and the two lots of cows were fed alternately for three-weekly periods on the two rations. A difference in favour of the cotton cake of about 1½ per cent. in the yield of milk and of 0.1 in the per cent. of fat is recorded. On cotton cake the cows gained 116 lbs., whilst on the coconut cake ration they lost 11 lbs.

Commentary.

In view of the small scale of this experiment it would be unwise to draw general conclusions as to the relative values of the two foods compared. It can only be said that in this case they proved of substantially equal value.

General Conclusions from Experiments with Coconut Cake.

All the experiments have demonstrated the general utility of coconut cake as food for cattle. The Edinburgh experiment alone has yielded a conclusive result as to the merits of coconut cake relative to the food with which it was compared. This experiment showed that, when used in soaked condition, as is commonly recommended, coconut cake was decidedly inferior to linseed cake. The results of a similar comparison with bran showed a difference in favour of the bran, but the degree of uncertainty attached to this difference is such as to necessitate further experiments before a definite conclusion can be formulated. When fed to dairy cows coconut cake has been found to give substantially the same results in yield and quality of milk as decorticated cotton cake and linseed cake, but in no case has the experiment been on a sufficiently large scale to warrant the conclusion that this experience is what may be commonly expected.

In all cases where observations have been made it is reported that the coconut cake had a beneficial effect upon the texture of the butter.

PART IV.—*Experiments with Earth Nut Cake.*

(a) *Experiments with Fattening Cattle.*

Comparison with Bean Meal.

Woburn Experiment (Winter 1891-92).

The experiment was conducted at the Royal Agricultural Society's Experimental Farm at Woburn, under the supervision of Dr. J. A. Voelcker. One lot of six Hereford bullocks was fed on a ration (per head

per day) of 45 lbs. of roots, 15 lbs. of clover-hay chaff and a mixture in equal proportions of beans, oats, and barley—the allowance of the mixture being raised gradually from 6 lbs. to 12 lbs. A second lot of four Hereford bullocks was fed in precisely similar fashion, except that the bean meal was replaced by an equal amount of earthnut cake. The cake used contained 47.44 per cent. of protein, and 8.47 per cent. of oil; "it was also free from rancidity, but was, however, slightly acid." It contained 2.62 per cent. of sand. The feeding was continued for 107 days, this being divided into three separate portions of 52 days, 31 days, and 24 days, at the end of each of which the live-weights of the bullocks were taken. "The bullocks did perfectly well on the cake, and there was no difficulty whatever in getting them to eat it, nor any harm from its somewhat acid character."

The average gains in live-weight per head for the whole period were as follows:—

	Lbs.	Lbs.
On bean ration - - - -	214.8	+16.9
On earthnut cake ration - - - -	235.2	+14.9
Difference in favour of earthnut cake - - - - -	20.4	+22.5

Dr. Voelcker concludes that the earthnut cake "proved to be a useful feeding material for cattle, and to have a feeding value just about equal to that of beans." The former part of this conclusion cannot be disputed, but in view of the large "probable error" with which the indicated difference between the lots is affected, the experiment cannot be regarded as proving the relative feeding values of the two foods.

Comparison with Linseed Cake.

Woburn Experiment (Winter 1891-92).

This comparison was obtained, simultaneously with the one just described, by means of a third lot of six Hereford bullocks which received the same rations, except that linseed cake was substituted for the earthnut cake (or bean-oat-barley mixture.) In all other respects the treatment and procedure were exactly as described in the foregoing section. The average gains in live-weight per head for the whole period were as follows:—

	Lbs.	Lbs.
Earthnut cake ration - - - -	235.2	+14.9
Linseed cake ration - - - -	216.7	+13.1
Difference in favour of earthnut cake - - - - -	18.5	+19.8

Here again the "probable error" is so large in proportion to the difference between the two lots that no conclusion as to the relative merits of the two foods can safely be drawn.

Comparison with Decorticated Cotton Cake.

Cockle Park Experiment (Winter 1904-5).

This experiment was carried out with two lots each of four cattle which had been bred and reared at Cockle Park by the Galloway cows in the summer of 1904, and had been weaned only a few weeks before the experiments commenced. Each lot consisted of three bullocks and one heifer, two of the animals being shorthorns and two blue-greys. For the first month, which was regarded as preliminary, lot I. received daily per head 28 lbs. turnips, 7½ lbs. meadow hay, and 2½ lbs. of a mixture of one-third maize meal and two-thirds decorticated cotton cake, whilst lot II. received a similar ration except that earthnut cake was used instead of the cotton cake. For the five succeeding months the average rations were:— 26½ lbs. swedes, 8½ lbs. meadow hay, and 4½ lbs. of the cake and maize mixture (i.e., 3 lbs. cake + 1½ lbs. maize). The cotton cake contained 52.1 per cent. of protein, whilst the earthnut cake contained 48.5 per cent. It is noteworthy also that the latter contained 2.35 per cent. of sand, whereas the cotton cake contained only 0.1 per cent. The average live-weight gains per head for the

whole experimental period of five months were as follows:—

	Lbs.
Lot I. (Decorticated cotton cake)-	- 290
Lot II. (Earlnut cake) - - -	- 212
Difference in favour of cotton cake	- 78

Taken as it stands, this difference implies that the cotton cake ration was practically 40 per cent. superior to the earlnut cake ration. It is difficult to accept this as even approximately correct. The records of the individual animals are not given in the report, so that it is impossible to assess the degree of reliability of the experimental result. The average increases for each month which are given in the report suggest, however, that it must have been fairly high, since in two of the five months the difference between the two lots is actually slightly in favour of the earlnut cake. In his report upon the experiment Professor Gilchrist suggests that the striking difference between the results given by the two cakes may have been due partly to the higher protein-content of the cotton cake and partly to the relatively large amount of sand present in the earlnut cake. The latter may indeed have been very detrimental to the young animals used in this experiment, but it may be recalled that the older animals used in the Woburn experiment consumed without apparent detriment a cake containing even more sand. Further experiments with materials that are beyond reproach in this respect are obviously required before any generalisations can be made as to the relative merits of the two cakes.

(b) *Experiment with Dairy Cows.*

Comparison with Decorticated Cotton Cake.

Newton Rigg Experiment (Feb.-May 1905).

For the purpose of this experiment four cows in full milk were selected, and were under trial for twelve weeks. For the first three and last three weeks decorticated cotton cake (4 lbs.) was fed along with 42 lbs. swedes (or 35 lbs. mangels), hay (two fodderings), straw (one foddering) and 4 lbs. crushed oats—these being the daily allowances per cow. During the middle six weeks earlnut cake (4 lbs.) was substituted for the cotton cake. The results were as follows:—

	Milk-yield.	Fat.
	Gallons.	%
First three weeks (cotton cake) -	242	3.2
Middle six weeks (earlnut cake) -	432	3.4
Last three weeks (cotton cake) -	179	3.7
Total milk-yield for cotton cake periods (six weeks).	421	—
Average fat per cent. for cotton cake periods (six weeks).	—	3.45

The cows increased in weight at a uniform rate during the first nine weeks, but fell off considerably during the last three weeks, possibly owing to the substitution of mangels for swedes at the end of six weeks.

It is claimed that "the results show that earlnut cake, when of good quality, is a good food for milch cows, and has for this purpose a value not far short of decorticated cotton cake." The latter generalisation can hardly be accepted on the evidence of only four cows.

From the report it would appear that the earlnut cake used was part of the same consignment as was used for the Cockle Park experiment, and, if so, the results form an interesting contrast.

General Conclusions from Experiments with Earlnut Cake.

Experiments with earlnut cake have been few and on a relatively small scale. Little in the way of

definite conclusions of general applicability can be drawn from them, therefore, beyond the broad fact that earlnut cake has proved acceptable to stock, and has, in the main, given reasonably good results.

In his report on the Woburn experiment Dr. Voelcker states as an objection to its use that "it is very liable to turn rancid and become sour." In none of the tests, however, did trouble arise from this cause.

Note on the Assessment of the Relative Values of Feeding-Stuffs from their Chemical Composition, with special reference to Palm-kernel Cake, Coconut Cake, and Earlnut Cake.

In considering the question of the relative values of different foods it is necessary to maintain a clear distinction between the relative values to the animal (or physiological values) and the relative values to the farmer (or money values). The two are by no means necessarily the same.

(a) *Relative Values to the Animal.*

These can only be determined with certainty by means of practical feeding experiments. It will be clear from the summary of such experiments in the preceding pages of this memorandum that to secure reliable average results on these lines is no simple matter. It requires repeated experiments with large numbers of animals and a variety of rations. The most extensive investigations of this kind have been made in Denmark with dairy cows and pigs and have led to the formulation of tables setting out the relative feeding values of the common farm foods, when used for these two classes of stock. For pig-feeding no discrimination is made in the tables between different oil-cakes, all being included in the highest class, equal in feeding-value to barley, maize, or wheat. For dairy cows, earlnut cake heads the list along with decorticated cotton cake, whilst palm-nut cake (or meal) is represented as having a 25 per cent. lower feeding value, and is classed with maize, wheat, barley, and the dry matter of "roots." Coconut cake is not included in the table, but is presumably classed as equal to palm-kernel cake.

Such average values are useful for general feeding practice, but leave unsolved the problem as to how the farmer is to discriminate between different brands of a particular food offered to him at different prices. The most obvious starting point in any effort to obtain guidance on this point is obviously to take into account the chemical composition of the materials, and repeated efforts have been made by agricultural chemists to base thereon a reliable method for assessing relative feeding values.

It is commonly assumed that the feeding-value of a sound, wholesome, and palatable foodstuff will be determined by its content of digestible protein, oil, and carbohydrate (including digestible fibre). By scientific experiments of a much higher order of accuracy than the ordinary type of feeding experiments the late Dr. Kellner arrived at the conclusion that for the purpose of fattening oxen the relative values of the above-mentioned food-constituents, taking digestible carbohydrates = 100, under ideal conditions were as follows:—

Digestible carbohydrates (starch) -	100
Digestible fibre - - -	100
Digestible oil - - -	241
Digestible protein - - -	95

Using these relative values, and assuming ideal conditions, we can then express the value for fattening purposes of 100 parts of a given foodstuff in the following way:—

"Carbohydrate-Equivalent" (or *Starch Value*) of 100 parts of the foodstuff = [Dig. Protein × .95] + [Dig. Oil × 2.41] + Dig. Carbohydrates + Dig. Fibre].

By scientific experiments similar to those by which the above relative values were arrived at, and using a variety of oil-cakes, Kellner found that in a few cases, including palm-kernel cake and coconut cake, the

values obtained agreed exactly with those calculated from the composition by the above expression. In most cases, however, the results obtained by actual experiment were slightly *below* those arrived at by calculation. Thus for earlnut cake the calculated result was 2 per cent too high, and for decorticated cotton cake or linseed cake 3 per cent. too high. In other cases the discrepancy was much greater, amounting, for example, to 16 per cent. in the case of undecorticated cotton cake. Expressed in different fashion, on the basis of these experiments we may say that whilst the digestible constituents of palm-kernel cake and coconut cake are fully "available," those of earlnut cake have an "availability" of 98 per cent., of linseed or decorticated cotton cake 97 per cent., and

of undecorticated cotton-cake 84 per cent. These "availabilities" represent therefore the corrections which must be applied to the "ideal starch values" given by the above expression, in order to arrive at the actual starch values. Assuming that this method of computing feeding values rests upon a sound basis—and, although it is far from being fully adequate in this respect, I know of no other method that can claim to be based upon more numerous or more reliable data—it is of interest to examine the conclusions to which it leads as to the relative values for fattening cattle of the common oil-cake foods, including the three which form the subject of the present memorandum. For this purpose the average composition (total and digestible) of the oil-cakes may be taken as follows:—

	Palm-kernel Cake.	Coconut Cake.	Earlnut Cake.	Linseed Cake.	Decorticated Cotton-cake.	Undecorticated Cotton-cake.
<i>Total Percentages.</i>						
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Protein	19	20	46	30	41	22
Oil	6	10	10	10	9	5½
Carbohydrates	46	42	26	35	26	34
Fibre	13	11	3	8	8	20
<i>Digestible Percentages.</i>						
Protein	16	15½	40	25	34	15½
Oil	5½	9½	9½	9½	8½	5½
Carbohydrates + fibre	47	42	22	33	20	20

Using these data for the percentages of digestible nutrients in each case, and the "percentage availabilities" as given above, the "starch-values" per 100 lb. cake (*i.e.*, weights of starch equivalent for fattening purposes to 100 lb. of the cake) work out as follows:—

	Starch Values per 100 lb. Cake.	Weight of Cake equivalent to 1 lb. of Earlnut Cake.
Palm-kernel cake	Lb. 75	Lb. 1.08
Coconut cake	79	1.03
Earlnut cake	81	1.00
Linseed cake	77	1.05
Decorticated cotton cake	71	1.14
Undecorticated cotton cake	40	2.02

This method of assessment thus leads to the conclusion that, with cakes of the composition and digestibility set out above, the earlnut cake should have the highest fattening value, followed closely by coconut cake and linseed cake, then palm-kernel cake, barely 10 per cent. inferior, decorticated cotton cake 14 per cent. inferior, and, lastly, undecorticated cotton cake with barely half the value.

The method is based entirely upon experiments with fattening oxen, and hence, strictly speaking, the results should be regarded as holding good only for the use of the cakes for fattening cattle.

Kellner claims, however, that they may be applied to the case of fattening sheep or pigs, to the feeding of dairy cows, or to the feeding of working horses.

There is good reason to believe, however, that for the feeding of dairy cows the relative value of protein is appreciably higher than for fattening cattle. On the basis of the very extensive data accumulated by the Swedish milk control societies, Hunssoy claims that for milk-production the results obtained by the starch-value method of assessment agree much more closely with practical experience if the relative value of protein be taken as 1.4 (starch = 1) instead of .95 as taken by Kellner.

With this amendment, the relative values *f* or milk production prove to be:—

	Starch Values per 100 lb. Cake.	Weight of Cake equivalent to 1 lb. of Earlnut Cake.
Palm-kernel cake	Lb. 83	Lb. 1.19
Coconut cake	87	1.14
Earlnut cake	99	1.00
Linseed cake	88	1.13
Decorticated cotton cake	86	1.15
Undecorticated cotton cake	46	2.15

It will be observed that the order of merit is substantially the same, but that the relative superiority of the earlnut cake is increased, except with reference to the decorticated cotton cake.

It was noted above that Kellner found in the case of palm-kernel cake and coconut cake that the digestible nutrients were fully "available," and that hence the "ideal starch value" needed no correction. This is difficult to accept, in view of the relatively large proportions of fibre in these cakes, and it is possible, therefore, that the merits of these two cakes have been over-valued, perhaps by 3 or 4 per cent., in the above calculation. In any case too much stress should not be laid upon the precise numerical result of the calculation. The starch-values have been given above to the nearest unit, and the estimates may be even lower than that approximation suggests. It may, for instance, be undesirable to conclude more than that the palm-kernel and coconut cakes are of substantially equal value, and inferior to earlnut cake for milk-production, but equal to it for fattening. The necessary data for gauging the degree of reliability of the method have not yet been accumulated.

It must be borne in mind further that the realisation of the values deduced by the starch-value method, presupposes that the foods in question are used as part of a ration that is satisfactory in every way, but especially in its supply of digestible protein, for the purpose for which it is intended. If there be any deficiency of protein in the full ration, the foods rich in protein will be relatively more valuable than the starch-value assessment would suggest.

Finally, it must be borne in mind also that the values obtained in this way represent feeding values and not money values.

(b) *Relative Money Values of Foods.*

The statement has already been made that the prices which it is worth while for the farmer to pay for two different foodstuffs are not necessarily closely proportional to their relative values to the animal.

The feeding value is, of course, the dominant factor in the calculation of what is a fair price to pay for one food in comparison with the cost of other foods, but there are at least two other factors which introduce complications into the estimate. These are:—

- (1) The special need of the farmer for supplies of digestible protein, rather than oil or carbohydrates.
- (2) The diverse manurial values of different foods.

The Special Need for Protein.

It is an axiom of the science of nutrition that every animal must receive in its food a certain amount of protein, the necessary minimum varying according to the individuality and kind of animal, and the particular purpose for which it is being fed. It may be able to utilise profitably more than this minimum amount of protein, but the minimum at least it must have. The further requirements of the animal can be adequately covered by supplies of oil and carbohydrates, or probably—except for a very low minimum amount of oil—by carbohydrates alone. The liberal use of these food-ingredients can reduce the minimum requirement for protein to a certain extent, but never entirely.

For reasons mainly associated with the climate the crops grown in the United Kingdom are mainly relatively poor in protein and rich in carbohydrates. The most highly nitrogenous crops grown here (beans and peas) contain (in the seed) usually not more than 20 to 25 per cent. of protein—a proportion which is regarded as only moderate for foods of the class of seeds. Further, in the case of crops sold off the farm it is usually the part richer in protein that is sold (e.g., grain). The consequence usually is that in the stock of feeding-material that is left for use on the farm, there is a relative deficiency of protein, which can only be remedied by purchasing foodstuffs relatively rich in protein, if wasteful use of the home-grown supplies is to be avoided.

The home-grown crops supply also only relatively scanty amounts of oil; but, as mentioned above, this is not as fundamentally serious as a shortage of carbohydrates.

Obviously then it is a shortage of protein in his home supplies that, consciously or unconsciously, brings the farmer to the market as a purchaser of feeding-stuffs. He has no option in the matter if he is to make the utmost of his home supplies and hence may be justified in paying for it at a higher rate than would be warranted if there were no element of compulsion about the purchase.

It must be admitted that many farmers—perhaps the majority—do not regulate their purchases conscientiously by such considerations, but they nevertheless represent the facts of the case, and must be taken into account by the agricultural expert in giving advice on prices.

According to the investigations referred to in the preceding section, once the minimum requirements of the fattening animal for protein have been satisfied, any additional protein given to it produces an effect barely equal to that of an equal weight of digestible carbohydrate. Below the protein-minimum, however, there can be no comparison between the two, since a further supply of protein is then absolutely essential, and carbohydrate cannot take its place.

In the present state of knowledge it is quite impossible to furnish precise guidance as to the amount which the farmer is justified in paying for protein over and beyond the price which a consideration of relative feeding values alone would suggest as fair in comparison with the cost of an equivalent amount of carbohydrates in the market. The matter can only be left to

individual judgment based upon available supplies of home-grown foods, prices of produce, and other considerations. Generally speaking, however, in choosing between foods of apparently equal cheapness as judged by feeding value, preference should be given to the one richer in protein.

The case of oil is simpler to deal with since no element of compulsion enters into the purchase here. There can be no doubt that, within the narrow limits within which it can be satisfactorily used, the feeding-value of oil is practically $2\frac{1}{2}$ times that of carbohydrates, and this factor can be used in estimations of money values of foods. It is true that many practical feeders hold that for certain purposes oil produces effects which cannot be attained with carbohydrates, but the results of physiological investigations afford little support for this belief, and it must be left to the individual to determine what extra cost, beyond that which the above proportion would indicate, he is prepared to give in order to secure oil rather than carbohydrate.

The Manurial Values of Foods.

In purchasing foods an important factor affecting the price which may reasonably be paid is the fact that manurial residues (both solid and liquid) of appreciable value will be left on the farm as a consequence of the consumption of the foods by stock. It is known that the value of these residues is not the same for all foods, and hence this must be taken into account in assessing the values of foods. Generally speaking, the value of the manurial residues will be greater, the richer the food is in nitrogenous matter (protein), so that another reason is furnished thereby for paying more liberally for protein in foods than relative feeding-values alone would warrant.

In one method of assessing the relative money-values of foods, which is widely used in this country, the allowance for manurial values is dealt with in this way (i.e., by putting an increased value upon the protein) (see next section). If a more precise discrimination is desired, allowance must be made not only for differences in nitrogen-content between different foods, but also for differences with respect to the other constituents of manurial value, viz., phosphates and potash. The full allowance for manurial values, taking all ingredients into account, and allowing for waste at the farm and other considerations, can be deduced from tables drawn up by Hall and Voeleker in 1902 and revised in 1913. These tables are being increasingly adopted by valuers as the basis of their allowances on the expiration of a tenancy for the unexhausted manurial values of purchased foods consumed on the farm.

Methods of Assessing Money Values of Foods.

Various methods of assessing the money values of foods have been suggested from time to time, and there is consequently considerable diversity of practice. All the methods, however, are based upon the same principle, in that they start with the composition of the food with respect to protein, oil, and carbohydrates. The difference between the methods lies essentially in the relative values placed upon these three ingredients. If an estimate of the absolute value of a particular food-stuff is required, a price must be placed on one or other of the three ingredients, usually the carbohydrate. This must be done more or less arbitrarily since it is impossible to say precisely what is the exact value of a pound of, say, carbohydrates as met with in cattle foods. In practice it is usually sufficient to make an estimate of the relative money value in comparison with some widely used food which stands at a price which is commonly regarded as reasonable. Two methods of making such an estimate are described below.

(a) *Old Method.*

The first method, which may be described as the old and still most frequently used method, is based upon the assumption that digestible protein and digestible oil are of equal money value, and each worth $2\frac{1}{2}$ times as much as digestible carbohydrates. Hence

an expression for the value of the food in terms of carbohydrate value is obtained from the composition (digestible) as follows:—

$$\text{“ Carbohydrate Value ”} = (\text{Digest. Protein} + \text{Digest. Oil}) \times 2\frac{1}{2} + \text{Dig. Carbohydrates.}$$

The total thus obtained is commonly referred to as the “ food units,” and on dividing into the price per ton of the food, the cost per “ unit ” is obtained. This may then be compared with the cost of a “ unit ” in other foods, as arrived at in the same way from composition, digestibility, and market price.

In this method the high value placed upon the protein in ranking it equal with oil, is supposed to include due allowance for manurial value and any other consideration that tends to increase the relative value of protein. The allowance is purely arbitrary, however, and it is difficult to say why the protein should be placed exactly on the same footing as the oil. For this reason the method must be regarded as empirical, and chiefly recommended by the fact that in the main it leads to conclusions which the practical man has usually little difficulty in accepting. The opinions given in my evidence before the Committee were based upon assessments made by this method, adopted at the time solely as being the commonly-used method.

New Method.

The nett cost of a food to the farmer is arrived at by deducting the manurial value per ton from the gross cost per ton. Thus, although the farmer may pay 11l. per ton for linseed cake, the real cost to him is only about 9l. 4s. per ton, since he obtains by consumption of the ton of cake manurial residues valued at about 36s.

If now this nett cost be divided by the “ starch-value ” of the food as assessed by the method outlined earlier in this Appendix, the cost of one “ starch-value unit ” is obtained. In similar fashion the cost per “ starch-value unit ” of other foods may be arrived at, and we thus obtain the costs in each food of quantities estimated to be of equal nutritive value. If one food be taken as standard, its cost per “ starch-value unit ” can be taken as the standard by which the “ fair price ” for other foods can be assessed as follows:—

$$\text{“ Fair Price ” per ton of Food} = (\text{Starch Value of Food} \times \text{Standard Cost per Starch Value Unit}) + \text{Manurial Value of Food.}$$

The method may be illustrated by taking the foods whose composition and starch-value were given earlier in this Appendix (p. 41). If linseed cake at 11l. per ton be taken as our standard, the “ standard cost per starch-value unit ” is arrived at as follows:—

	£	s.	d.
Gross cost of linseed cake per ton	11	0	0
Manurial value	-	-	1 16 0
Net cost	-	-	9 4 0

Starch value (for fattening), per cent.	-	77
Cost per starch-value unit	9l. 4s.	= 28·7d.
(for fattening)	-	77

The corresponding cost, if the cake be used for milk production, is 9l. 4s., or 25·1d.

The estimated “ fair price ” per ton for, say, palm kernel cake, as compared with linseed cake at 11l. per ton, is now obtainable, as follows:—

<i>For Fattening :</i>	
Starch value	= 75.
Estimated “ fair net cost ”	= 75 × 28·7d.
	= 8l. 19s. 4d.
Add manurial value	= 22s.
Estimated “ fair price ”	= 8l. 19s. 4d. + 1l. 2s.
	= 10l. 1s. 4d.

For milk production, the price of 9l. 15s. 7d. is arrived at. Proceeding on the same lines, the following results (to nearest shilling) are obtained for the “ fair price ” of the different cakes when linseed cake stands at 11l. per ton:—

	“ Fair Price ” per Ton.	
	For Fattening Purposes.	For Milk Production.
	£ s. d.	£ s. d.
Palm-kernel-cake	10 1 0	9 16 0
Coconut cake	10 18 4	10 11 0
Earthnut cake	12 8 0	13 1 0
Decorticated cotton cake	11 3 0	11 13 0
Undecorticated „	6 8 0	6 8 0

These figures throughout are appreciably higher than those arrived at by the old method. For palm-kernel cake and coconut cake they are probably 5 to 10 per cent. too high, owing to the starch-values used for these foods being uncorrected for “ availability.” In all cases it must be remembered that the estimates are largely theoretical, and represent simply the best that can be done in the existing state of knowledge.

CHARLES CROWTHER.

The University, Leeds,
December 4th, 1915.

Appendix C.

Statement showing, according to the latest information available in the Commercial Intelligence Branch of the Board of Trade, the duty leviable on Vegetable Oils, Margarine, and Oilcake in the undermentioned countries.

FRANCE.

Linseed oil	6 frs. per 100 kgs. (2s. 5½d. per cwt.).
Cotton seed and sesame and groundnut oils intended for the manufacture of soap or alimentary fats (under certain conditions).	6 frs. per 100 kgs. (2s. 5½d. per cwt.).
Other cotton seed, groundnut, and sesame oil	12 frs. per 100 kgs. (4s. 10½d. per cwt.).
Rape seed oil	15 frs. per 100 kgs. (6s. 1½d. per cwt.).
Soya and maize oil intended for the manufacture of soap (under certain conditions)	6 frs. per 100 kgs. (2s. 5½d. per cwt.).
Soya and maize oil, other	16 frs. per 100 kgs. (6s. 1½d. per cwt.).

Olive oil :		
Intended for manufacture of soap (under certain conditions)	- - -	3 frs. per 100 kgs. (1s. 2½d. per cwt.).
Other	- - -	10 frs. per 100 kgs. (4s. 0½d. per cwt.).
Palm oil, coconut, touloucouna, illipé and palmetto (<i>palmiste</i>) oils	- - -	1 fr. per 100 kgs. (4½d. per cwt.).
Castor and pulghera oils	- - -	5 frs. per 100 kgs. (2s. 0½d. per cwt.).
Fixed oils, pure, not specially mentioned	- - -	15 frs. per 100 kgs. (6s. 1½d. per cwt.).
Oilcake, containing :		Free.
Less than 12 per cent. of oil	- - -	75 centimes per 100 kgs (6s. 1½d. per ton).
From 12 up to 16 per cent. of oil	- - -	1.50 frs. per 100 kgs. (12s. 2½d. per ton).
More than 16 per cent. of oil	- - -	25 frs. per 100 kgs. (10s. 2d. per cwt.).
Margarine	- - -	25 frs. per 100 kgs. (10s. 2d. per cwt.).
Alimentary vegetable fats	- - -	25 frs. per 100 kgs. (10s. 2d. per cwt.).

GERMANY.

Fatty oils :—

(a) In casks :—

Colza and rape seed oils	- - -	12 marks per 100 kgs. (6s. per cwt.).
Linseed oil	- - -	4 marks per 100 kgs. (2s. per cwt.).
Beechnut, earlnut, poppy seed, niger, sesame, and sunflower oils	- - -	10 marks per 100 kgs. (5s. per cwt.).
Olive oil, pure	- - -	Free.
Cotton seed oil	- - -	12.50 marks per 100 kgs. (6s. 3d. per cwt.).
Castor, cotton seed, and sesame oils, officially denatured	- - -	2 marks per 100 kgs. (1s. per cwt.).
Wood oil	- - -	4 marks per 100 kgs. (2s. per cwt.).
Castor oil	- - -	2 marks per 100 kgs. (1s. per cwt.).
Fatty oils, not specially mentioned	- - -	9 marks per 100 kgs. (4s. 6d. per cwt.).
Fatty oils, not specially mentioned, officially denatured	- - -	4 marks per 100 kgs. (2s. per cwt.).
(b) In other receptacles :—		
Pure olive oil	- - -	10 marks per 100 kgs. (5s. per cwt.).
Cotton seed, beechnut, earlnut, poppy seed, and other fatty oils not enumerated, including castor oil not specified below.	- - -	20 marks per 100 kgs. (10s. per cwt.).
Castor oil in tins, weighing, with the tin, at least 15 kgs.	- - -	2 marks per 100 kgs. (1s. per cwt.).
Cocoa butter (cocoa oil)	- - -	35 marks per 100 kgs. (17s. 6d. per cwt.).
Cotton stearine oil	- - -	12.50 marks per 100 kgs. (6s. 3d. per cwt.).
The same, for manufacture of soap or candles, under conditions and officially denatured.	- - -	5 marks per 100 kgs. (2s. 6d. per cwt.).
Palm oil, palmit oil, coconut oil, and other vegetable greases such as shea-butter, unfit for consumption.	- - -	2 marks per 100 kgs. (1s. per cwt.).
Residuum, solid, from the manufacture of fatty oils, whether ground or in the form of cakes (oil cake) or not.	- - -	Free.
Margarine (preparations similar to butter or to butter fat, the fatty contents of which are not exclusively derived from milk).	- - -	20 marks per 100 kgs. (10s. per cwt.).

BELGIUM.

Seed oils and vegetable oils	- - -	Free.
Oil cake	- - -	Free.
Margarine	- - -	20 frs. per 100 kgs. (8s. 1½d. per cwt.).

DENMARK.

Hempseed oil	- - -	Free.
Rape seed oil and linseed oil	- - -	7 öre per kilogram. (3s. 11½d. per cwt.).
All other seed and vegetable oils	- - -	5 öre per kilogram. (2s. 9½d. per cwt.).
(Vegetable oil for use as food enters duty-free as "Edible goods" when it is of the consistency of ordinary fat, and imported in packages of not more than 1 kilogram each for retail sale.)		
Oil cake and oil-cake meal	- - -	Free.
Margarine	- - -	Free.

NETHERLANDS.

Coconut oil, palm oil	Free.
Linseed, hemp seed, cotton seed, rape seed, and other seed oils and vegetable oils	55 cents per 100 kgs. (5½d. per cwt.).
Oil cake, viz.: groundnut, hemp, poppy, rape, and linseed, also linseed meal cake	Free.
Margarine	Free.
Castor oil (required as an auxiliary in factories and workshops)	Free.

RUSSIA.

Vegetable oils and glycerine, unrefined:	
(1) Fatty oils (olive, laurel, cotton seed, &c.), not specially mentioned, boiled oil, siccativo oil ("Olifa").	3·10 roubles per poud (1l. 0s. 5d. per cwt.).
(2) Castor oil	4·36 roubles per poud (1l. 8s. 8½d. per cwt.).
(3) Coconut and palm oils	1·815 roubles per poud (11s. 11d. per cwt.).
(4) Glycerine, unrefined	1·65 roubles per poud (10s. 10d. per cwt.).
Margarine products	Prohibited.
Specially prepared cattle foods	19½ copecks per poud (1l. 6s. per cwt.).
Cattle feed, consisting of waste or by-products from factories	Free.

SWEDEN.

Linseed oil:—	
Raw (also linseed oil acid)	7 öre per kilog. (3s. 11½d. per cwt.).
Boiled, including bleached linseed oil and so-called "Standolja" (boiled linseed oil for making printing inks).	10 öre per kilog. (5s. 7¾d. per cwt.).
Turnip and rape seed oils	7 öre per kilog. (3s. 11½d. per cwt.).
Olive oil, groundnut oil, sesame oil and cotton seed oil:—	
In casks of any size	Free.
In other vessels (including the weight of the vessel)	5 öre per kilog. (2s. 9¾d. per cwt.).
Other vegetable fatty oils (including castor oil, hemp oil, maize oil, soya bean oil)	
Margarine	Free. 15 öre per kilog. (8s. 5¾d. per cwt.).
Oil cakes, cakes made of compressed maize meal	Free.
Vegetable fats, such as palm oil, palm-nut oil, coconut oil, and other vegetable fatty substances, which under ordinary temperature do not as a rule assume liquid form.	Free.

NORWAY.

Olive oil	1 öre per kilog. (6¾d. per cwt.).
Rape seed and hemp seed oil, unboiled linseed oil, cotton seed oil, palm oil, coconut oil, maize oil, and other similar oils.	4 öre per kilog. (2s. 3d. per cwt.).
Boiled linseed oil	6 öre per kilog. (3s. 4½d. per cwt.).
Margarine	15 öre per kilog. (8s. 5¾d. per cwt.).
Oilcake and oilcake meal	Free.

Appendix D.

MEMORANDUM BY MR. G. A. MOORE AS TO THE OUTWARD FREIGHT
OBTAINABLE BY STEAMERS CARRYING PALM-KERNELS FROM
THE WEST COAST OF AFRICA TO HAMBURG.

After a careful and exhaustive examination of all the circumstances the Committee have made a recommendation which it is hoped will have the desired effect of transferring the palm-kernel trade from Germany to the United Kingdom.

As a means of adding to this effect it is suggested that steps should be taken with a view to curtailing the outward cargo available from the Continent to West Africa, return freights being an important factor in determining the destination of shipping.

It is well known that this outward cargo consists almost exclusively of cased spirits, which are already subject to a high rate of duty in the West African Colonies.

These spirits are shipped from the Continent on account of their low price and this is due to several causes :—

- (1) The restrictions placed upon the manufacture of alcohol in this country by the Excise authorities.
- (2) The absence of modern and economical plant for the manufacture.
- (3) The extra cost of bottles and cases if made here.

The first two reasons are to a large extent removable and one object of this memorandum is to call attention to that fact.

The step which, in the opinion of the undersigned, should be taken to direct this trade to the United Kingdom, is merely that, when the Colonial Authorities see fit to make a further increase in the rate of duty on spirits imported into the Crown Colonies of West Africa, such an increase should apply only to those shipped from the Continent or other country than the United Kingdom.

The various Governments of our West African Colonies have steadily raised the rate of duty on imported spirits as they were able to do so without causing the natives to turn to the production of fermented drinks, a result which would be disastrous to the future of these territories. It is therefore suggested that the next *increase* should be made the occasion for the introduction of a differential tariff.

The advantages to be derived from such a diversion are numerous ; they include :—

- (1) The erection of up-to-date distilleries.
- (2) The production of cheap industrial alcohol and the stimulation of the numerous manufactures dependent thereon.
- (3) The introduction of a large bottle- and case-making industry.

This suggestion has been unanimously approved by the Committee of the West African Section of the Liverpool Chamber of Commerce.

G. A. MOORE.

The SECRETARY OF STATE to the GOVERNOR-GENERAL OF NIGERIA
and the GOVERNORS OF SIERRA LEONE and the GOLD COAST.*

Downing Street,
1st June 1916.

Sir,

In my telegram of the 22nd of July 1915 I informed you that I had appointed a Departmental Committee to consider the position of the West African trade in palm kernels and other edible and oil-producing nuts and seeds, and to make recommendations for the promotion in the United Kingdom of the industries dependent thereon. I now have the honour to transmit to you copies of the Report which has been presented by the Committee as a result of their deliberations.

2. The Committee's recommendations are four in number: the imposition for a period of years of an export duty on palm kernels, to be remitted if the kernels are brought to the United Kingdom and crushed there; the popularisation of palm kernel cake as a feeding stuff for cattle and other live-stock; the amendment of the Food and Drugs Act so as to allow the addition of the words "British-made" to the word "margarine" on the statutory wrapper; and the further investigation of the properties and cultivation of the oil palm in the Colonies.

3. I have considered carefully the report which the Committee have presented and I see no reason why their proposals should not be adopted forthwith. Of their four recommendations, the first and last alone call for action on the part of your Government, and as regards the investigation into the properties of the oil palm you will no doubt direct the Agricultural and Forestry Departments of your Government to continue, and to pay increased attention to, this particular branch of their work. It appears to be clear that more information is desirable as to the palm tree and the most advantageous methods of working it commercially, and, in view of the great importance of the industry, you will, I am sure, cause the necessary action to be taken.

4. As you will observe from the opening paragraphs of their report, the Committee concentrated their attention upon the trade in palm kernels and did not think

* The Governor of the Gambia has been sent a copy of this despatch and requested to take similar action.

it necessary to make any recommendations concerning the other oil-producing nuts and seeds from West Africa. It is not necessary here for me to recapitulate the facts as to the palm kernel trade, which are set forth exhaustively in the Committee's report. It is enough to observe that, for a variety of reasons, the trade in this important article of commerce was, at the outbreak of the present War, almost entirely controlled by enemy merchants and seed crushers, and that British firms were not in a position to deal satisfactorily with the annual crop.

5. You will, I have no doubt, agree with me that such a state of affairs ought not to be allowed to occur again, and that any practicable measures should be taken to keep this trade in the hands of British seed-crushers. To this end, I consider that the Committee's recommendation of an export duty, to be fixed provisionally at 2*l.* per ton of palm kernels and to be remitted on production of proof that the kernels have been delivered to, and crushed by, a seed crusher in the United Kingdom or any part of the British Empire, is a practicable proposal which should be adopted.

6. It will therefore be necessary to introduce legislation in the West African Colonies to impose such an export duty upon palm kernels and to provide for its remittance when proof is produced of the crushing of the kernels in this country, or in some other British possession, and I should be glad to have an expression of your views as to the manner in which the necessary legislation should be framed so as to cause the least trouble to the merchants dealing in palm kernels, and, at the same time, to ensure that kernels shipped to foreign destinations do not escape payment of the duty. You will realise that uniformity is desirable, and I think it best that I be afforded an opportunity of considering your proposed legislation in draft form.

7. In this connection, I would draw special attention to the Committee's suggestion that a system be introduced whereby the exporter will give a bond for the amount of the duty, such bond to be cancelled on production of the necessary certificate from a seed-crusher within a specified period. This period must not be too short, in view of the delays which may occur in the transit and delivery of kernels in this country or elsewhere.

8. The Committee, as you will observe, suggest a duty of 2*l.* per ton, in the first instance, as a tentative measure. If this amount proves inadequate for its purpose it should be raised, and it may therefore be expedient that power should be taken in the Ordinance to modify the amount of the duty by Order of the Governor in Council, which is a more expeditious process than fresh legislation. It will be necessary that the course of the trade should be carefully watched, at any rate for some years after the conclusion of hostilities.

9. The Committee do not anticipate that the native producer of palm kernels will suffer as a consequence of the action which they recommend, since they believe that the increase in the demand within the Empire will be adequate to counterbalance the loss of the German market, assuming that the imposition of the export duty proves sufficient to effect the purpose for which it is intended. This matter, also, will require close scrutiny. The prices paid to the producers on the West Coast of Africa had been increasing prior to the outbreak of war, when they dropped. Prices in Europe are now very high, partly owing to increased freights and partly owing to the shortage of tonnage, but, so far as I am aware, the prices paid to the native producer are below the pre-war prices, or, at any rate, no higher. It will, in my opinion, be advisable to watch carefully the course of local prices for palm kernels and, if possible, to avert anything in the nature of a combination of merchants to depress prices artificially for their own profit.

10. I shall be glad if you will take the report into consideration and cause the legislation necessary to carry it into effect to be drafted as soon as practicable. The Committee recommend that the export duty should be levied for the period of the War and for five years thereafter, and it will be necessary to review the position again at that date in order to decide whether to maintain the duty or not.

I have, &c.,

A. BONAR LAW.

COMMITTEE ON EDIBLE AND OIL-PRODUCING
NUTS AND SEEDS.

MINUTES OF EVIDENCE.

[The Report is published separately as Cd. 8247.]

Presented to both Houses of Parliament by Command of His Majesty.
June 1916.



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WEST AFRICA.

MINUTES OF EVIDENCE

TAKEN BEFORE THE

COMMITTEE

ON

EDIBLE AND OIL-PRODUCING NUTS AND SEEDS.

FIRST DAY.

Wednesday, 18th August 1915.

Colonial Office, Downing Street.

MEMBERS PRESENT:

Mr. A. D. STEEL-MAITLAND, M.P., Under-Secretary of State for the Colonies (*Chairman*).

Sir G. FIDDES, K.C.M.G., C.B. (Assistant Under-Secretary of State).
 Sir WILLIAM G. WATSON, Bart.
 Sir F. LUGARD, G.C.M.G., C.B., D.S.O.
 Sir HUGH CLIFFORD, K.C.M.G.
 Sir OWEN PHILLIPS, K.C.M.G.

Mr. L. COUPER.
 Mr. C. C. KNOWLES.
 Mr. T. H. MIDDLETON, C.B.
 Mr. G. A. MOORE.
 Mr. T. WALKDEN.
 Mr. T. WILES, M.P.

Mr. J. E. W. FLOOD (*Secretary*).

Professor DOUGLAS ALSTON GILCHRIST, M.Sc., called and examined.

1. (*Sir G. Fiddes*.) You are Professor of Agriculture at Armstrong College, Newcastle-upon-Tyne?—That is so.

2. I believe you have given special attention to the part of the question with which we are now occupied, namely, the value for cattle of feeding stuffs derived from nuts?—We have made feeding experiments connected with this question.

3. Possibly it will be best to begin by asking you your experience generally with regard to feeding stuffs derived from nuts?—I might say that generally we have had feeding experiments in Cockle Park with earth-nut cake—that is monkey-nut cake, or ground-nut cake. We have also had feeding experiments at Offerton Hall, the Dairy Research Station for the Durham County Council, with palm-kernel cake. Further than that we have had experiments at Newton Rigg, Penrith, at the Cumberland and Westmorland Farm School, as to the feeding value of coco-nut cake for cattle. Those are the main experiments which we have conducted.

4. We will take palm-kernel cake first. You have, I suppose, conducted your experiments from the chemical point of view as well as from the point of view of the effect of the experiments on cattle?—Yes; we have analysed the cakes, the analyses being made by our adviser on agricultural chemistry.

5. Can you tell us anything about the composition of palm-kernel cake?—I may say that we have been surprised to find that the composition does not come out so good in any case in our analyses in this country when we compare them with the analyses of palm-kernel cake given in United States text-books. I think perhaps that may be due to what has been explained to us, namely, that the decorticating process is sometimes not very complete, but I do not know whether that is so.

6. What do you mean by "decorticating"?—The removal of the husk or the shell of the nut may not be

quite complete. I do not know what the reason of it is, but the analysis does not quite come up to the American analysis.

7. Is there any corresponding German analysis that has come under your notice?—No, but I think the German analyses are nearer the analyses we get.

8. What are the chief factors that differ on the question of the composition of the cake as shown by analysis?—At Offerton Hall on the analyses by Mr. S. H. Collins, M.Sc., the adviser in agricultural chemistry to Armstrong College, we found the oil to be 5.98 in palm-nut cake; albuminoids 18.90; carbo-hydrates 43.59; fibre 13.43; and ash 3.75.

9. In the American analyses I think you say the albuminoids are higher. What does that mean when translated into practice?—It practically means that the value of a cake as a rule is measured by the albuminoids.*

10. The value for fattening purposes, or for milking purposes?—The value for both. In other words, the foods usually available on a farm want making up in albuminoids, and for that reason a rich cake like decorticated cotton cake, or linseed cake, or soya cake has on the whole a higher value to the British farmer, mainly because it is very rich in albuminoids.

11. Then the proportion of oil is of less importance?—The oil is an exceedingly difficult question. Oil certainly for dairy cattle is of less importance. If the oil is not apt to become rancid, then a certain amount of oil is very useful; but we do find in our feeding experiments that the albuminoids are, generally speaking, more important than the oils.

12. As regards the value of the cake for fattening cattle, or for milch cows, or for pigs (which so far as I know are the three main uses for the cake), what is

* The witness found on reference afterwards that American analyses show a higher content of oil but not of albuminoids.

18 August 1915.]

Professor D. A. GILCHRIST, M.Sc.

[Continued.]

your experience of the palm-kernel cake?—In the case of palm-kernel cake we have only had experiments with milch cows; we have not had experiments with it either in the case of pigs or for fattening cattle. As regards milch cows, at Offerton Hall, during the past winter (1914-15) Mr. Frank P. Walker, M.Sc., adviser in agriculture to the Armstrong College, conducted trials to test the feeding value of palm-kernel cake as compared with Bombay cotton cake. Six lbs. of palm-kernel cake were fed to one lot of cows and 6 lbs. of Bombay cotton cake to another lot. Bombay cotton cake was chosen because it was about nearest in composition to palm-kernel cake. The palm-kernel cake was a little richer in oil and a very little richer in albuminoids, but it had not so much fibre.

13. Is Bombay cotton cake commonly used in this country?—It has been very largely used since it became known in the north of England and especially in Northumberland, this being largely due to our experiments at Cockle Park. In the experiments which we conducted at Offerton, 6 lbs. of palm-kernel cake was fed to one lot of cows per head daily, and 6 lbs. of Bombay cotton cake to another lot. Other foods were fed in proportion, but those cakes were the chief concentrated feed.

14. Do you say those were the quantities per diem?—Yes. At the end of eight weeks the lots were reversed—6 lbs. of Bombay cotton cake were fed to each cow in lot 1, and 6 lbs. of palm-kernel cake to each cow in lot 2. We adopted that practice because we find that eight weeks is sufficient to test a food, and, if we go on with the same two lots of cows but reverse the feed, we get over any accidental variation in the cows. At Offerton we find that system works very well.

15. How many cows were there in each case?—Five cows in each lot. On the average the amounts of milk produced by each lot of cows were about equal, and the effects of the two cakes on the weight of the cows were practically equal. We find it desirable when making experiments with dairy cows to note the quantity of milk given by each lot of cows, and also to note whether the cows increase or decrease in weight and to what extent; and it was interesting to find that the results on the two lots of cows, both in the weight of the cows and the amount of milk produced, were practically equal.

16. If you had a sixteen weeks' experiment with two lots of cows, each lot having had eight weeks of one feed and eight weeks of the other feed, it seems to me that theoretically the results should have been equal. I do not see how you establish the difference?—We compared the results at the end of the first eight weeks, and then again at the end of the second eight weeks. The conclusions which I have given were arrived at by comparing the results at the end of each of the two periods of eight weeks.

17. It comes to this, that by the double experiment the results of palm-kernel cake and Bombay cotton cake were practically the same?—Practically equal. There are two further points which are important. It was interesting to find that the milk was rather richer in fat when palm-kernel cake was fed, and also that the cows which were receiving this cake had the best bloom, and were in the best condition; you could easily see from the look of the hair and their glossiness that they were thriving better. Mr. Walker was very much struck with that and so was the cowman. At Offerton Hall we have had many experiments, but have not been able to alter the amount of the fat in milk by different feeding, and it is rather interesting to find that palm-kernel cake has had a slight effect in that direction—it may be accidental, but still the milk was distinctly richer in fat, and that agrees with German results. It is claimed that palm-kernel cake is one of the few foods which may have, not a big influence, but a certain influence on the milk by increasing the fat.

18. As a matter of curiosity, I should like to know what proportion this palm-kernel cake represented of the whole of the feed fed to the cows per diem?—The rations fed were, to lot 1, 56 lbs. of swedes, 12 lbs. meadow hay, 6 lbs. oat straw, 2 lbs. malt coombs, 3 lbs.

of soya cake, half a pound of oat chaff and 6 lbs. of palm-kernel cake. Of the concentrated food used, 6 lbs. were palm-kernel cake and 5 lbs. were other foods, so that the larger half of the concentrated food used was palm-kernel cake.

19. You were also using soya cake?—Yes, and I may say we had to use soya cake because we could not get the albuminoids up unless we used either soya cake or decorticated cotton cake, and for that reason we also used malt coombs which are rich in albuminoids.

20. Did you have any difficulty in getting the cows to take the palm-kernel cake?—At first—but that applies to any new food.

21. I suppose the cake was mixed with the other food?—Yes.

22. You did not administer it by itself?—It was mixed with the other foods.

23. It was, so to speak, disguised to a certain extent. Was there any scouring action?—No scouring action. It was, if anything, laxative in its effects, and I think Mr. Walker states that in his report.

24. Do you know where this particular cake was obtained from. It is quite possible that some of the alleged scouring action might be due to faults in the preparation of the cake, and therefore it would be interesting to know where the samples you experimented with were obtained from?—From Messrs. Lever Brothers.

25. I think you have also made some comparison with linseed cake and cotton cake?—Yes, in another experiment with decorticated cotton cake. In this experiment the only change in the ration was that 6 lbs. of Bombay cotton cake were introduced instead of 6 lbs. of palm-kernel cake. I should like to say that the results of the experiment and of the composition of the palm-kernel cake indicate that it has a slightly higher value than Bombay cotton cake, but it should not be compared with a rich cake like decorticated cotton cake. I think it is not desirable it should be so compared owing to its low-percentage in albuminoids.

26. Of course, from our point of view, it is necessary to compare it with anything which might enter into competition with it as a feeding stuff.—I think palm-kernel cake has been injured by suggestions being made to compare it with rich cakes with which it is not suitable for comparison. I think if farmers were told that it is not a cake that would replace a rich cake like decorticated cotton cake, but that it is a cake with a composition more like the undecorticated cotton cakes, that would enable us to place it more quickly before farmers in its true position. It would not be fair, for instance, to compare so many pounds of palm-kernel cake with so many pounds of decorticated cotton cake because one of the rations would be wrongly balanced.

27. You may assume, and quite rightly, that I know nothing about these agricultural matters. Would a farmer be well advised to use cotton cake and to give the go-by to palm-kernel cake, or is there a use for both?—It depends entirely on the price. At the present time we can obtain in Newcastle palm-kernel cake for 6*l.* 10*s.* per ton, whereas Bombay cotton cake costs 8*l.* 17*s.* There is no doubt as to palm-kernel cake being very much preferable at the present time, but a few months ago palm-kernel cake was being offered in Newcastle at too high a price when Bombay cotton cake was much cheaper. There was a sudden rise in the price of palm-kernel cake and as we had just induced a number of farmers to try it, and had actually got an agent in Berwick market to sell several tons to farmers, he had to write and tell them that the price had been increased by 30*s.* which just made the difference between the cake being useful and not being useful. The farmers knew the composition of it and knew it had not the value represented by that price.

28. So it comes to this, that provided the price of palm-kernel cake is sufficiently low it is quite a useful feeding stuff for the farmer to have; but if the price rises above a certain point the farmer had better turn his attention to other foodstuffs?—That is so.

29. It is necessary that palm-kernel cake should always be appreciably cheaper than cotton cake?—The market for cakes is in a most extraordinary position at present. The cheaper cakes are now relatively much

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dearer than the good cakes. For instance, Bombay cotton cake is 8*l.* 17*s.* 6*d.* a ton and decorticated cotton cake is only 9*l.* 5*s.*, but that does not represent the difference in their real value at all.

30. In other words, it is at present much cheaper to buy the higher priced product?—Much cheaper.

31. I take it palm-kernel cake means the residue after crushing?—Yes.

32. It does not mean, the residue after extraction, which brings us on to the meals?—Palm-kernel cake is the residue after pressure. I think the name "palm-kernel cake" is better than "palm-nut cake" because "palm-kernel cake" makes it clear that the two outer coverings are removed.

33. Have you anything further to say about palm-kernel cake before we pass to the meal?—No, I think that is all.

34. As regards the meal, that is produced and extracted by solvents instead of by pressure?—Yes.

35. I think you have made experiments with that too?—We have made no experiments with that, but in connection with it I may say that there has been a good deal of interest shown in the North of England as to what pig food is really the best at the present time, especially as gram, which had been used very largely, stopped coming from India.

36. Is there any legislation in this country which will ensure anything that is sold as palm-kernel cake being up to its description?—If a food is sold as decorticated cotton cake or palm-kernel cake it must be that. If palm-kernel cake is sold as such, but is mixed with any other thing the seller is liable to severe penalties; but if sold as a pig food meal you cannot question what is put into it.

37. You have made no experiments as regards pigs, I think you said?—Not with palm-kernel cake meal.

38. I suppose you have not made any experiments as regards the feeding of horses with it?—No.

39. Have you any information to give us with regard to ground nuts?—With regard to ground nuts we carried out in the winter of 1904-5 experiments at Cockle Park as to the comparative feeding value of earth-nut cake and decorticated cotton cake for fattening cattle, and a trial was conducted with milch cows at Newton Rigg. I prefer the name of "earth nut" to "ground nut," because I think it is a little more definite.

40. But of course we know them as ground nuts.—The cattle were blue greys at Cockle Park, about seven months old at the beginning of the experiment, and were sold fat at the end of the five months feeding trials, being then 7 cwt. live weight. Each beast received for each daily ration 8½ lbs. of meadow hay, 26½ lbs. swedes, 1½ lbs. of maize meal, and either 3 lbs. decorticated cotton cake, or 3 lbs. earth-nut cake. In this case decorticated cotton cake was chosen as the check food to earth-nut cake, because both are rich in albuminoids and very similar in composition, and if we had taken Bombay cotton cake we should have required some other feed with it to bring up the albuminoids to make it comparable with earth-nut cake. The cattle receiving decorticated cotton cake gained 14½ lbs. per head weekly during the 20 weeks of the experiment, whereas those receiving earth-nut cake gained 10·6 lbs. per head weekly. That is a considerably less gain, but the percentage of carcass to live weight, when killed, was 1·5 per cent. higher from the cattle receiving earth-nut cake than from those receiving decorticated cotton cake. That brings the relative live weight gains of the earth-nut cake cattle nearly up to 12 lbs. a week instead of 10·6 lbs. In that experiment we came to the conclusion that earth-nut cake when clean was very nearly equal to decorticated cotton cake in feeding value. As to the composition of the two cakes, in the decorticated cotton cake the albuminoids were 52·12 per cent., and in the earth-nut cake 48·5. What undoubtedly weighed against the earth-nut cake was the fact that there was 2·35 per cent. of sand in it as against only 0·10 per cent. of sand in the decorticated cotton cake.

41. Where did you get your earth-nut cake from?—From Hull, from Mr. Edwin Robson, of the British Oil and Cake Company.

42. I take it as to the sand present, that is a pure question of its preparation?—Yes, it may be; but of course the fact is that the habit of the earth-nut is to go down into the soil, which makes it more difficult to clear the sand, because when the husks are removed some of the sand off the outer husk may get mixed with the kernel.

43. Would that produce a scouring effect?—This is an experiment which was made some years ago, but so far as I remember it did not have that effect. I do not think the earth-nut cake is a cake that is liable to produce scouring; it is not a costive cake, but I believe, if anything, laxative. Then in the same winter at the Cumberland and Westmorland Farm School at Newton Rigg, the manager, Mr. Lawrence, conducted a trial on the feeding value of earth-nut cake for milch cows. During twelve weeks from February to May 1905, each cow received daily 42 lbs. of swedes, in the first part of the time, and in the latter part the same amount of mangolds, two fodderings of hay, one foddering of straw, 4 lbs. of crushed oats, 4 lbs. of decorticated cotton cake for the first and last three weeks, and 4 lbs. of earth-nut cake for the middle six weeks. The total milk yield of the first and the last three weeks was practically the same as that of the middle six weeks, while the average percentages of butter fat in the milk during the two periods was practically equal. The effects of both cakes on the weight of the cows were also about the same. The results showed that earth-nut cake when of good quality was a good food for milch cows and had a value for this purpose not far short of decorticated cotton cake. The results of that experiment are given in more detail in the Cockle Park Bulletin No. 12, page 31; I have summarised them.

44. What is your experience with regard to the keeping value, both of palm-kernel cake and ground-nut cake?—May I answer that question generally?

45. Certainly.—We find that all feeding cakes should not be kept long. That is one of our difficulties even with regard to Bombay cotton cake and decorticated cotton cake, and in fact all cakes. In the case of these two particular cakes, I think earth-nut cake will keep for a longer time than palm kernel cake, and my reason for saying so is that the samples we keep for a year or two in our laboratory do not go far wrong—they become hard, not very rancid, but just a little strong; they do not become rancid quickly. Palm-kernel cake kept for a few months, even dry, does smell very strongly, and it is a cake that should be used as quickly as possible.

46. What is your idea as to how soon after crushing it should be used?—I think it would be advantageous to use it within five weeks after crushing, or perhaps, six weeks.

47. The point is one of importance, because one suggestion, out of many which have been made, is that it would be possible to put up mills in West Africa. It seems to me that the question of keeping the cake would come in rather prominently when considering that suggestion?—I may say that some years ago we heard of a cargo of Bombay cotton seed that became heated on the voyage to this country. That seed may have been ground into cake, and, if so, the cakes made from it would not keep well. We had a complaint from one buyer, and, on enquiry, we found that this heating very likely was the cause. In reply to your question I should say that it would not be desirable to crush the palm kernels and then have the cake undergo a long voyage. I should much prefer to have it used as quickly as possible after being crushed.

48. Now, I want to put to you a rather general question. Do the experiments you have conducted and the inquiries you have made suggest to you that there is much prospect of popularising these two cakes as feeding stuffs? Have you any information as to the progress made recently with regard to the use of these cakes among farmers?—I only received the invitation to give evidence on Friday last, but I have made what inquiries I could, and I find that not much palm-kernel cake is being used in the North of England, mainly because the price asked some months ago was too high.

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49. But given a reasonable price and given a large output of palm oil, and therefore of crushed palm kernels, do you think there would be a reasonably large market for the residue, namely, the cake, in this country?—My impression is that that is so, but I just wish to say that I am disappointed, because owing to the rise in the price we have not been able to get it tested by farmers as it would have been. However, I am certainly under the impression that there is a good outlet for palm-kernel cake.

50. Is it established by your inquiries that in the first place there is no *a priori* prejudice on the part of farmers against palm-kernel cake?—Not as palm-kernel cake. Of course, all farmers are naturally prejudiced against an untested food. The fact of this cake not keeping is fairly well known. Farmers who have bought small quantities and kept it for some time have found it smelling very strongly, and that has created a prejudice against it. It is exceedingly important to impress upon them not to keep it long.

51. There is no invincible repugnance on the part of cattle to take it?—I do not think so.

52. And it has no bad effect on the cattle?—No, not so far as we can make out.

53. Have you any information as regards the use of the cake in Germany?—Practically none, but I know it was very largely used in Germany.

54. You have, however, no special information on the subject?—No special information.

55. I suppose it is hardly fair to ask your view as to the price at which the cake would have to be put upon the market if it is to compete with other foods such as cotton cake, and so on, except in so far as a comparison of their relative value in albuminoids would establish a ratio between them?—In our Cockle Park feeding experiments we have had a remarkable proof in all the tests we have made that relatively the composition of a food does indicate, not only its chemical value, but its real value. We made up a table in February, and at that time Egyptian cotton cake was selling at 7*l.* 12*s.* 6*d.* a ton, and from its composition we made its feeding value 4*l.* 19*s.* 7*d.*, which was very different from 7*l.* 12*s.* 6*d.*, its price. Palm-kernel cake was then selling at 7*l.* 10*s.* a ton, and its unit value is rather higher; its unit value, compared with Egyptian cotton cake at 5*l.* a ton is probably 5*l.* 5*s.* or 5*l.* 10*s.*, but owing to the fluctuation in price it is better to establish a ratio between them.

56. (Mr. C. C. Knowles.) You say that in your opinion palm-kernel cake is worth 5*s.* or 10*s.* a ton more than Egyptian cotton cake or Bombay cotton cake—undecorticated cotton cake?—Yes.

57. You also tell us that higher prices have been asked for it. Is that since the war?—In December or January last palm-kernel cake was offered in the North of England at 5*l.* 10*s.* a ton. As the result of addresses given by us at Berwick and at other centres in the North of England, several farmers would have tried this cake, but the price was suddenly raised to 6*l.* 10*s.* a ton.

58. My notes give the price of palm-kernel cake in Liverpool in early January at 6*l.* 5*s.* a ton?—I am counting the carriage to Northumberland, and I take the price delivered at a Northumberland station.

59. For a very long time, palm-kernel cake has been offered in this country at a very much lower price than undecorticated cotton cake. The reason farmers have not used it, I suppose, is that the palm-kernel cake was not at that time sufficiently advertised, and they did not know of it?—I made inquiries some years ago and found that although palm-kernel cake could be got, it was only in very small quantity, and that it was not likely to be increased. A market being made for it in Germany, the price being obtained in Germany was probably relatively higher than the price in this country.

60. Do you consider Egyptian undecorticated cotton cake is worth more or less than Bombay cotton cake?—A good quality Bombay cotton cake is worth more than a bad quality Egyptian cotton cake; but, when you have them both of equal quality, we find Egyptian cotton cake is worth rather more. We have tested

that by feeding experiments at Cockle Park, and have found it worth about 10*s.* a ton more.

61. As a rule, Egyptian cotton cake runs anywhere from 10*s.* to 1*l.* a ton more in price than Bombay cotton cake?—Yes, and it usually has about 2 per cent. or 2·5 per cent. more of albuminoids in it.

62. In comparing palm-kernel cake with Egyptian cotton cake you say it is, in your opinion, worth 10*s.* a ton more?—From 5*s.* to 10*s.* a ton more.

63. Then if Bombay cotton cake is worth 5*s.* or 10*s.* a ton less than Egyptian cotton cake, palm-kernel cake must be worth 10*s.* to 1*l.* a ton more than Bombay cotton cake, in your opinion?—Yes.

64. That is a very important point?—I would not, perhaps, put the worth of Bombay cotton cake quite so much as 10*s.* to 1*l.* a ton less than palm-kernel cake, but perhaps at 5*s.* to 15*s.* a ton less. The figures for digestible albuminoids (not the total albuminoids) in Bombay cotton cake are about 14 per cent., in Egyptian cotton cake 17 per cent., and in palm-kernel cake 16 per cent., but although palm-kernel cake has usually 1 per cent. less of digestible albuminoids than Egyptian cotton cake, it has considerably more carbohydrates, so that increases its value.

65. As I dare say you know, Germany dumps her undecorticated cotton cakes in this country and sells them at any price, but they keep their palm-kernel cake, and I hear given as one reason for it that they go in so much for stall feeding, and palm-kernel cake is more suitable for stall feeding than for feeding cattle in the open. In this country we only stall feed in the depth of winter.—That is so, there is little stall feeding in summer.

66. But in Germany there is a lot of stall feeding done.—That is borne out by the experiments in Northumberland. The reason that Bombay cotton cake is so high in price just now is that it is slightly costive in its action, and for feeding on grass it has become a valued food. Then very little Bombay cotton-seed cake is coming into this country at the present time, and those accustomed to it are afraid to change over to palm-kernel cake, thinking it would not be suitable for the purpose because it has not got that slightly costive character that is so desirable. I think what you mention in your question is quite right.

67. There is a very great scarcity just now both of Egyptian and Bombay cotton cake, and we must not lose sight of that as being one of the reasons for this extra demand for palm-kernel cake, which would not arise perhaps if we had a free quantity, as we previously had, of cotton cakes coming into the country?—Yes.

68. (Sir Owen Philipps.) Has your attention been drawn to the fact that in Germany they will give 10*s.* to 30*s.* a ton more for this palm-kernel cake than has been given for it in England in the past?—Yes.

69. Can you give us any reason for that? You have told us that in England it does not go well as a food for cattle at grass. Is the reason anything to do with the fact that in Germany they use such a very large quantity of wet slips of sugar beet?—I do not know what the effect is of the sugar-beet refuse, but if it has a rather costive effect, then palm-kernel cake would be a very good feed to go with it, and that may be the reason for it. In connection with the first part of your question, I should like to say that I think the reason why cakes like palm-kernel cake and earth-nut cake have not been used largely in this country is simply because they have never been sold to any extent, and, when they have been sold, they have got into the compound cake merchant's hands. There has been little attempt made by the producers to make them known.

70. (Sir F. Lugard.) You said that the palm-kernel cake had to be fed to stock within five weeks or else it began to smell and turn rancid?—Yes, it is better to do so.

71. Is there no known remedy for that? Is there no chemical or other substance which would preserve the cake?—There is a known remedy, and that is to dose it with boric acid or some preservative.

72. Would that hurt the cattle?—It is very desirable not to overdo preservatives, and I am quite sure they

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are sometimes overdone. What might be much better would be to get very thorough pressure used in order to get as much of the oil from the cake as possible. It would be extremely interesting and well worth while to make experiments with palm-kernel cake and meal, because I have no doubt the meal would keep longer as the oil is more thoroughly extracted. I think that is perhaps a very important point to bear in mind.

73. That is to say, cake made by extraction instead of by expression would keep longer?—I do not wish to be definite upon the point, but it is well worth while experimenting to see what the result would be.

74. (*Mr. G. A. Moore.*) Can you tell us what the requirements are with regard to analyses in the case of cake dealers? Are they obliged to guarantee a certain analysis in their compound cakes?—In compound cakes, in common with other foods, they are not obliged to give a complete analysis, but only the albuminoids and oil.

75. There is no compulsion upon them to provide an analysis with their cakes?—Yes, there is a compulsion to give the analysis, but it need not be a complete one.

76. I ask the question because when speaking to several of the compound cake makers in Liverpool they have always told me that the analysis coincides very nearly with that of undecorticated cotton cake and that as far as they are concerned in making their compound cakes they will choose whichever of those two is the cheaper, whether undecorticated cotton cake or palm-kernel cake; they will take either of those indifferently almost because it does not affect the analysis?—I can quite understand that from the analysis, but I should have thought most of these compound cake manufacturers had noted the results of feeding experiments, and would have considered not only the analysis but the costive and laxative effects, and would not suddenly change over in a well-known compound cake, such a substance, say, as Bombay cotton cake, in the mixture for palm-kernel cake, but would take care that the other ingredients counteracted these properties.

77. In the experiments which you have mentioned I notice that there was included a small quantity of Soya cake. When Soya beans first came to this country was not there a good deal of difficulty with regard to feeding them to cattle? Had not they a poisonous effect of some kind?—I am very glad that question has been put. At Coekle Park we made almost the first experiment in feeding with Soya cake. We have used Soya cake largely for feeding cattle and young cattle only six months old, and since the first experiment we had with it we have found that Soya cake has proved the best and cheapest concentrated food at our disposal for the last five or six years. Also, I may say that great prejudice was created against Soya cake because there was a case in which a bean meal, supposed to be made from Soya beans, was blamed for poisoning some cattle. I am quite sure it was not Soya bean meal at all but that another bean, the Java bean, had got into the meal.

78. It was some other bean mixed up with the Soya bean?—Yes, and no Soya beans may have been in the meal.

79. But it must have come from China?—No.

80. The Soya beans were nearly all shipped from China?—Yes, but I think this mixed bean meal did not come from China.

81. My recollection of the earlier arrivals of Soya beans is that there was a good deal of trouble owing to complaints from people who had used Soya beans for food, and that they were all Manchurian beans?—There were a number of complaints probably because the Soya bean is a little more laxative than decorticated cotton cake, and, owing to that, farmers at first did not take precautions, and they found difficulties. Then a further difficulty arose; I believe I am correct in speaking from memory, that one or two cargoes of Soya beans came to this country very badly heated on the voyage from China, and the cake or meal from those beans would most likely be sold. Any food that is badly heated, no matter what it is, will do harm. Probably these few cargoes of Soya beans did a great deal of harm to Soya cake at the time.

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82. My reason for asking the question about Soya beans is simply because in your experiments you give a certain amount of Soya cake as having been used with the palm kernel cake and the Bombay cotton cake?—Yes.

83. I was wondering whether the fact that Soya cake was used might not affect the result differently in regard to the two cakes you were testing. Perhaps if an experiment had been made without such an addition as Soya cake it would have been more satisfactory and more conclusive?—That is an important question. I think perhaps decorticated cotton cake would have been better with palm-nut cake instead of Soya cake, but at the same time it has not militated against the results because the experiment worked out in quite a satisfactory way. The fact that they were getting a fair amount of meadow hay and oat straw would probably keep it right. Had there been a distinct laxative tendency it would have been an advantage to substitute cotton cake for Soya cake.

84. (*Mr. T. Walkden.*) Did I understand you to say that the analysis of palm-kernel cake from America was better than that from the United Kingdom, or that it turned out better?—The analysis that is given in the best-known book on cattle feeding in the United States shows a higher percentage of oil.

85. All these palm kernels would come from West Africa?—Yes.

86. In some place I know they compel them to have certain analyses; for instance, take the French colonies, where the analysis would turn out 3 per cent. of shell and dirt, whereas from other parts it is probably 10 per cent. Is it possible that in America they have a better system of cleaning or cleansing the kernels?

87. (*Chairman.*) Mr. Knowles tells me that he is not aware that any palm-kernel cake is imported from America at all?—I do not think there is any palm-kernel cake imported from America. All I said was that in comparing the analysis given in an American text-book it showed it to be higher in oil than we had known it here. When we came to compare the analysis in that reference book with the cake we used, then we expected palm-kernel cake to be rather richer than our analysis shows.

88. (*Mr. T. H. Middleton.*) You refer to Henry's book, I suppose. The edition is several years old?—I am referring to the new edition of 1913 and the analysis is still in it—it is Henry's book.

89. (*Mr. T. Walkden.*) With regard to the keeping of palm-kernel cake, here I suppose it is only a few weeks that it will keep, but in Germany I understand it will keep very much longer, and from inquiry which I have made it is owing to the use of some preservative, such as boracic powder. Is that likely to be so?—I believe some preservative is used with Bombay cotton cake and other cakes, but I do not think as much as formerly. I have no doubt in Germany the cake has been kept in that way; but the point I made was that it is rather desirable to get the cake used quickly, as no doubt it will then give better results. If preservatives are used there is great danger that it will be over-dosed with preservatives.

90. (*Sir William G. Watson.*) With regard to its keeping properties, I think in Germany there is much more extraction than crushing, and by the process of extraction I believe a much smaller proportion of oil is left in the cake or meal, and therefore the keeping properties would be improved owing to the lesser quantity of oil, because it is the oil that goes rancid.—I am sure that is one direction in which something could be done in order to get the cake or meal to keep longer.

91. I also understand that in Germany there was a big difference between the meal and the cake, but gradually they are getting closer together, and now, I believe, the Germans like the meal almost as much as the cake, although it has less oil; whereas an English farmer looks at the analysis and has regard to the quantity of oil in the cake?—Yes.

92. Another thing the Germans say is that they see the cattle enjoy both palm-kernel cake and copra cake, and therefore they do better on it than the analysis

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would lead you to expect. I think you said something in your evidence as to some particular cattle which had done better or looked better?—Yes; I do not think they enjoyed it better, but they certainly had a better bloom. The difference was this: if you take two lots of sheep and feed one lot on linseed cake with 12 per cent. of oil, and another lot on another cake with 5 per cent. of oil in it, those sheep getting the cake with the 12 per cent. of oil would have better bloom and glossier wool. I think it was the same in this case to which I have alluded.

93. When cake is dear, I take it farmers are always inclined to go to cheaper qualities because they are trying to buy for price rather than for quality. They have a rooted objection to paying 12l. a ton for cake when they see something else is to be obtained at 8l. a ton?—I am glad to say that, as a rule, north country farmers know better; they will not buy cheap cakes unless they are getting value. On the whole there is a very good knowledge of cakes possessed by our good-feeding farmers in Northumberland, for this very important reason, that they know that to buy one of the cheaper cakes when they have got a lot of roots and straw, would mean that they would find a very serious loss, because they would not get the albuminoids.

94. With regard to ground-nut cake, there is always a quantity of sand in it naturally, I take it, because it comes out of the earth and one would expect to find sand?—It may be difficult to get it out.

95. With regard to the analysis of palm-kernel cake, you said the analysis you had made recently—I presume since the war broke out—did not give such good results as some analyses in America; but do not you think it is very possible that that is owing to the fact that these palm kernels that have been produced since the war have been stored, and perhaps knocked about from quay to quay, and thereby come below the normal quality, so that the analysis was not so good as the analysis made some time ago?—I do not think that is so, because when Messrs. Lever Brothers sent us the cake they also sent us sample bottles of palm nuts and of the kernels and of the oil. They did not seem to be old samples, but seemed fresh.

96. Probably the analysis is affected by the fact that the palm-kernel oil bought since the war has been distinctly inferior to that which we used to get before the war.—This is possible.

97. (Mr. T. H. Middleton.) You made a point of the importance of comparing palm-nut cake with similar feeding stuffs, and you selected undecorticated cotton cake as the most suitable for comparison. I do not quite understand why you selected that particular feeding stuff.—Because it was the nearest we could get. We did not want to compare it with two concentrated foods, and the Bombay cotton cake came very close to it.

98. In the chemical analysis?—In chemical analysis, and that was our main reason. But there is this very big difference—the proportion of fibre is very much more in Bombay cotton cake than in palm-kernel cake, and the carbo-hydrates are also considerably greater.

99. I was coming to that point. Is it not the case that there are a number of specific differences between the two cakes which must be taken into account?—There are three great differences. First, the undecorticated cotton cake is costive and the palm-kernel cake is laxative; secondly, you have a larger amount of fibre in the Bombay cotton cake than in the palm-kernel cake; thirdly, the palm-kernel cake is considerably richer in carbo-hydrates. Then there is a fourth difference, that there is usually a little more oil in the palm-kernel cake, but not very much more—the two cakes we had were just about the same. I may say that the biggest difference we had was the difference in the fibre. Now Kellner's experiments in Germany show that a large amount of fibre depreciates the cake. At Cockle Park we have not found it so. We can substitute oat straw and grain with quite a large amount of fibre for the same feeding constituents in roots which have no fibre, and we get as good results from the larger amount of fibre. We rather think from our experiments that Kellner made the mistake

of working with just a few animals. Cattle are ruminants and can dispose of a very large amount of fibre; if they did not get fibre you could not feed cattle at all; they must have fibre in their food. I think that point is not so important as it might look from Kellner's results. The two foods I must agree are not quite comparable, but I cannot think of another food to compare with it.

100. You mentioned the fact that pig feeders were using the palm-kernel cake to some extent in the north of England?—Yes, palm-kernel meal.

101. Have you ever heard of pig feeders using Bombay cotton cake?—No, I have not.

102. As a matter of fact pig feeders are using a large quantity of palm-kernel cake in different parts of the country for feeding with very satisfactory results, and I think that indicates there must be some very marked difference between the palm-kernel cake and the Bombay cotton cake?—There is no doubt this is an important point, that you cannot feed a lot of fibre to pigs, whereas you can to ruminants. I think experiments have been made with Bombay cotton cake in America, and they have not been successful.

103. Have you ever known pigs to be fed upon decorticated cotton cake?—No, Henry's book records one or two experiments, but, speaking now from memory, I do not think they were satisfactory.

104. You noted that the coats of these cattle at Offerton Hall showed a remarkable bloom?—Yes.

105. I noted the same observation in the course of another experiment in Norfolk, so I think probably this effect is something more than chance?—Yes; I quite agree with you.

106. Is there any other feeding stuff that you would expect to produce bloom in the same way?—Linseed cake, which is rich in oil, would do so.

107. I should have thought so. Is there any suggestion that this palm-kernel cake might replace the more valuable linseed cake because of the specific effects of the oil?—One reason why I suggested that palm-kernel cake should be used quickly is because I cannot help thinking that a careful farmer, if he got his palm-kernel cake fresh and used it quickly, might get a considerable amount of value from the oil in the cake so long as it was not rancid.

108. At the same time you made a great point of the value of the albuminoids in a cake, and you rather lightly passed over the possible value of the oil?—I should like to say that we have been weighing cattle at Cockle Park for the last thirteen years, and when we weigh the cattle we find that the bloom does not count for anything, but we can sell the bloom in the market. I am rather looking at it from the point of view of the experimenter, and I do not think the bloom is worth much except for selling.

109. The selling is a very important point?—Yes, that is very important, I know, but those of our butchers who now know the difference, are beginning to find out that there is not the value in bloom which they thought there was.

110. There is some difference in the specific effects of these cakes?—I do not want to depreciate the value of bloom, because good bloom in cattle is worth a very great deal.

111. You mentioned that the Germans attributed some slight effect in the amount of milk-fat produced to the feeding with this cake?—That is so, and our experiments rather corroborate that as far as they go.

112. So possibly one ought not to compare palm-kernel cake with undecorticated cotton cake. The mere fact that they are similar in chemical composition does not indicate at once that they are similar in practical value to the feeder?—I still adhere to the statement I have already made. You have to take special trouble with palm-kernel cake, and it is a disadvantage if you cannot stock a cake for a few months. Further, I think putting 5s. to 15s. a ton as its higher value allows for that increased value.

113. You compared it with undecorticated cotton cake, which you said had a particular chemical composition, and I am trying to indicate that the chemical composition may not be the only sign of good value. You are inclined to attribute the present high price of

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undecorticated cotton cake to its value for grazing purposes?—Yes, and to the fact that there is very little coming into the country at present.

114. The second fact is the more important because if you compare the unit values for the last four months of April, May, June and July, you will find that Bombay cotton cake has been costing 1s. 11½d. to 2s. a unit, which is the variation, whereas palm-kernel cake has been selling at 1s. 7d., 1s. 6d., 1s. 5½d. and 1s. 5d., a very substantial difference?—Yes, but some farmers will have Bombay cotton cake for grass feeding.

115. So it is not the grazing season which has made the difference?—You have taken the units and added them together.

116. Yes?—Unfortunately I do not like that system, because you multiply the oil by 2½ and when you do that you give palm-kernel cake an artificial value.

117. You do not agree that the oil has 2½ times the value of carbo-hydrates?—I do not say that, but I do say that I do not like the system of aggregating all the units into one, because it is so important for a farmer to know that he has his albuminoids, and you have no guarantee of that in these units.

118. But in this particular case we have specially helped the albuminoids by multiplying them too by 2½?—Even though you multiply the albuminoids and the fat by 2½ and you add the carbo-hydrates and take the total, my point is that they should not be put together, but that you should keep the albuminoids separate.

119. (Chairman.) I think it is quite clear what you mean?—My point is that if you have not albuminoids in the foods at home, the cake you buy must have those albuminoids.

120. (Mr. Middleton.) You have had no experience of the extracted cake in feeding?—No, we have not. We should like to have an experiment with that cake next winter if it can be arranged.

121. (Mr. Couper.) Has Germany had longer experience than this country with these particular cattle foodstuffs?—Germany has had far longer experimental experience, and, taking palm-kernel cake, it has been going almost entirely to Germany, I think I am right in saying, and hardly at all coming to this country.

122. It has been used there as a feeding stuff for many years?—I believe so.

123. Do you imagine that the cattle in Germany would consume more cake than the cattle in this country per head?—My impression is that the cattle in this country consume much more cake per head than the cattle in Germany. They are certainly better fed in this country than in Germany. We use a larger amount of roots in this country.

124. (Mr. T. Wiles.) Have you any experience of feeding sheep with ground-nut cake?—No.

125. Do you know anything about the experiments in Denmark in the way of using cake for cattle?—No, except in a general way.

126. (Sir Hugh Clifford.) I understood you to say that it was hardly fair to compare palm-kernel cake with undecorticated cotton cake and that the latter was very much superior?—I was comparing it with decorticated cotton cake.

127. Not with undecorticated cotton cake?—It is not fair to compare them. In the case of decorticated cotton cake you have about three times the amount of digestible albuminoids that you have in the palm-kernel cake.

128. Does that apply to the undecorticated cotton cake?—No; the undecorticated cotton cake and palm-kernel cake have just about the same amount.

129. That is what I wanted to get at. Then I take it that this experiment which Mr. Middleton has attached to his memorandum—the one made at Armstrong College—was with undecorticated cotton cake?—Yes.

130. Therefore you would corroborate the statement that of the two, if anything, the preference is in favour of the palm-kernel cake?—That is so. That is the same experiment, the results of which I have just been giving to you.

131. That is the point which I do not think was made quite clear to the Committee.—I hope it is clear now.

132. (Chairman.) As between expressed cake or meal and extracted meal you have really no opinion as to their comparative value at present?—We have made no experiments.

133. Supposing you take the composition of various cakes, if we have an extracted meal that contains only about 1 to 2 per cent. of oil instead of 5 to 6 per cent. as in the expressed cake, do you think it is likely to decrease its value much for ordinary feeding purposes?—The question is an exceedingly important one, and one that should be put to a thorough experimental test. As Mr. Middleton has just said, oil has a high value, and I should be sorry to see palm-kernel cake, from the point of view of feeding, losing all its oil or down to 1 per cent. of its oil, if it could be used to advantage. That is why I am so keen upon getting the farmers to use it quickly without keeping it. But at the same time it is quite worth while to ascertain whether in that case it would prove a good feeding stuff and whether the oil has a distinctly beneficial or deleterious effect.

134. What I am asking you is whether *a priori* you would think that the meal which has been got by extraction, and consequently with little oil in it, is likely to be inferior as a food to the cake with which you experimented.—I have no hesitation in giving my opinion that that would be so. Some years ago when soya cake was introduced into this country it was said that it was the oil in it that was doing harm. We tested it for sheep feeding. Soya cake has, I think, 7 per cent. of oil while soya beans ground with the whole of the oil in them have about 17 per cent. The sheep did better with the bean meal containing about 17 per cent. of oil than with the cake containing 7 per cent. I do not want to lose sight of the fact that oil is to a certain extent of value.

135. You do not think that the value of the oil is counteracted at all by the large amount of carbo-hydrates. I am not talking of albuminoids at the moment, but am speaking of the value as between oils and carbo-hydrates?—For certain purposes carbo-hydrates can take the place of oil, but for certain things oils are requisite.

136. For what purposes?—That is difficult to say. There is no doubt that oil in moderate quantity contributes to bloom and thriving condition and is an important aid to nutrition.

137. We have been talking generally of cakes for feeding purposes. I do not know whether you have been asked to distinguish between foods for fattening cattle and foods for cattle for milking purposes. You lay a great deal of stress upon the value of albuminoids, but would you distinguish, in talking of the relative value of albuminoids and carbo-hydrates, between the use of them for fattening purposes and the use of them for milking purposes?—They are very important for both purposes; in other words, our ordinary farm foods in this country need cakes or foods which are rich in albuminoids in order to bring them to a proper balance either for milking purposes or fattening purposes, but it is rather more important for milking than for fattening.

138. Supposing that for keeping a cow in the same condition one way or the other without increasing or going back a certain ration, say, 8 ozs. of albuminoids and 5 to 6 lbs. of carbo-hydrates, were needed if I wanted to produce milk, would not I increase the albuminoids rather out of proportion to an increase of carbo-hydrates?—Of course you would.

139. And if I were wanting to fatten the animal I should increase the carbo-hydrates a good deal, say, by 7 or 8 lbs., and certainly increase the albuminoids a bit so as to carry off the extra dose of carbo-hydrates, but I should not increase them in proportion?—There is not very much difference between the right nutritive ratio for feeding beasts and for milking purposes. For milking purposes the food should be a little higher but not much in albuminoids. We had a very careful experiment at Cockle Park in which we tried both to increase and reduce the albuminoids below or above the normal

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and in both cases we did harm. We found it desirable to keep the albuminoids up to a certain point and not to put them too high or too low.

140. (*Mr. Middleton.*) What age were the cattle upon which you experimented?—From eighteen to twenty-four months old, I think.

141. (*Chairman.*) When you talk about the comparison between palm-kernel cake and undecorticated cotton cake I presume that is only to make it clear that all you meant by the comparison was not that the two feeds were exactly alike, because they would differ, of course, slightly in chemical composition and also in their effects as to their being costive or laxative, but simply to show that if you were asked to choose a food with which it was most analogous you would choose undecorticated Bombay cotton cake. That is really what you meant?—That is all I meant, and it is simply emphasising the difficulty of the experimenter. After all, although composition is only one thing in a food, it is about the most important thing.

142. Of course it is. As regards the question of rancidness, you were talking of preservatives like borax. Have any experiments been carried out, or do you know of any experiments that would be possible for sterilising it in any way?—No, not that I know of.

143. Would it be possible, do you think, to treat it in that way?—I should think it would be possible, but I cannot tell.

144. I mean, of course, within a commercial cost?—Yes.

145. That matter has never occurred to you?—It has occurred to me, but I have not thought out how to do it.

146. The rancidity is, of course, a chemical action, is it not?—Yes, partly.

147. There is a question as to whether heating would sterilise it?—Yes.

148. You do not know whether the rancidness comes from a cause actually within the material of the cake itself, or from outside?—I had a talk some time ago with interested chemists on this subject. The proportion of the soluble fatty acids is, I am told, high in the case of palm-kernel cake, and that makes it more liable to go rancid. No doubt it is these special fats that are there which cause it to go rancid.

149. What particular fatty acids are they?—For that I think you will have to ask a chemist.

150. It is true that the particular fatty acids in coco-nut cake and palm-kernel cake are rather similar, but do you find coco-nut cake go rancid in the same way as palm-kernel cake, or as it is alleged to?—Mr. Lawrence writes as to coco-nut cake: "Some of the cows did not take readily to it, but by mixing it with cotton cake which they had been having, at the end of a week they took it all right; it has a somewhat laxative tendency"—I asked him that very question—"it absorbs moisture more readily in an ordinary atmosphere than cotton, linseed, or soya cake, and so becomes very soft, although it did not become at all rancid or mouldy while we were using it." That was an experiment that was continued for twelve weeks.

151. We are told that palm-kernel cake becomes rancid and that coco-nut cake does not become rancid. The reason for the rancidness in the first case lies, you say, in the soluble fatty acids; but the fatty acids in the two cakes are remarkably analogous, so why does one behave differently from the other?—They are probably not exactly the same.

152. (*Mr. C. C. Knowles.*) I should like to say that we have kept palm-kernel cake in store in Liverpool for twelve months, and it has been quite good for feeding purposes at the end of the twelve months. We have had mills at Opobo and at Lagos, and, as you know, you cannot get cake home from there by every steamer, and we have often had cake there for two or three months before it was brought home and have then sold it in England and in Germany. I think a great deal more is made of this rancidity than need be.

153. (*Chairman.*) Do you get many complaints as to it being rancid, and, if so, what is the reason, because that is an important matter from the point of view of getting farmers to take it up?—I am told the soluble

fatty acids in oil of linseed cake are only about 2½ per cent., whereas in palm-kernel cake there is about 10 per cent. of soluble fatty acids.

154. Free fatty acids?—This is again a question for a chemist. In coco-nut cake the percentage is not quite so much. In answer to Mr. Knowles I may say that the cake that we have in our chemical laboratory keeps fairly well, but when you put it into an ordinary farmer's store it will not keep so well. There is a further very interesting question which arises on this point: I know some of these cakes have been fed to cattle even when the cake has begun to smell strongly, and so far I have not heard of it doing harm; but I have doubts as to whether it may not do harm when it is in that state. I am quite certain that the cakes you mention as having been kept for a year would not keep in an ordinary farmer's granary.

155. I do not think you have quite explained the point; at all events I am not quite convinced as to the existence of the rancidity or as to the reason of it. Why should palm-kernel cake become rancid or more rancid than the linseed cake, because after all the oil in the linseed cake is made up of fatty acids with glycerine?—But there is, I believe, more easily decomposable fat in palm-kernel than in linseed, and not quite so much in coco-nut as in palm-kernel.

156. But not enough to make all the difference?—It may be that the dryness of the coco-nut cake makes the difference. It may be that the actual physical character of the coco-nut cake enables it to keep better.

157. I do not want to press the point further. With regard to palm-kernel cake you say the farmers are getting accustomed to it now partly under the stress of circumstances?—Unfortunately it has not been selling at a very low price in the North, and not many people are using it.

158. Has it been selling within 5s. or 10s. of the price of Bombay cotton cake?—It has been higher, but it is considerably lower lately.

159. Do you think farmers will take to it or will their tradition prevent them experimenting with it freely?—They will take to it once they become accustomed to it, but an opinion has got out among farmers in the north that it does not keep.

160. You know the north country farmers. Do you know of any way of getting them accustomed to it except by bringing it home to their notice, and getting agents to try to sell it to them?—That is all, and by conducting good experiments. I have no doubt the conduct of the experiments at Offerton Hall will help in this direction.

161. With regard to ground-nut cake, do you use that at all freely in the North?—No, we are using very little. I am informed that there is likely to be a good deal more produced, though so far as I know it has been little offered in the north of England. I have not given you the result of the experiments made with coco-nut cake.

162. If you will give those results, we shall be glad to have them.—Trials of coco-nut cake were made at Newton Rigg, Penrith, at the Cumberland and Westmorland Farm School in the winter of 1914–15 by Mr. Lawrence, the manager. He then conducted an experiment on the feeding value of coco-nut cake for milch cows. Those cows were divided into two lots. Each cow in Lot 1 received 3½ lbs. of decorticated cotton cake and 3½ lbs. of crushed oats, while each cow in Lot 2 received 5¼ lbs. coco-nut cake and 2½ lbs. crushed oats. I would like to say here that Mr. Lawrence conducted this trial, and he was in the difficulty that he thought coco-nut cake was a little richer than Bombay cotton cake; he therefore compared it with decorticated cotton cake, although it was much poorer in albuminoids, and therefore he altered the quantity of oats. These rations were reversed at the end of three weeks, again at the end of six weeks, and still again at the end of nine weeks. The trials lasted twelve weeks. While receiving the cotton-cake ration the cows gave slightly more milk than when they received the coco-nut ration, and the average percentage of butter fat was slightly

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greater when cotton cake was fed. The cows gained considerably in weight while receiving decorticated cotton cake, and lost slightly in weight while receiving coco-nut cake. I might just remind you that that brings out the two points, namely, that the coco-nut cake ration may have had too little albuminoids, so that looking to the fat production the cows lost weight, and the milk production also decreased. The results of this experiment show that coco-nut cake is of considerably less feeding value than decorticated cotton cake, as I say, because of its less percentage of albuminoids. Now that we know the results, it might have been a better experiment to compare coco-nut cake either with Bombay cotton cake or Egyptian cotton cake. The decorticated cotton cake was not quite comparable. The composition of the coco-nut

cake was oil 9.35, and of the decorticated cotton cake 10.27; albuminoids 21.01 in the coco-nut cake (that is richer than palm-kernel cake), and 41.36 in the decorticated cotton cake; carbo-hydrates 40.82 in the coco-nut cake and 25.34 in the cotton cake; fibre 10.42 in the coco-nut cake and 6.23 in the cotton cake. The results indicate that it should be compared with a cake like Egyptian cotton cake rather than decorticated cotton cake, and it may be assumed that the value of coco-nut cake should only be slightly higher than the value of Egyptian cotton cake. It does analyse a little better than palm-kernel cake.

163. You put the value of palm-kernel cake at 5s. to 10s. higher than Bombay cotton cake?—I put it at rather more—from 5s. to 15s.

The witness withdrew.

Adjourned to Wednesday next at 11 o'clock.

SECOND DAY.

Wednesday, 25th August 1915.

Colonial Office, Downing Street.

MEMBERS PRESENT:

Mr. A. D. STEEL-MAITLAND, M.P. (Under-Secretary of State for the Colonies (*Chairman*).

Sir G. V. FIDDES, K.C.M.G., C.B. (Assistant Under-Secretary of State).
 Sir F. D. LUGARD, G.C.M.G., C.B., D.S.O.
 Sir HUGH CLIFFORD, K.C.M.G.
 Sir OWEN PHILLIPS, K.C.M.G.
 Mr. L. COUPER.

Mr. C. C. KNOWLES.
 Mr. T. H. MIDDLETON, C.B.
 Mr. G. A. MOORE.
 Mr. T. WALKDEN.
 Mr. T. WILES, M.P.
 Mr. T. WORTHINGTON.

Mr. J. E. W. FLOOD (*Secretary*).

Mr. CHARLES CROWTHER, M.A., Ph.D., called and examined.

Précis of Professor C. Crowther's Evidence.

1. *General Character of Feeding-stuffs derived from Nuts.*

In comparison with home-grown feeding-stuffs the feeding materials derived from the oil-bearing nuts are relatively rich in *protein* and *oil*, and their value is largely determined by their content of these two nutrients. The oil-content fluctuates according to the efficiency of the oil-extraction process, and, generally speaking, is lower in the residues from the "solvent process" than in those obtained by pressure alone.

The protein-content varies greatly in different classes of nuts, and consequently in the cakes and meals obtained therefrom. At its lowest (*e.g.*, in palm-kernel cake) it is comparable with the home-grown foods (peas and beans) that are richest in this respect.

Further factors governing the nutritive value of the nut residues are—

- (a) The amount of *fibrous material* incorporated therein.
- (b) The degree of *heat* to which the materials have been subjected. Generally speaking, heating tends to lower digestibility.
- (c) The *palatability* and *general wholesomeness* of the material.

2. *Palm Kernel Cake.*

(a) *Composition.*

Varies notably with reference to oil and crude fibre. *Pott* (Handbuch d. tierischen Ernährung, 1909),

gives the following data relative to material as used in Germany:—

	Minimum.	Maximum.	Mean.
	Per cent.	Per cent.	Per cent.
Moisture - - - -	5.0	16.0	10.0
Crude protein (albuminoids).	10.7	26.3	17.4
Oil - - - -	1.2	18.1	8.6
Sol. carbohydrates, &c.	17.9	57.3	38.5
Crude fibre - - -	7.6	38.2	21.5
Ash - - - -	?	?	4.0

The cake now being produced in this country would appear to be generally much freer from fibre, rather poorer in oil, and rather richer in protein and carbohydrates than the above average. The composition of a typical sample is appended—

	Per cent.
Moisture - - - -	12.0
Crude protein - - -	18.2
Oil - - - -	6.8
Sol. carbohydrate, &c. - - -	44.2
Crude fibre - - - -	15.0
Ash - - - -	3.8

Compared with most other "oil cakes" palm-kernel cake is poor in protein and rich in fibre. In composi-

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[Continued.]

tion it resembles undecorticated cotton cake more closely than any other cake in common use.

Its digestibility compares favourably with that of any other oil-cake, and Kellner (Ernährung der landw Nutztiere) ascribes a high degree of physiological efficiency to the digestible ingredients.

Kellner further asserts that the fibre of palm-kernel cake (and meal) is more highly digestible than the fibre of most foods, but the evidence in support of this claim is meagre and unconvincing.

(b) *Its Value as Food for Farm Stock.*

Palm-kernel cake of good quality is readily consumed by all classes of stock, though in many cases there is a little difficulty at the outset in inducing the animals to consume it. Moreover, it becomes actually distasteful to stock when mixed with warm water. For this reason it should be fed dry and just moistened with cold water.

(1) *For Fattening Stock.*—Favourable results have been obtained on the Continent, but it does not appear to be at all generally used there for this purpose.

(2) *For Pigs.*—Has been very favourably reported on in connection with extensive pig-feeding experiments in Denmark (F. Friis, 1895). Said to give a very good firm bacon.

(3) *For Milch Cows.*—Enjoys on the Continent a reputation equalled only by coconut cake. Experiments have demonstrated that under certain conditions the use of palm-nut cake leads to an appreciably increased output of milk-fat. It has a hardening influence upon the butter. The limit of this favourable influence upon the yield and quality of the butter is reached as a rule when about 1 to 2 lb. of palm-nut cake per head per day is fed. If greater quantities are used the yield of butter is not further increased, and the butter becomes undesirably hard and tallowy.

(4) *For Horses.*—Pott reports that good results have been obtained in several cases by feeding palm-nut cake (or meal) to the extent of 1 to 2 lb. per day as partial substitute for oats. A mixture of palm-nut cake (or meal) with oats is said to have proved very satisfactory in the case of horses with weak digestive powers.

(c) *Value in comparison with Linseed Cake and Cotton Cake.*

I am not acquainted with any comparative tests and can only assess the relative values on the basis of chemical composition. Taking as a basis the food units in these materials as set out in the current monthly issue of the Journal of the Board of Agriculture (August 1915, p. 457), the relative values are:—

Palm-kernel cake; linseed cake (English)	= 83.5:120.1
Palm-kernel cake; Egyptian cotton cake	= 83.5:71.9
or Egyptian cotton cake; palm kernel-cake; linseed cake	= 100:116:167.

In other words, with Egyptian cotton cake at 7l. per ton, palm-kernel cake should be worth 8l. 9s. 6d. per ton, and the linseed cake 11l. 14s. per ton; or if a standard price of 11l. per ton be taken for linseed cake, then palm-kernel cake should be worth 7l. 13s. per ton, and Egyptian cotton cake 6l. 12s. per ton.

These assessments take into account both the actual nutritive values of the cakes and the values of the manurial residues that would remain after consumption.

3. *Palm-kernel Meal (Solvent Process).*

Differs from the cake essentially only in the lower content of oil and correspondingly increased content of protein, &c.

It has been suggested that the solvent may extract from the nut not only oil, but also other ingredients which, though present in only small proportions, may be essential for the efficient utilisation of the material as food. This is not unlikely, but as yet no direct evidence in support of this view has been adduced.

There may possibly be differences in keeping quality between the cakes and meals (*see later*).

The feeding qualities of the meals appear to be similar in general to those of the cakes, except that the specific effects upon the secretion of milk-fat referred to above appear to be associated with the oil, and if so would not be attained with the meals.

Judged strictly by their content of digestible protein, oil, and carbohydrates, a palm-kernel meal containing 2 per cent. of oil might be expected to be about 10 to 15 per cent. inferior in general feeding value to a palm-kernel cake containing 7 per cent. of oil, and the price should be correspondingly lower.

4. *Keeping Qualities of Palm-kernel Cakes and Meals.*

The belief prevalent in this country that palm-kernel cakes and meals do not keep as well as linseed and cotton cakes and meals does not appear to be held, or, at least, to affect their use, on the Continent. It was probably true of the cakes formerly made by crushing the whole fruit, but does not hold seriously for the materials now supplied.

All cakes and meals containing oil tend to go rancid on keeping. With special reference to palm-kernel cakes and meals, Emmerling (1898) found that the materials poor in fat turned rancid more quickly than those richer in fat, and in accordance with this fact the meals turned rancid more quickly than the cakes.

5. *Ground-nut Cake.*

(a) *Composition.*

It is necessary to discriminate between—

- (1) *Undecorticated Earthnut Cake*, made by crushing nut and shell together.
- (2) *Decorticated Earthnut Cake*, made from shelled nuts.

The average composition of the two cakes as used in Germany is given by Pott as follows:—

	Undecorticated.	Decorticated.
	Per cent.	Per cent.
Moisture - - -	11.0	10.0
Protein - - -	31.0	48.0
Oil - - -	9.0	7.3
Sol. carbohydrates, &c.	19.5	24.5
Crude fibre - - -	23.5	5.0
Ash - - -	6.0	5.2

The undecorticated cake is used only to a relatively small and steadily diminishing extent, being inferior in every way to the decorticated cake. The following remarks have reference only to the decorticated cake.

The outstanding characteristic of the composition of this cake is its richness in protein, being equalled or surpassed in this respect only by decorticated cotton cake (or meal) and soya cake (or meal) amongst the foodstuffs widely used in this country.

The digestibility of the various ingredients is very high.

(b) *Its Value as Food for Farm Stock.*

Earthnut cake of good quality has an agreeable flavour, and is readily consumed by all classes of stock. Much trouble has been experienced in Germany, however, from the use of material of inferior quality, partly due to imperfect preparation of the nuts before crushing, partly to the presence of injurious impurities, such as castor bean, and partly to fermentative changes. In recent years there seems to have been much improvement in this respect, and the cake now enjoys a high reputation.

(1) *For Fattening Stock.*—It is readily consumed and gives good results, but the high price restricts its use.

(2) *For Milch Cows.*—It is strongly recommended on account of its high protein content. Experiments have demonstrated that it is equal in value to other concentrated foods, but give no evidence that it exercises any specific effect upon milk-secretion. The amount used should not exceed 3-4 lbs. or the quality of the butter is adversely affected.

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(3) *For Horses.*—Pott quotes numerous instances of its successful use in horse feeding, and concludes that it is “a concentrated food of the highest merit, not only for working horses, but for pedigree stock and foals of all breeds.”

(4) *For other Stock.*—Pott reports good results with young cattle, sheep, and pigs, and fattening pigs:

(c) *Value in comparison with Linseed Cake and Cotton Cake.*

Decorticated earthnut cake of the composition indicated above will contain 145.0 food-units per ton, so that it should be worth roughly double the price of Egyptian cotton cake. It is doubtful, however, whether the method of assessment which leads to this conclusion is reliable for materials so rich in protein as this. Practical considerations would lead rather to the conclusion that the price should be approximately that of linseed cake and certainly not much higher.

(d) *Keeping Qualities of Earthnut Cake.*—This cake ranks as one of the less durable, and this fact is met with in German writings as a drawback to its extended use.

6. *Prospects of Popularising these Foods among British Farmers.*

The governing factor is the price at which the foods can be offered. The limited experience of the past in the use of these foods in this country has not been uniformly favourable, so that there is an initial prejudice against them, probably not very widespread, which needs to be overcome.

It is necessary to demonstrate that the materials now produced are unimpeachable both in quality and keeping properties.

The foods must be offered at prices such that the agricultural adviser can recommend them to the farmer as bargains not to be missed. The oft-asserted conservatism of the British farmer amounts in this connection to little more than a refusal to abandon the known for the equally costly unknown. He will use a new food, if authoritatively recommended, if there be obvious financial advantage in so doing, as evidenced by the introduction of the soya bean foods. Prices must remain relatively low until the merits of the new foods have become widely realised in practical experience.

In the case of palm-kernel foods their introduction will be facilitated if, by “spicing” or otherwise, they can be made more palatable. It is desirable that experiments should be made to test the reliability of the special claims made for palm-kernel cake with reference to its alleged specific influence upon the secretion of milk-fat. German results appear to be convincing but do not appeal to the British farmer with the same force as would experiments carried out here.

(Signed) CHARLES CROWTHER.
The University, Leeds,
August 23rd, 1915.

164. (*Chairman.*) You are Professor of Agricultural Chemistry and Director of the Institution for Research in Animal Nutrition, of the University of Leeds?—That is so.

165. May we count this very interesting memorandum which you have sent in as part of your evidence, to be printed as a preface to any oral evidence that you give us now, as I think it would be of use for the Committee and anyone outside to be able just to refer to it?—I am perfectly agreeable to that, but I may say that this memorandum has been prepared at very short notice, and possibly on more leisurely consideration. I should prefer to amend it slightly in one or two places.

166. We will send you a proof of your evidence, and then if you wish you may revise it or alter it in any way which does not make it an entirely different thing?—Thank you; I do not anticipate that I should want to make any alterations in the general character of it, but merely one or two alterations in detail.

167. Perhaps my best plan would be to ask you some questions now based upon your memorandum. You say at the beginning that the feeding materials derived from the oil-bearing nuts are relatively rich in protein and oil, and their value is largely determined by their content of these two nutrients. Do you set a good deal of store by the oil?—Certainly.

168. For what particular object?—Because the oil is the most concentrated form in which nourishment can be supplied. One ounce of oil is roughly equivalent to two-and-a-half ounces of any other form of nourishment for the main purposes of nutrition.

169. There are some rather different opinions held as to the actual value of the oil in feeding stuffs, and I want to know whether your opinion of it is that it is a very valuable constituent?—I am well aware that there are these differences of opinion as to the feeding value of different oils, but I am not conversant with the experimental evidence upon which these opinions are based—in fact, I believe such evidence does not exist in the great majority of cases. One cannot get away from the fact that one ounce of oil contains at any rate two-and-a-half times as much energy locked up in it as one ounce, say, of carbohydrates; so until there is some definite proof to the contrary, I think one is bound to assume that the value of the oil will be roughly in that proportion with reference to carbohydrates.

170. As you will understand, this point affects the subsequent question of cake *versus* meal?—Yes.

171. Is there any particular feeding use for which the oil is of special value for fattening or for milk production—for one more than for the other?—Certainly, with regard to milk production, if palm-kernel cake has any specific influence upon milk secretion that influence is exerted through its oil content. The whole of the experimental evidence points in that direction. I know of no instance in which a palm-kernel meal poor in oil has been found to exercise a specific influence upon the secretion of milk fat.

172. We will come back to that point later.—With regard to fattening cattle it is very much more difficult to express a decided opinion, except to say that we have reason to believe that a minimum amount of fat is necessary in a fattening ration; but of course it is quite possible that the other foods, along with which the palm-kernel meal would be fed, would themselves supply that minimum amount of fat—I mean the home-grown foods.

173. Have you any proof at all that there is an increased output of milk fat from the use of palm-kernel cake? In other words, have you any proof at all that it has peculiar value with regard to milk cows?—There is a great deal of experimental evidence, most of which I must confess I personally regard as inconclusive; but there is in particular one large scale experiment which has been carried out by the Association of German Agricultural Experimental Stations on eight or ten farms with several hundred cows in all, which showed clearly a decided influence—not a very great, but still a decided influence—of the palm-kernel cake upon the secretion of milk fat. I cannot ignore that experiment, but that is the only one which I personally regard as a really satisfactory test on this point.

174. The point is very important, is it not?—Very, naturally.

175. It leads to this, does it not, that there may be a differentiation in value between these different cakes for the different purposes—for fattening stock, for milk cows, for pigs, or for horses as the case may be?—That is so.

176. I am thinking really of getting the value of this article first of all ascertained and then made known to farmers. For that purpose, would it be possible, do you think, to get an experiment carried out which would carry conviction?—I can scarcely say. Any such experiment, if attempted to be carried out, would have to be on a sufficiently large scale to ensure that the results might be accepted as thoroughly reliable. The difficulty in most of our colleges is in

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getting a sufficient number of animals. We usually have to content ourselves with lots of four, five, six, or seven in the case of cows.

177. What sort of scale do you mean in order to make it sufficient?—If one could do it one would like to conduct an experiment on some such scale as that on which the Germans carried out their experiments.

178. How many cows had they?—They had, I think, eight different farms with lots of 20 cows each—that is, 20 cows receiving a ration containing palm-kernel cake, and 20 cows receiving a corresponding ration without the palm-kernel cake.

179. Supposing we could get one of the bigger dairies to carry such an experiment out for us, if we could persuade them to do so, that would be the size of experiment you mean, with 20, 40, or 60 cows possibly?—Yes, an experiment with two lots of 20 cows each would give every promise of being satisfactory.

180. Do you think it quite feasible to lay down the conditions under which the experiment should be carried out in order to obtain results, if there were results, from the given conditions, which would be tolerably reliable?—Yes, if the conditions provided that the experimenter in personal charge of the experiment should be one in whom you could have confidence. It should not be left to the farmer to carry it out, but it would require a trained investigator.

181. I do not say that a large dairy would do it, but I am merely giving that as an instance to try and get at what is practical. Supposing we could get a dairy like Lord Rayleigh's to allow an investigator to go there and have the experiment carried out under his supervision, that might give a valuable result?—Certainly.

182. That would be an experiment as to the proof of the cake leading to milk fat, that is, the amount of butter, practically?—Yes, the amount of butter.

183. As to the quality of the butter, it would perhaps be less advantageous to experiment in the coming winter than in the summer, obviously?—Quite so.

184. Do you think there is any real indication of an effect on the value of the butter in its quality?—I imagine a great deal will depend upon the amount of palm-kernel cake that is fed to the animals. If the amount is limited to one or two lbs., I should hardly expect to find any great effect, but once you get beyond about 2 lbs. in the case of almost any of these oil cakes, you begin to observe effects upon the butter.

185. Therefore you think the ration ought to be, say, 3 to 4 lbs. of the cake?—Yes, 3 to 4 lbs.

186. It would have to be something of that kind in order to have any effect that can be clearly traced?—Yes, and I feel confident you would be able to trace some effect from it.

187. From a practical point of view, could that experiment be carried out during next winter? Would you advise that, or ought one to wait for the summer in order to judge of the type or kind of effect?—I think it might be carried out in the winter.

188. You think it is not too late in the year to start an experiment of that kind?—No; the ration would have to be suitably selected in order to admit of the effects being brought out.

189. You say in your précis that the degree of heat to which the materials have been subjected as a rule tends to lower the digestibility. Palm kernels are very considerably heated as a rule?—Yes.

190. Do you think that has interfered with their digestibility, which I am told is very high?—I am afraid I could not venture to give an opinion. I am not aware of any comparison having been made between unheated palm kernels and heated palm kernels. The whole of the digestion trials will have been made with the material as put on the market.

191. So far as you have had the materials put on the market, do you consider them digestible?—Quite so; the results of the digestion trials have been very good.

192. Yet the palm kernels may have been heated to a temperature of 190 degrees?—Yes.

193. In the case of the meal it is much higher, of course. As to the palatability of palm-kernel cake,

do you consider it an unpalatable cake?—No; my own experience of it is that it is perhaps rather insipid than unpalatable, and has no pronounced taste. It is not attractive in any way.

194. Has it any pronounced feel in the way of grittiness?—It is very gritty. It is not the sort of thing which the stockman or stable-boy would be tempted to eat, as he eats certain other cakes, such as linseed cake.

195. But as far as the animals are concerned, what do you say?—My own experience is that in the case of cows there are certain individual cows which do not seem to relish it, certainly at the outset. In my own case, in which the feeding has been spread over about two months, there were certain individual animals that never within that period seemed to eat it with any great relish; they would eat it, but they did not eat it so rapidly as they would eat linseed cake, say.

196. Do you consider it a considerable drawback if the animals get on to it by degrees?—Oh, no.

197. Is there any drawback which there is any real need to try and get over in order to get the farmer to take it? I am always thinking of the practical side of it.—For certain practical reasons I think it is worth attention. As I point out later in my memorandum, there is the initial prejudice against palm-kernel meal to overcome, and, further, a farmer does not like a food which any of his stock may turn against even at the start.

198. Have you any suggestion to make by which you think that initial unpalatability could be overcome within ordinary commercial limits?—I have not really given serious consideration to it, but on the farm we find we can overcome it quite easily with a little treacle. Whether that is feasible, or not, I cannot say; it certainly might be feasible if introduced in the production of the meals, but whether that would also apply to the cake I cannot say.

199. Will you think over it and let us know if any ideas occur to you?—Certainly, I will.

200. As to the specified contents of these various cakes, the first analysis you give is a German analysis?—Yes.

201. Dealing still with cake and not with meal, what first strikes one is the very great variability of the contents. Has that struck you?—One notices this in the case of all these feeding stuffs, and possibly it does not appeal to me with quite the same force as it may appeal to you. No doubt I could produce a similar range of fluctuations in the case of linseed cake.

202. You think that is not really a disadvantage to its sale?—No, not in the least. Perhaps it is hardly fair to set out the maxima and minima in the way I have done, because the minimum has perhaps only been met with once, and similarly the maximum. One ought to be able to give the frequency of distribution of the different qualities, and that I have no means of getting at.

203. I quite agree it does not give the statistical view of it at all.—You could get this sort of variation in the case of almost any kind of feeding stuff.

204. As to the different experiments, have you carried out any experiments for either fattening cattle, or for feeding pigs or for horses?—No; I have not carried out any such experiments. I have used the palm-nut cake and merely watched the effects, but I have not carried out any definite experiments.

205. You have not carried out any comparative experiments with regard to cattle?—No.

206. Nor for pigs?—No.

207. Do you think palm-kernel cake has much of a future for pig feeding?—I should think it might be very useful indeed for pig feeding. I know at least one large firm is using it in its pig foods, and very considerable quantities are being used in that way unknown, possibly, to the farmers.

208. You mean mixed with other foods?—Yes; mixed with other materials.

209. For pig feeding with what other foods would it be mixed?—Milling offals, bran and sharps.

210. Added to them you think it would be valuable?—Certainly.

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211. In relation to the price received for the bacon?—Yes. Judging by Continental experience one would expect to get remunerative results, only in selecting it for pig feeding one would watch the fibre content pretty carefully. If I got a material (as I set out in my memorandum) with 15 per cent. of crude fibre I would not hesitate to use that in relatively small quantities for pig feeding; but if the fibre content got up to 22 or 23 per cent. of crude fibre I should reject it unhesitatingly. I can find no reference in recent German literature to any corresponding improvement in this respect (fibre-content) in the palm-kernel cake supplied in Germany; there it is still quoted as containing on the average over 20 per cent. of crude fibre, so I must confess I, personally, am a little puzzled how it comes about that the palm-kernel cake produced here is so much better in that respect.

212. (Mr. C. C. Knowles.) The reason is this: Some crushers import the shells with the kernel, which they mix in the cake. The shells are about 30s. a ton as compared with the price of palm kernels at about 15s. or 16s. to-day, so you can easily see why they use the shell. That, I think, gives the cake the large percentage of fibre?—It is a very important point as affecting the value of the feeding stuff.

213. I do not think there is much danger of that in the future.—Quite so.

214. (Chairman.) Have you any information as to the use of kernel cake for horses, and as to how far it has been satisfactory?—I have never known it used for horses in this country, but there is a considerable amount of Continental evidence as to its use for horses.

215. Would you put meal higher than cake or as high as cake for horses?—I think I should almost prefer the meal to the cake for horses. The horse is an animal whose digestion is very much more readily upset than that of a cow, and if the oil were slightly rancid that might have a detrimental effect in the case of a horse.

216. In your memorandum you next compare the value of palm-kernel cake with linseed cake and cotton cake. We have these values given and also the food units and so on. There are cakes of different classes: linseed cake and decorticated cotton cake fall into one sort of class, and Bombay cotton cake and palm-kernel cake into another class. I suppose these classes of cake are useful for different kinds of feeding applied to different objects particularly?—Yes.

217. But you would not say that the comparative value of palm-kernel cake with linseed cake was as 116 to 167 for any particular feeding purpose indiscriminately?—I think if these figures have any significance at all they must be taken in that respect as a sort of average. All we can do in valuing up foods is to attempt to strike some average.

218. If asked as a practical feeder under what conditions and for what purposes—whether for fattening cattle, for milch cows, or for pigs as the case may be—you would use palm kernel cake, and for what you would use linseed cake (which comes in a different class), how would you distinguish your uses and conditions?—The outstanding difference to my mind as between the two materials you mention would be the proportion of fibre. I would not use palm-kernel cake for very young stock, for instance, on account of the presence of this relatively large amount of fibre; whereas linseed cake is pre-eminently a food for young stock. Considerations such as that would have to guide me.

219. Now take the difference in the nitrogenous matter in them, in which I should have thought there was an even greater difference between linseed cake and palm-kernel cake?—That would depend upon the nature of the ration in which the cake was to be included.

220. Would you make any difference as between fattening cattle and feeding milch cows, and so on, as to your preference for one rather than the other?—I should work to certain standards in drawing up my ration, and I might conceivably find that with the supplies of home grown foods at my disposal I could more economically make up the ration to give the amount of protein I wanted by using linseed cake than by using palm-kernel cake. On the other hand, if I

were fairly well supplied with more nitrogenous home grown foods such as peas and beans, I might find I could balance my ration, so to speak, more cheaply by using the palm-kernel cake.

221. In other words, supposing you were a dairyman you would make either of them up to a certain dairyman's standard with your home-grown foods?—Yes.

222. And if you were fattening cattle you would similarly make up the feed to a standard for fattening?—Yes.

223. It really depends, then, on the comparative prices of the cakes and your supply of other foods to make up your standards?—I think it is so very largely. I might be allowed to mention to the Committee that this subject of assessing the values of different feeding stuffs is one of the most difficult which agricultural chemists have to deal with at the present day. Any opinions we have to offer are only very rough, based upon very crude methods of assessment.

224. We know that is so, and that is why we are asking you about it. Dealing now with palm meal, what authority is there for thinking that other properties besides the oil are extracted by the solvent? I have had the same thing stated to me in another connection privately.—One knows in connection with other foods—at any rate recent research seems to make it fairly clear—that there are in those foods ingredients present in very small proportions which yet are necessary for the full utilisation of the nutritive properties of those foods. There is a growing belief that substances of this character are probably present in all seeds. Therefore, there is just a chance—and it has not been investigated at all, so far as I know—that these ingredients may also be removed along with the oil. This is merely a suggestion, and there is absolutely no evidence known to me about it.

225. You think that might affect the digestibility of the meal?—Not so much the digestibility as the utilisation of the digested material.

226. With regard to the keeping qualities of palm-kernel food, what do you think the improvement is due to when you say that formerly it was thought it would not keep, but that now there is not so much apprehension?—I think it must have improved. I have no experience of the older cakes, but I understand that at one time the nut was crushed as a whole with the shell and the pericarp, which would give a very inferior product, probably very highly infected with various organisms. Probably the heat was not as great in those days, and I imagine the preliminary heating of the material now will tend to destroy many of the organisms which might produce subsequent changes in the cake. I think there must have been considerable improvement in this respect.

227. The rancidity comes from the oil being decomposed, if I may so describe it?—Certainly.

228. What reason is there why the meal should become rancid sooner than the cake, as you state in your précis, if there is less oil in it?—Exposure to the atmosphere plays a part in the changes which bring about rancidity.

229. Due to the loose character of the meal?—The more you break a material up the more you increase its surface. In the meal you have a very much greater surface of the material exposed to the air than in the case of cake.

230. Is there any way which you know of which would prevent rancidity developing?—Only by the admixture of antiseptics with the cake, as is done, for instance, in Bombay cotton cake, which almost invariably contains borax.

231. Would that affect its value?—We deprecate the introduction of borax into foods. It certainly has no beneficial effect upon digestion, and all the evidence accumulated so far seems to tend in the opposite direction.

232. With regard to the prospect of popularising these foods among British farmers, do you find at present that around you they are beginning to take the palm-kernel cake or palm-kernel meal more than they did in the past?—I do not think it has really been brought to their notice very much. So far as I

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can gather they have not heard of it yet; but it is being introduced in the way of compound feeding-cakes and meals.

233. We want, of course, to introduce it *simpliciter*.—I am not aware of any sort of propaganda having been carried out in my own county.

234. Would it be possible to carry out any such propaganda with advantage?—I should think so, but it must be carried through by the trade, of course.

235. By the distributing agencies?—The agricultural educational agencies cannot undertake to carry on a propaganda in favour of one particular thing; but we are quite prepared to report upon it. I do not see why propaganda should not prove very useful. That seems to me the only way of getting the article widely known.

236. Now, with regard to the ground-nut cake, have you had much experience with it?—I have had no direct personal experience with it.

237. None at all?—None.

238. It looks as if it ought to have a very high nutritive value?—It ought to have a high nutritive value, and the German experience seems to indicate that it has.

239. What is the price of ground-nut cake at the moment?—I am afraid I do not know that.

240. (Mr. C. C. Knowles.) It is about 8*l.* a ton.—Is that a decorticated ground-nut cake?

(Mr. C. C. Knowles.) Yes.

241. (Chairman.) In your précis you mention about the farmer getting a bargain. Would you not call decorticated ground-nut cake, on the chemical analysis which you give, a bargain at 8*l.* a ton?—Yes; I should consider it a great bargain at 8*l.* at the present time.

242. Therefore if it were brought to the notice of dealers, ground-nut cake might appear a bargain for them to push?—Certainly.

243. (Mr. C. C. Knowles.) In comparing the values of cake do you consider that palm-kernel cake is a substitute at any time for linseed cake. Can it be substituted for linseed cake?—Yes, I think so, certainly in the case of milch cows, for instance.

244. Of course, the price of linseed cake is so very much higher than that of palm-kernel cake, that if palm-kernel cake could be substituted, it seems to me there is a great future for palm-kernel cake.—Yes.

245. But dealers and distributors have never expected that palm-kernel cake could be substituted for linseed cake?—As I endeavoured to point out before, everything turns upon what the other ingredients of the ration are as to whether you can economically introduce palm-kernel cake in order to make your ration at least theoretically a satisfactory one, or whether you have to introduce linseed cake.

246. Have you ever heard of palm-nut cake being substituted for linseed cake in Germany or here?—In Germany certainly, although linseed cake is not used to anything like the same extent in Germany as it is here.

247. Would you not rather compare it with undecorticated Bombay and Egyptian cotton cake?—In composition certainly, and I think I have expressed that opinion.

248. And not with other foodstuffs?—Generally speaking, I should expect to find it most often used as a substitute for food of that character.

249. You probably know that Germany dumps very large quantities of Bombay and Egyptian cotton cake on to the English market?—Yes.

250. They certainly pay 30*s.* to 2*l.* a ton more for palm-nut cake, and get it from this country and import it into their own country, than they are prepared to sell undecorticated cotton cakes for. What do you think that points to?—That is apparently accounted for by the very high reputation which palm-nut cake has now acquired in Germany for the feeding of milch cows, owing to the results of the experiments I have quoted. Palm-nut cake enjoys what the Germans term an "affektionspreis," that is a sentimental price corresponding to that which linseed cake enjoys in this country for fattening stock. As a rule, linseed cake commands a price which the chemist considers to be in advance of its theoretical value, because

it is so popular with the farmer. In the same way palm-kernel cake is very strongly in favour with the Germans for milk production, and especially for butter production.

251. You mentioned meal as being better stuff for feeding horses; what form of meal—the ground cake or the extracted meal? There is a great difference between them, you know.—I had in mind more the extracted meal; or, at any rate, a meal relatively poor in oil.

252. Have you ever heard of horses eating that extracted meal?—I cannot recall actual cases. I have no actual experience.

253. You have told us that nearly all Bombay cotton cake contains borax as a preservative, which is a suggestion that we might use it for preserving palm-kernel cake?—I must be allowed to protest against that being put forward as a suggestion from me.

254. Have you found out by analysing the cake that it does contain borax? I put this question to you because as a manufacturer of cakes I never remember that an ounce of borax has ever been put into cotton cakes.—I can only say that in the limited number of Bombay cotton cakes that have come under my notice I have almost invariably been able to obtain at any rate the chemical tests for borax.

255. Perhaps it comes from the cotton seed?—I have not investigated the natural boric-acid content in cotton seed, so I cannot say to what extent in any case there has been a difference; but agricultural chemists, such as Dr. Voelcker, for instance, who deal with large numbers of cakes almost invariably report as one of the characteristics, at any rate, of Bombay cotton cakes that they contain borax. That possibly applies more to imported cake than to the home-made article.

256. I have never heard of borax being used in those cakes?—It is very often found.

257. (Sir Owen Phillips.) The extracted meal, we have heard, is used much more in Germany than palm-nut cake for feeding milch cows. Can you suggest any special reason why the extracted meal, which has little oil in it, should give such good results in Germany when you impress upon us the advantages of cake with much oil in it?—I am extremely surprised to hear the statement that the meal is used more widely in Germany. Of course, I cannot refute it, but it is certainly contrary to the experience of German experimenters. I can only think that the German farmer has for the time being been tempted by the somewhat lower price of extracted meal, thinking he was getting practically the same article as the cake.

258. Can you tell us anything as to the other ingredients of the ration used in Germany? Do they use it largely with wet slices of sugar beet?—Yes, they use a great variety of materials in Germany that we never use here.

259. Would you get exceptionally good results by using meal or cake with the sugar beet slices?—Do you mean a ration exclusively made up of the two?

260. Do the two things go exceptionally well together?—They go well together, but I do not know that I should say they go exceptionally well together. The beet slices are rich in carbohydrates, and the cakes are relatively rich in protein; the beet slices are poor in oil, and the cakes are relatively rich in oil.

261. (Sir F. Lugard.) In speaking of the rancidity you said you heard that rancidity was not an actual deterrent and did not produce indigestion. Is that your view, or do you think it is deleterious?—I do not think it would produce any appreciable lowering of the digestibility unless the rancidity were extremely advanced. As a matter of fact the oil in palm-kernel cake as one gets it fairly fresh is usually just slightly rancid.

262. Then you expressed a prejudice against the use of borax. Would it be useful by experiment to prove whether borax was deleterious in any way?—There is already experimental evidence. It has been tested very considerably in America for instance. I doubt whether any useful purpose would be served by duplicating those experiments. On general grounds we deprecate the introduction of antiseptics or foreign materials of any character into a feeding stuff. If the

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material can be kept sound without them, so much the better.

263. In that connection you say the meal is more liable to go rancid because it is more broken up than the cake?—Yes.

264. Could not that be got over by compressing the meal?—That is a practical question for the manufacturer.

265. I mean after the meal had been extracted could not it then be compressed into a cake and so get over the difficulty?—If the practical man can devise a satisfactory cake which does get over the difficulty entirely, it would be a good thing.

266. As regards values, you tell us that linseed cake is now at 11l. a ton. Is that a fairly constant quotation for linseed cake?—I would not like to describe it as a constant quotation. The quotation fluctuates very much.

267. If it is at that figure palm-kernel cake must be available at 7l. 13s. a ton?—The chemist would report that that was probably a reasonable price.

268. Then if palm-kernel cake can be produced in this country at a profit to the seller at 7l. 13s. a ton it would be taken up by the farmer?—This figure of 7l. 13s. a ton is dependent upon the figure of 11l. a ton for linseed cake. When linseed cake is at 11l. a ton, then if palm-kernel cake is offered at 7l. 13s. a ton the agricultural chemist would report that it appears to be a reasonable price; but it does not at all follow from that that the British farmer would take it up, because it is a new food, and there is no obvious reason why he should abandon the old foods whose use he knows for new foods which he does not know, and which do not appear to be any cheaper. They are cheap but not any cheaper. If he is to take the palm-kernel cake up it must be offered as a real bargain to him, and the chemist must be able to report that it is relatively very cheap.

269. If no definite standards are available we must be able to sell palm-kernel cake at not more than 7l. 13s. a ton in order to get it taken up?—At not more than 7l. 13s. a ton with linseed cake at 11l. a ton.

270. (Mr. G. A. Moore.) You speak about the oil being worth 2½ times the carbo-hydrates. Is the oil as easily assimilated as these other ingredients?—Provided it is given in a reasonable quantity and in a suitable form. There is a fairly strict limit as to the amount of oil that should be supplied to an animal without causing serious disturbance to the digestive system.

271. Is that taken into consideration in that figure of 2½ times?—No, the figure of 2½ is based upon the scientific comparison of the two. It assumes that the digestive conditions are satisfactory.

272. Then possibly the doubt as to the value of the oil, to which the Chairman referred when asking his questions, might be due to the fact that it is not digested as satisfactorily as the other contents?—I do not think there is any evidence that it is not digested as satisfactorily as most other kinds of oil. I think the doubt with regard to the relative values of different oils referred more to the use made of them by the animal after digestion and as to whether the use of the digested portion is of equal value in every case.

273. I am asking as to the relative values of palm-kernel cake compressed and palm-kernel meal extracted, and whether there is as much value to be placed on the oil as a food ingredient, as you stated by saying that it has 2½ times the value of the carbo-hydrates. I should like to know whether that figure might not be reduced by the fact of it not being so easily digested?—I do not think the figure can be reduced. It all depends upon whether the material is properly used or not.

274. In making comparative experiments do you attach very much importance to the other foods that are used in making up the total ration?—Certainly.

275. We had certain experiments detailed to us by Professor Gilchrist at our last meeting, and he gave us the results of feeding a certain number of animals with rations which in the one case had palm-nut cake and in the other case had undecorticated cotton-cake,

but both rations had soya-cake in them. Can you tell me the object of putting in soya-cake. Would not it rather affect the results?—Provided the two sets of animals received the soya-cake, I do not see that any complication need arise at all. The main object of introducing the soya-cake would be to ensure that the animals were receiving a sufficient supply of protein per day.

276. Was not that one of the objects of using the two kinds of cake, and could not the amount of cake have been increased in order to secure that object?—Without seeing the actual rations employed by Professor Gilchrist I could not express a definite opinion, but I can quite see that in certain circumstances he could not get a satisfactory supply of protein by using palm-kernel cake.

277. I should like, if I may, to correct your idea that the palm-nut was ever crushed as a whole. I am pretty well conversant with the matter, and I think I can say that it never was the case. In the early days of crushing, owing to the machinery not being so efficient as it is to-day, Messrs. A. M. Smith and Company used to leave in 11 per cent. of oil, and Messrs. James Samuels and Company—I am speaking now of 30 years ago—used to leave in about 9 per cent. That probably would account for its non-keeping quality?—Certainly.

278. (Mr. T. Walkden.) With regard to popularising palm-kernel cake, I suppose you would suggest that the makers should put it on the market at as cheap a price as possible?—Certainly.

279. Therefore with the present price of palm-kernels and the ruling price of the oil you would naturally suggest that they should, to popularise it, put it on the market at a very low price. You mention it is now worth 7l. a ton, so if the makers could afford to put it on the market at 3l. or 4l. a ton it would tend to make it more popular?—Certainly.

280. That would have a tendency to popularise it and it would be wise of the makers to do it?—Undoubtedly. As I express it in my précis, I feel certain the British farmer is not as conservative in this respect as he is commonly stated to be. If a food is recommended to him, by people in whose judgment he has confidence, as being extremely cheap he will at least try it; I am perfectly certain of that.

281. (Mr. T. H. Middleton.) You mentioned the need for further experiments in cow feeding. Do you think it would be possible to organise a co-operative experiment in York-shire somewhat on the lines of the German experiment of which you gave us particulars. Would you be able to get a sufficiently large number of dairy farms on which experiments could be made?—Of course that is a point into which I have not looked at all. I could not give you an opinion upon it that would be in the least degree reliable. It might be possible to have such an experiment, but I think the greater difficulty would be in finding suitable people to take charge of the different experiments.

282. That is what I mean, and I wondered whether you knew of a sufficient number of dairy farmers in your district around Leeds who would be likely to take charge of the work?—I am thinking more of the men who would milk the cows, and who would weigh, sample, and test the milk.

283. You mean student assistants?—Student assistants would, I imagine, be the outstanding difficulty at the moment.

284. You think if student assistants could be provided you could get a sufficient number of cows on which to experiment?—I think it might be possible. There is a further outstanding difficulty, as you know, of meeting the financial cost of such an experiment. That would have to be provided for.

285. Assuming this Committee were to recommend that further experiments of this description were necessary in different parts of the country, I suppose you could very easily provide us with an estimate of the probable cost of carrying out suitable experiments?—Certainly; and perhaps I might be permitted to add to my expression of opinion that I think such an experiment as you now suggest in different parts of the country would be an ideal experiment and if, say, a

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number of agricultural colleges could each supervise one experiment with fairly large groups of cows then we could appeal directly to farmers in different parts of the country at once with the results.

286. Have you any information going to show whether the German farmer uses compound cakes to a greater or less extent than the English farmer?—I have no direct information, but from my reading of German agricultural papers, farmers' papers, and so on, I should gather that they are not used to anything like the extent there as here.

287. The German farmer buys the pure article and blends it for himself?—Certainly.

288. And in that way his knowledge of the practical value of the feeding material must be pretty extensive if he deals with the pure article?—Certainly.

289. So that if he appreciates palm-kernel cake there must be some special value in this feeding stuff which our farmers have not discovered?—Very probably; but one must not forget the extreme deference to authority of the German, whether farmer or otherwise. If the agricultural scientific authorities in Germany issue a pronouncement that palm-kernel cake is the cake for milk cows, that pronouncement will carry far greater weight than any pronouncement of British agricultural chemists would carry with the British farmer.

290. I agree as to the first part of your answer that it would carry more weight, but do you think a practical farmer, even in Germany, would continue using the feeding stuffs if he did not find a benefit from them? Would not it be obvious to him after long experience that he was getting something out of this palm-nut cake?—You know how difficult it is to be certain whether you are really getting a benefit or not, unless the benefit is something very extraordinary. At any rate I believe the German farmer would continue using it much longer than the British farmer would after he were convinced.

291. Does not he keep milk records?—Certainly.

292. Do not those indicate to him pretty clearly whether he is benefitting by concentrated food or not?—But the special claims for palm-kernel cake have not reference so much to milk yield as to butter yield, and the production of fat. The assertion is that palm-kernel cake exercises a specific influence upon the secretion of milk fat. Although a hundred farmers might keep records of milk yields there probably would not be more than one or two who would keep the results of the butter fat yield, even in Germany.

293. I should doubt that. I should think they would ascertain the quantity of butter that was produced at their creameries.—In the case of milk going to creameries they would have facilities for ascertaining the yield of fat, of course.

294. The object of my question is to bring out the fact that there is a very great deal of evidence as to the value of this particular food for dairy purposes?—Certainly.

295. Some questions have been put to you as to the value of oil, and you have indicated that it has been valued at $2\frac{1}{2}$ times the value of carbo-hydrates. It is also frequently valued at $2\frac{1}{2}$ times the albuminoids?—Practically at $2\frac{1}{2}$ times.

296. (Chairman.) You mean the oil is valued at $2\frac{1}{2}$ times the value of the albuminoids?—Yes. That is for a certain specific purpose, but not in assessing the price at which the material might be sold; it is rather when comparing the actual nutritive value to the animal of those materials in the ingredients of a mixed ration.

297. (Mr. T. H. Middleton.) The point has also been put to you that we should compare palm-kernel cake with undecorticated cotton cake rather than with linseed cake. The feeder of cattle is specially interested I think in getting a good oil substitute for linseed oil?—Yes.

298. Do you think that there is any probability of making palm kernel oil a substitute for linseed oil in feeding cattle?—There is a possibility, but whether it amounts to a probability or not I would not venture an opinion, as we have no evidence to guide us.

299. We have information that these vegetable oils differ considerably in their value for feeding purposes, or do you not agree with that?—The assertion is very frequently made, but I find it very difficult to track down the experimental evidence upon which this assertion is based.

300. I wish to put to you specially the point whether you have been able to track down any such experiments?—I have not, beyond the evidence of practical experiments with relatively small numbers of animals.

301. You would agree that there is a visible difference in the effect of these oils on the coats of animals?—There again I would not like to commit myself. I have heard the assertion made so frequently by practical men that I dare not say it is not the case.

302. But you have not met with it?—When one inquires into the actual circumstances of the feeding one usually finds so many other possibilities that may account for this difference in the coats.

303. Then you are inclined to value cotton seed oil, linseed oil, and palm-kernel oil at about the same?—I have no reason to depart from that practice. I want to add that I do know of really excellent cattle feeders who have absolutely abandoned the use of linseed cake, and who assert definitely that they cannot see that their animals are any worse in condition than the animals they used to turn out when they used linseed cake. So the practical men, according to my experience, are divided upon that point. The greater number believe, of course, in the superior merits of linseed oil.

304. May I ask what these cattle feeders use as their ordinary farm foods—roots and straw, or chiefly pasture?—Roots and straw in the winter, and, of course, pasture in the summer.

305. But was the evidence to which you refer based on winter feeding or summer feeding?—Winter feeding. I know one particular case where soya cake was introduced in the place of linseed cake. The ration, so far as I remember it, along with roots and straw consisted of a mixture of Egyptian cotton cake and soya cake.

306. (Mr. L. Couper.) In regard to earth-nut cake you say in your memorandum that the undecorticated cake is used to a steadily diminishing extent. So far as West Africa is concerned the ground nut mainly comes from the Gambia, and that is all undecorticated. The Northern Nigeria ground nut is decorticated possibly by reason of the rail freight charges and so on. The Gambia undecorticated nut cake goes entirely to France, or has done so until quite recently. Can you say what use would be made of that in France. Would it be applied to the mere purposes of use locally or did France send cake to Germany?—Is this cake produced in Gambia?

307. The nut is produced in Gambia.—Yes; but is the nut then decorticated in France?

308. No, it is shipped to France in an uncrushed form, I understand?—Then it must be used as an undecorticated earth-nut cake.

309. Do you imagine that the cake is used in France by the farmer?—I imagine so, but I am not so well acquainted with the conditions in France as I am with those in Germany.

310. We hear that Germany imported from this country all sorts of cakes. Is it likely that she also did so from France?—She certainly did, because in German papers I have come across frequent complaints of the Marseilles cake sent from France, with the comment that this was presumably the undecorticated cake, as the high fibre content of it indicated that it was undecorticated cake.

311. In reference to palm-kernel cake, is there any maximum price imposed upon it other than in relation to the price of similar cakes? I mean does the farmer in this country switch off to something else altogether than this cake at a price?—Of course he can switch off, say, to maize and peas.

312. It is a question of price which governs that?—Presumably it is very largely so. On many large farms maize germ meal is used in place of an equivalent amount of cake.

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313. To sum up the difficulty in regard to palm-kernel cake, it seems to me to be a matter of education, first of the British farmer and secondly of the British cow?—Yes.

314. The cow is concerned in the fibrous part of the cake and its rancidity, while the farmer has those difficulties as well as that of price, which is his main difficulty, and, added to that, he wants a regular supply?—Certainly.

315. He must have a regular supply if we are to hope to do any good with him?—Certainly. Of course that is obviously important.

316. There must be a regular supply for some years to come, at all events while it is in the experimental stage, and the supply should be at as nearly as possible a regular price?—Yes, I think so, and at a low price in comparison with the older established foods.

317. (Mr. T. Wiles.) I see you refer in your précis to Denmark where cake or meal is used for feeding pigs. Do you know if Denmark uses a great deal of this cake for feeding stock and so forth?—I am afraid I could not say; I do not know at all. I am only familiar with the experimental work that has been done in Denmark.

318. Do you know whether in Germany, where it is used so much, there is any climatic reason why the farmer should give preference to the palm-kernel cake over the ordinary cotton cake or linseed cake, and the old-fashioned cakes?—I do not think there can be any climatic reason. I know the climatic conditions of some parts of Germany.

319. (Mr. T. H. Middleton.) There is the hardening of the butter fat in summer?—Of course they get higher temperatures in the summer than we do, so that in the summer it is of greater value there than here.

320. (Mr. T. Wiles.) Do you think the scientific knowledge of the German farmer is greater generally than that of the British farmer and therefore he is able to use these nut cakes and new cakes more quickly?—It is certainly greater in a great many cases, but I think it is often just the little knowledge that is very dangerous and causes the German farmer to proceed longer upon the lines of theory which is not borne out by practice than the practical British farmer in his ignorance does.

321. Do you think from what you know that the smaller German farmer is better scientifically equipped than the smaller British farmer for the use of these many new kinds of cake?—It is very difficult to strike an average, but I should imagine that the average is probably rather higher, although I have come across small German farmers who were colossally ignorant of the most rudimentary principles of stock feeding.

322. I notice you say at the end of your précis that the initial unpalatability has to be got over. Does not that mean that the large farmer could easily use palm-kernel cake because he could buy it freshly, but many thousands of small farmers could not get over that difficulty?—I do not see why the small farmer should not be quite well able to get over the difficulty. It is a matter of using a little skill and common sense in blending the foods in order to produce a palatable ration. A small consignment of palm-kernel cake is not necessarily of inferior value and not necessarily old cake.

323. But has not the larger farmer a greater stock to draw from?—Certainly.

324. Therefore, is it not more easy for him to use a new cake than for a man who only has half a dozen or a dozen stock?—It is easier for the large farmer to blend different foods together as he is able to keep a greater stock of the different kinds.

325. Then you said that some cake contains more husk than others?—Yes.

326. Is that evidenced by an experiment which you have made recently?—Not from my own experiment, but numerous published analyses indicate a great fluctuation in the contents.

327. One of the members of the Committee referred to an old make of cake which had husk in it. Have

you made any recent experiments?—I have recent analyses which indicate the presence of fibre.

328. The presence of fibre indicates that some husk is left in the process of manufacture?—Presumably, the outer coating of the kernel, if you refer to that as the husk, but not necessarily the shell. I did not refer to the shell being left in.

329. You said you thought young stock would not take palm-kernel cake easily. Why would not you give it to young stock?—What I meant to imply was that on general principles one would refrain from giving material rich in hard fibrous ingredients to young stock.

330. At what age would you suggest it would be possible to use palm-kernel cake?—With calves of, say, six months onwards.

331. You think after six months they could take it?—Certainly.

332. But at an early age they could take cotton cake or linseed cake, I suppose?—Linseed cake, but not cotton cake. Cotton cake is another food rich in fibre. As soon as the animals could easily deal with relatively large quantities of hay one could then begin introducing more fibrous oil cakes if one wished to use them.

333. Then you said there were traces of borax present in Bombay cotton cake?—According to my own experience and the publications of results which I have come across.

334. You said you thought probably there were greater traces of borax in imported cakes than in home-made cakes; have you any evidence to show that?—None whatever. It is merely based upon the idea that the imported cake has a long sea journey to make through a very trying climate, and that it might deteriorate very considerably on the voyage if not preserved to some extent.

335. You only make that suggestion. You have no evidence to show that it is so?—None whatever.

336. You are unable to give any evidence to show that imported cake had more borax in it than a home-made cake?—I cannot give any evidence at the moment, and I am not aware whether any such evidence exists or not.

337. Will you tell the Committee whether you have any experience of using sugar-beet slices?—I have no experience with sugar-beet slices.

338. Have you any knowledge of feeding palm-kernel cake or meal to sheep?—I am familiar with the ordinary practice on the farm of giving a little cake to sheep.

339. But you have no knowledge of experiments in giving palm-kernel cake to sheep instead of cotton cake?—Not in this country; I am not aware of any.

340. Do you know if it is used in Germany for sheep at all?—I cannot give any expression of opinion about its use there. I cannot recall that it is, but I should imagine it would be used to a certain extent, though probably not to a great extent.

341. (Sir Hugh Clifford.) I think you told us that the principal index of the value of a feeding cake was in the quantity of oil that it contained?—Protein and oil, yes.

342. What would be your comment on the following: "The value of a cake as a rule is measured by the "albuminoids"?—"Albuminoids" is an alternative term for protein.

343. Quite so; and then there is this further statement: "Our feeding experiments show that the "albuminoids are generally more important than the "oils."—That is rather a wide assertion.

344. What would be your comment on it—that it would not coincide with your own experience?—It seems to me to be the sort of assertion that cannot be justified as a general assertion. The albuminoids may be more important for certain purposes, and the oils for other purposes. I do not know what the feeding experiments were.

345. Your original statement to us was, I think, that the best index of the value of a feeding cake

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would be the quantity of oil it contained?—Oil and protein.

346. In combination?—It must be one or the other.

347. But could you give us any idea as to the relative proportions of the two that would make your ideal cake?—I could not make any general statement on that; it would depend on the other ingredients of the ration.

348. Taking cake that is produced by expression and the other form of cake from which the oil has been extracted, in the former case a larger quantity of oil remains than in the latter case?—The cake produced by pressure is richer in oil than the material produced by the action of solvents.

349. Would that in your opinion give a much greater value to a cake that is the result of compression?—For general purposes, certainly.

350. I think you also said that the larger the quantity of oil left in the cake, the less rapidly does it become rancid?—That statement is made by a German investigator, and it is taken from the results of German investigation. I have had no direct experience.

351. But it is stated on authority which you consider of value?—Yes.

352. (Chairman.) It is not simply because of the quantity, but because of it being packed together in a cake instead of being loose and open to atmospheric influence?—Yes, there are the two points.

353. (Sir Hugh Clifford.) That refers to the case of the meal, but I am asking you to compare the two cakes, (1) the cake that is produced as the result of compression, and (2) the cake that is produced as the result of the extraction of oil. You say the one that has most oil in it becomes rancid less rapidly?—Yes. I have come across two sets of experiments conducted in Germany, each of which led to that conclusion. One was with reference to palm-nut cake and meal, and the other with reference to earth-nut cake and meal, and the results were concordant although the foods were different.

354. A layman would have thought that the more oil there was in a cake the more rapidly would it become rancid?—Yes.

355. But that is not correct?—So many apparently sound ideas are found not to be borne out by experience.

356. I take it, then, that is a fallacy?—Apparently.

357. Are you able to account for that result?—I could suggest an explanation, namely, that in the one case you have a small quantity of oil spread over a certain surface, producing there an extremely thin film, while in the other case you have a much larger quantity of oil spread over the same surface and producing a thicker film. In the one case the oil is relatively more exposed to the air than in the other. The oil inside the thick film is protected to a certain extent. Whether that is the explanation or not I could not say; it is merely an explanation that occurs to me on the spur of the moment.

358. You spoke of making cake more palatable by the use of treacle?—Yes.

359. I think you said you had seen that done?—We did that.

360. Would it be possible economically to do that on any large scale for feeding cattle, or would the cost of the treacle be too heavy an item?—I should think it would be possible. It is very common practice now-a-days to mix a little treacle in with the food.

361. And it would practically have very much the same effect as the beet-sugar slices spoken of as being used in Germany?—Of course the beet-sugar slices are residues after the extraction of the sugar.

362. But a certain amount of sugar is still in them?—A certain amount, but not very much.

363. Not enough to make the difference of palatability?—I should not think so.

364. (Sir G. Fildes.) You spoke of the influence of authority on the Germans. Has anything come before

you that would lead you to suspect that the nut-crushing interests in Germany have endeavoured to push the sale of cake among the farmers by Government influence, or by any other kind of influence that is not dependent upon the nature of the cake or the value of the cake itself?—I have no evidence whatever upon that.

365. You have no reason to suspect that that might be the case?—Having no evidence I can have no reason to suspect it.

366. Therefore, so far as you know the cake has won its way on its merits?—Yes, so far as I know.

367. Have you any information from the dairying point of view as to the winter feeding of cattle in Switzerland; do you know if cake is fed to them at all?—I have very little knowledge of the conditions of dairying in Switzerland.

368. You do not know whether cake enters into their feed?—I should think it almost certainly does if the cows are housed through the winter, as presumably they will be.

369. They are housed in the winter, I believe?—I imagine the winter-feeding of cows varies considerably in different parts of Switzerland, probably more than in any other country, as far as my limited knowledge goes.

370. I had an idea that the influence of the big milk companies, like Nestlé's, was directed towards uniformity in that respect, but I have no information on the subject.—I am speaking from very limited knowledge, so I would not press my opinion in any form on that point.

371. As regards dairy cattle, do you assent to the statement that oil to dairy cattle is of less importance than the albuminoids? I rather gather that you did not.—Not as a general statement. I do not believe in these general statements at all.

372. (Chairman.) I have just one or two questions to put to you to clear up some points that have arisen. Some questions were put to you by Sir Owen Philipps as to the price in Germany of cake and of extracted meal. Have you heard that the prices of the two have tended to approximate to one another?—I have not heard that.

373. I have had it definitely stated to me as a fact.—I have not heard it. I, personally, have been cut off from all sources of German information for the last twelve months.

374. I was not meaning during the last twelve months, but prior to the war. Whereas the price of extracted meal had previously been about 10 marks per ton lower than the price of crushed cake, recently that difference had tended to vanish before the war.—I have not heard that.

375. With regard to the value of different oils, when you said they were on the whole much the same in value, do you think that answer holds good if it is the case that palm-kernel cake has a particular value as regards butter fat?—It would not hold then for that specific case, but I would like again to make my own position clear on this point, because it would be rather serious for any statement to go forth that is not really the opinion I hold. My opinion is that there is no satisfactory evidence as yet of appreciable differences in the values of the different oils. I know that opinions have been expressed and that definite statements have been made, but I personally have not been able to track down the experimental evidence upon which those statements are based, and therefore what I have said is that, as far as our information goes at present, there is no reason to believe that there are essential differences in value between the different oils. I am quite open to conviction if experiments are carried out that demonstrate the opposite.

376. You suggested an experiment, possibly several experiments in different parts of the country under the supervision of agricultural colleges with, say, 20 cows in each. I wonder how much such experiments would cost, or any one of such experiments.—It is very difficult to form an estimate on the spur of the moment.

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377. (Mr. T. Worthington.) You suggested that there would be 40 cows in each experiment?—When I mentioned 40 cows I had in mind a single experiment. If we could get a number of experiments made, I personally would be pleased to get two sets of 10 cows each on farms, that is, 20 cows in all; but if one experiment were carried out at one place I would prefer more cows in order to get a more reliable average.

378. (Chairman.) You said the value of the oil content was great, but that beyond a certain limit it might not be of substantial use?—That is so.

379. I suppose for milk purposes you would not like to state any sort of limit?—One can only speak of the oil content of the total ration, and you cannot pick out one particular ingredient. We have evidence that the limit for milch cows is reached when the daily ration per cow contains about half a pound of digestible oil, that is to say that no further specific effect can be produced upon the milk secretion by an increased amount of oil supplied in the food.

380. When you put such a value upon oil would you still, in view of that, say that you would not set great store on having a more or less reliable content to your cake? I put a question to you earlier about the great variation in the contents of different cakes, and you said that occurred very likely in linseed cake, and in decorticated cotton cake, and in all cakes?—Yes.

381. If the oil value, which is one of the smaller percentages in cakes, is of such importance, is not it of value to know how much oil you have in the cake instead of letting it be a variable quantity?—Naturally one always likes to know how much oil there is in the particular cake one is using, and I think it would be extremely useful if those chemists who deal with large quantities of these foods could give us some guidance as to what are the common limits of variation.

382. Supposing that a big crusher was selling cake, and said: "I guarantee this cake as containing "not less than five per cent. of oil," would that be of value do you think?—Certainly.

383. It would be of value if he gave it a minimum limit?—I think at present he must state it; it is compulsory under the Fertilisers and Feeding Stuffs Act. He must guarantee the percentages of oil and albuminoids.

384. (Sir Owen Phillips.) And whatever he says must be right?—He must guarantee a minimum; he need not give the exact figure.

385. (Mr. T. H. Middleton.) There is one point which I think has not been touched upon. In comparing the fibre of palm-kernel cake and undecorticated cotton cake, are we certain that they are equally objectionable?—As I think I mention in my memorandum, the late Professor Kellner (possibly the leading German agricultural chemical authority on feeding) makes a definite assertion in his book that palm-nut fibre is more valuable and is more highly digestible than the fibre of most foods; but I am personally very sceptical on that. So sceptical am I that I have recently carried out a preliminary trial with rabbits to ascertain the comparative digestibility of the fibre of bran, and palm-kernels and cotton seed. That trial is not quite completed yet, but the comparison of the bran-fibre and the palm-kernel fibre is practically completed, and does not bear out Kellner's statement; they are practically equal in digestibility according to my experiment, which I regard just as a preliminary trial.

386. There is one point on which we have a good deal of information which seems to bear out Professor Kellner's experiments, and that is that palm-kernel cake is being used largely for pig feeding, and we know the pig does not digest fibre well, or does not digest undecorticated cotton cake. Is not there a suggestion that the different experience may be due to the different qualities of the fibres?—It is legitimate to make the suggestion, but one can bring against it, I think, actual digestion estimations with pigs showing, speaking from memory, that the fibre of palm-nut kernel has not proved specially more digestible than other kinds of fibre. I could put my finger on the actual results of those trials, but I cannot quote them at the moment.

387. (Mr. G. A. Moore.) Would it be any use to you if I sent you a small sample of the shell and the palm-kernel together—that is to say, after they have been cracked but still mixed together? There would be about 75 per cent. of the shell and fibre and about 25 per cent. of the kernel. I can send you such a sample if it would be of any use?—I should appreciate it very much, because it would be extremely useful to me in my educational work.

The witness withdrew.

Professor ROBERT WALLACE called and examined.

Précis of Professor Wallace's Evidence.

I am Professor of Agriculture and Rural Economy in the University of Edinburgh, where I have occupied the chair for thirty years. I have made a special study of live stock, including dairy cattle, their feeding and management,

I remember "palm-nut meal," as it was called, being used in my father's dairies with most beneficial results about fifty years ago. Its use was discontinued after a few years because the meal could not be got in the market. I had no difficulty in recognising the characteristic agreeable smell of the cake and meal when it was again brought to my notice after the outbreak of war. I took a keen interest in its re-introduction and brought the necessity for carrying out experiments to the notice of the Governors of the Edinburgh and East of Scotland College of Agriculture.

Beef-cattle feeding experiments, being the most interesting for the college area, were instituted with most satisfactory results to test palm-kernel cake against four other well-known foods mentioned in the subjoined table.

It has been arranged to carry on further experiments during the coming winter, and I expect that the merits of the two methods of removing the oil, viz., by

pressure and by extraction, will probably be tested. Feeders want to have more information on the qualities of the residues from these two processes.

Palm-kernel Cake Analysis.

	Total Dry.	Albuminoids.	Oil.	Soluble Carbo-hydrates.	Crude Fibre.
Recently -	90	18 to 19	6½ to 8	45 to 48	13
Last year -	90	17	10	36	22

The change is all for the better, the result of improved methods of handling. More flesh-formers, less fibre; more carbo-hydrates and less oil. The fibre, which is the only objectionable substance, should be still further reduced by improved practice.

The following table showing comparative analyses is, with the exception of linseed and coconut cake, taken from Mr. Wm. Bruce's report on the Edinburgh and East of Scotland College of Agriculture cattle-feeding experiments for 1914-15:—

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[Continued.]

	Linseed Cake.	Bombay Cotton Cake.	Palm-nut Kernel Cake.	Dried Distillery.	Bran (Medium).	Coconut Cake.
Moisture - - - -	11·0	12·04	12·03	8·31	13·57	10·5
Oil - - - -	8·6	5·82	8·83	10·75	4·55	8·5
Nitrogenous matter - - - -	33·5	20·50	18·12	23·62	14·81	21·4
Fibre - - - -	8·7	22·27	12·22	13·68	9·60	14·7
Ash - - - -	6·5	15·98	3·57	2·00	4·40	6·2
Soluble carbohydrates - - - -	31·7	33·39	45·23	41·64	53·27	38·7
	100·0	100·00	100·00	100·00	100·00	100·0

Linseed cake, the premier cake, is the ideal standard by which other foods can be measured. Although palm-kernel cake is considerably below linseed in feeding value, it is not far behind coconut cake.

In the college experiments, in which the substances in the four columns in the centre were pitted against each other in a well-balanced ration, results showed that palm-kernel cake was the cheapest food of the kind in the market, about 1*l.* per ton cheaper than undecorticated Bombay cotton cake. No distinction is made between Bombay and Egyptian, for, although the Egyptian seems to be richer from its analysis, the feeding quality of the Bombay variety brings it to practically the same level. The prices since this was pointed out through the college experiments have tended to come very closely together.

Palm-kernel cake has a low residual manure value round 1*l.* per ton as against 2*l.* in linseed cake and 1*l.* 10*s.* in undecorticated cotton cake.

Palm-kernel cake is deficient in flavour and not so palatable as most other cakes, partly owing to the granular character of its substance and to the fact that it retains this character during the process of mastication. Grown-up cattle do not readily take to it in the pure state—they take longer to learn to eat it than other foods. Calves do well on it, if the percentage of fibre is low and if given in moderate quantities, and are not so difficult to train. In the condition of meal it has been sweetened and seasoned by spices to advantage. It is best fed in a mixture forming one-quarter, one-third, to one-half of the whole, but the exact proportions for different classes of animals have yet to be determined. Pigs will probably do best with the lower proportion.

It is not a food which, like cotton cake or linseed cake, may be given alone. It has to be given in small quantities at first, working up to 5 or 6 lbs. for cows and rather less for bullocks.

F. P. Walker's experiments, Durban C.C., showed that cows fed on 6 lbs. of palm-kernel cake against 6 lbs. of Bombay cotton cake in a well-balanced mixture showing a nutrient ratio of 1 : 5·3 produced a more thriving condition of skin. Though these experiments were otherwise inconclusive, nevertheless palm-kernel cake is an ideal food for milch cows.

It does not taste the milk objectionably like many foods, but gives it a rich flavour and colour. It has been claimed that it increases the amount of fat and solids in the milk, but such an unusual result requires confirmation and further demonstration. It has a tendency to make the butter hard rather than oily, a matter to be regulated by the amount given to the animals.

The fat from palm-kernel cake is the most digestible of all the fats of the common feeding stuffs; 98 per cent. digestible as against 92 per cent. in linseed cake. The carbohydrates are also more digestible than the corresponding substance in other cakes.

Palm-kernel meal (extracted) differs in composition from the cake in having not more than about 2 per cent. of oil, in place of 6 to 8 per cent., with a corresponding increase in the other solid substances.

Farmers do not like meal so well as cake, as it is not so convenient to handle, and it cannot be used in windy weather out of doors.

The oil of the palm kernel is peculiarly liable to become rancid: in other words, an acid or acids resembling butyric acid in badly smelling butter is liberated from its glycerine base and gives the material, either cake or meal, an objectionable smell and repulsive flavour. This evolved material ceases to be a food, and although it may not be poisonous it makes the food with which it is associated less digestible and less attractive.

Meal is more liable to the change than cake because more exposed to air. Well-made cake kept quite well during the college experiments from three to four months, and I have known it being kept for six months without evil consequences. During the process of making it should be exposed as little as possible to the air, and it should afterwards be kept in a dry place and fed dry to the animals.

Ground-nut cake is made from the monkey-nut, earth-nut or pea-nut, *Arachis hypogaea*, a leguminous tropical and sub-tropical product which I have found grown by the natives all over the warmer parts of the Empire. As a cattle food the nuts before the war went mainly to the Continent. Earth-nut cake meal contains round 45 to 50 per cent. of crude protein and only 5·2 crude fibre, and is an excellent ingredient to mix with other food-stuffs which are poor in albuminoids. It usually has under 10 per cent. of oil.

It yields the best results when given in moderate quantities and always mixed with other foods. Decorticated ground-nut cake could fill the place of decorticated cotton cake in a mixed food, and all kinds of stock eat it freely and thrive on it.

The value of its manurial residue is exceptionally high, estimated by Hall and Voelker's scale at 66*s.* 2*d.* per ton when made into dung and at 89*s.* 1*d.* when consumed on the land. It stands the highest in the table of manurial residue values.

The quality of cake in the market is very irregular, owing to the evil native Indian practice of wetting the nuts which leads to their rotting so that the dark-coloured cake is fit only for manure. Cakes from Indian sources often contain sand and other adulterations or impurities that seriously lower their values.

When of good quality it has been successfully used as an ingredient in a mixture of food for horses, although cakes as a rule are not appreciated as food for horses in competition with oats, bran and beans.

I do not think the prospect of feeding palm-kernel cake to horses is very hopeful. Pigs, however, do well on foods containing palm-kernel cake or meal as an ingredient.

Poultry do not take to palm-kernel meal, and its success with them after being seasoned and sweetened is doubtful, as it should not be wetted.

The Germans have demonstrated their very high opinion of palm-kernel cake by consuming not only the enormous amount of the cake pressed and otherwise treated in Germany, but also by buying the comparatively limited amount made in this country. The British farmer has not known about it and he has consequently neglected it.

The prospects of introducing it so as to transfer the greater part of the trade of crushing from Germany to this country are excellent.

The general results of the numerous experiments carried out by the various universities and agricultural

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colleges in this country are most satisfactory, and farmers and feeders are rapidly catching on to its true value. To this end experimentation should be extended for purposes of research and demonstration, and the results published far and wide by means of printed reports and popular lectures.

One of the most successful ways to popularise it with consumers will be to keep down the price till they are persuaded to test it for themselves.

Bombay cotton cake, which was at first despised by them, was largely introduced in this way. Many farmers first made its acquaintance at prices down to 3*l.* a ton and even less, and now its price is established on the basis of its feeding value in competition with other common cakes in the market.

ROBERT WALLACE.

University, Edinburgh,
August 20th, 1915.

388. (*Chairman.*) You are Professor of Agriculture and Rural Economy in the University of Edinburgh?—Yes.

389. Before putting to you any questions, perhaps I might ask you whether you would allow your précis of evidence to be prefaced to your verbal evidence in the print, a proof of which will be submitted to you for any alteration or correction you would wish to make?—Certainly.

390. I will take you in the first place through your précis, which you have kindly sent us. I see you say that during the coming winter you expect the merits of the two methods of removing the oil, namely, by pressure and by extraction, will probably be tested?—Yes.

391. Do you know of any experiments which are being made on this subject?—I could have spoken with authority if we had had a meeting of the Governors, but I am practically certain that experiments will be conducted by the East of Scotland Agricultural College in continuation of the experiments done last year. We have had no meeting since the question came up, but it is arranged that the experiment should go on, and now that we have had the hint, that will be the method it will follow.

392. And will you try the extracted meal, too?—Quite so. It may be taken as a certainty, but I am not in a position to say so until the College Governors have pronounced upon it.

393. You say in your précis that, comparing the palm-kernel cake formerly and now, "the change is all for the better, the result of improved methods of handling. More flesh formers—less fibre; more carbohydrates, and less oil." Is it an advantage to have less oil?—I thought you might have some difficulty about that. It usually has been considered that the more oil there was the better, but I think if we have 8 per cent. of oil it is practically all we require. Eight per cent. of oil gives the proper consistency to the cake, and the deficiency of oil can be made up from the soluble carbohydrates.

394. When you say "proper consistency to the cake," do you mean merely for giving it as food, or for its nutritive value?—The hardness of it. The difficulty is that when you have little oil in it you get it so hard that the animals cannot eat it.

395. I am talking of its nutritive value. Do you think 8 per cent. of oil is the maximum that is of much use for nutritive value?—The oil is worth more for other purposes, I think, as a rule. We consider up to 8 per cent. of oil is required in order to have a properly soft cake, but beyond that I think probably the value of the oil for other purposes will lead to its extraction down to that point. There is no object in having oil in any quantity beyond that required for the proper consistency of the cake, which is secured by having about 8 per cent. of oil.

396. I am not thinking of the consistency of the cake in order to get the cake to adhere, but I am thinking of it from the point of view of getting butter from milk cows?—The more oil you give for milk purposes the worse the butter is as a rule. I think there should be the minimum amount of oil to secure a good cake, then the less oil the better. I know it is a

new idea and chemists have not pronounced on it, but it is my own idea. If you have more oil in this cake in which you are specially interested, you get hard butter, and if you have more oil in linseed cake you get soft butter. If you get all the oil you want up to 8 per cent. there is no necessity to have more.

397. Below 8 per cent., do you think it is a disadvantage?—Yes; I know we get cakes even down to 6 per cent. of oil; but no doubt 8 per cent. is the proper proportion, and if you get less than that you get a hard cake, which is bad for the cattle.

398. Bad from the point of view of the cows not liking it?—From the point of view of mastication. A great number of people do not break the cake as it should be broken, and get it in nuts, so that when sheep or cattle get hold of it they cannot eat it and it falls out of their mouths and you get a lot of loss because of its being hard; the animals cannot eat it readily.

399. Do you know of any experiment as to the value of the oil from palm-kernel cake, particularly with regard to milk cows?—No, I do not think there have been any. It is recorded in the text-books how digestible it is and how useful it is for that purpose, but we have carried out no experiments on cows at Edinburgh and we have no knowledge beyond what is in the text-books.

400. You do not know whether it has any peculiar value with regard to the amount of butter fat in the milk?—I do not believe in anything having any peculiar merit in that way. We do not believe in foods giving a greater quantity or a different proportion. It is only a fraction of 1 per cent. if anything has been discovered.

401. Nothing has been settled about it one way or the other?—It is settled pretty well that it is within a very small fraction of 1 per cent. Nobody can show that any kind of food will give more than a mere fraction of 1 per cent. of increase of fat or of other solids.

402. You think that is demonstrated?—I think so. Experiments have been conducted in America and Germany.

403. On the contrary the German experiments rather go to show that palm-kernel cake is of some particular value just for the purpose of butter fat.—It may be the exception to all other foods, but I should think with so many foods it is very unlikely that the whole physiological character of the beast would be upset with one kind of food and not with others.

404. It is not called an "upset."—Not an upset, but a change, from the practice. If it is a food that gives any definite increase, it varies from all other foods; and therefore I should say it would have a very peculiar effect on the physiology of the beast if it was successful in securing a result which other foods could not secure.

405. On the other hand, you think it does make the butter harder?—Yes, no doubt.

406. Then it does have a physiological effect if it makes the butter harder, and it might affect the animal in other ways too?—But all other foods do the same.

407. Linseed cake makes the butter softer?—Yes.

408. Therefore that has a physiological effect?—Yes.

409. And therefore it might have an effect on the question of the amount of butter produced as it has an effect upon the hardness or softness of the butter?—I do not think it is at all likely.

410. Is there any reason it should have one physiological effect and not another?—All other foods vary in that respect, and it conforms with the common results of other foods; that is to say, it has the effect of giving hardness or softness, but not of giving greater quantity.

411. You say palm-kernel cake is considerably below linseed cake in feeding value, but not far behind coconut cake?—Yes.

412. You put coconut cake higher?—Yes.

413. Supposing you were giving palm-kernel cake, say at 7*l.* a ton, what would you put coconut cake as being worth?—I have not worked it out like that,

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but it is less than 1*l.* difference; the difference is a few shillings a ton; it is very little, and I should say 1*l.* was a distinctly considerable difference between the two cakes.

414. You say later on in your *précis* that it is not a food which, like cotton cake or linseed cake, may be given alone?—No.

415. Do you ever give cotton cake or linseed cake alone?—Very often cotton cake.

416. Decorticated cotton cake, or Bombay cotton cake?—Undecorticated cotton cake as a rule, Bombay or Egyptian.

417. You would give that cake alone?—Yes, quite easily.

418. But not palm-kernel cake alone?—No, not palm-kernel cake.

419. What would you mix it with to make a ration?—It mixes very well with dry brewers' grains and with linseed cakes for calves—one-third of each; calves do remarkably well on that.

420. You do not think the fibre in it is at all bad for calves?—The natural fibre of the kernel is not so bad, but when you get a big percentage of fibre and you have the shell coming in it is very bad.

421. I am not talking of the shell, but of the actual kernel.—When you get a big percentage of fibre it is classified, and the shell comes in as fibre.

422. Of course, it has to be given first of all in small quantities, as we have heard, generally, working up to 5 or 6 lbs. for cows for milk purposes?—Yes.

423. Would you give as much as 5 or 6 lbs. of palm-kernel cake to cows for milk purposes?—These Northumberland experiments made by Professor Gilchrist or Mr. Walker give 6 lbs.; 5 lbs., I think, is about correct.

424. You do not think it enough to affect the quality of butter and make it tallowy?—Yes, it makes it hard, so I think it best to keep it down.

425. Therefore, you would not give as much as 5 or 6 lbs.?—No, I would not, although it has been successful in Northumberland apparently under those circumstances.

426. In the case of meal you have not had much experience, I think?—No, we have not much experience, but I saw it used fifty years ago only as meal.

427. I am now thinking of an extracted meal, not a crushed meal?—We have not really tried an extracted meal.

428. But you think if the college agree it is possible we may get an experiment made with extracted meal?—It is practically certain.

429. Do you think that would be a valuable food?—Yes, but I do not think it conforms to the rule with regard to other cakes, or that it will be so good if you reduce the oil to 2 per cent. I think you must have a higher percentage of oil. I am quite sure you must have oil in combination if it conforms to the rule. It is like water; water in combination with other foods gives far better results than are given with dry food. I think oil finely divided throughout the food must have greater value, and the food be much more digestible when it is in combination, than that same dry food without oil.

430. You say the farmers do not like a meal so well, as it is not convenient to handle and cannot be used in windy weather out of doors—in the Lothians, for example?—No, the farmers do not like meal at all.

431. Can you suggest a way by which it could be made easier to handle, and therefore more agreeable to the farmers?—The best way for cakes like that is to have them ground. The farmers ought to grind them themselves.

432. I am speaking of extracted meal; that in its natural state is fluffy?—Whenever you begin to press it you get it into such hard condition that the beasts will not eat it at all. Even with 4½ per cent. of oil I have found a case in which the cattle would not touch it.

433. When it becomes rancid, of course it is the oil that decomposes?—Yes.

434. Do you think it becomes rancid when there is more oil in it or when there is less oil in it?—It is sure to become more rancid with more oil, because it has more material to work upon.

435. I think we were told as the result of some German experiments that for some reason or other the less the oil the more it became rancid?—Yes, I saw that stated, but I did not believe it.

436. Meal, you think, is more likely to become rancid than cake?—Yes, because there is more air in it.

437. Do you know of any way in which the tendency for it to become rancid could possibly be overcome?—It should be worked fresh; that is the thing. When it is kept for any time it gets rancid.

438. As a practical man how long would you say it is possible to keep palm-kernel cake?—This kind of well-made cake I have known keep for six months absolutely good—kept in a dry place, of course. If it becomes mouldy, it immediately sets up trouble.

439. With regard to ground-nut cake, have you had much to do with that?—Not intimately, but I have seen it when I have been abroad.

440. In France?—No, in our colonies and in tropical parts, in fact, everywhere; in Rhodesia and different parts of South Africa you find it, but the nuts themselves are more used by the natives.

441. You have not seen the cake used in this country or in France?—I have not, and I have never had to do with any experiments, but I know pretty well generally the character of it, and I know it is liked by different beasts in all ways, and there is no difficulty about it.

442. What sort of cake is ground-nut cake like?—Is it more or less like linseed cake?—Yes, it is much more like that.

443. With a very high percentage of protein?—Yes.

444. From that point of view it ought to be a valuable cake?—Yes, reckoning it from the point of view of value. The manurial residue becomes very valuable when you have a high percentage of nitrogen.

445. Supposing you had linseed cake at 1*l.* a ton, what value in proportion would you be willing to give to ground-nut cake? Supposing you were a farmer near Edinburgh and you had cake to buy, and had been accustomed to buy linseed cake, and you found ground-nut cake in the market, with linseed cake costing 1*l.*, at what price would you prefer to buy ground-nut cake?—It is quite easily worked out, but I am rather out of these calculations at present, and I cannot just on the spur of the moment give it. It is quite easy to give it, and any farmer can do it. I will work it out if you like, or see that it is worked out for you.

446. If you could get ground-nut cake at 8*s.* a ton, as compared with linseed cake at 1*l.* a ton, would not you be securing rather a bargain?—Yes, I think so. I can say that that would be decidedly a bargain. I am quite sure of it, because the value of the manurial residue is so much greater. I shall be quite pleased to put in that calculation for you if you wish it.

447. It will be of value. I understand you do not assign any particular different values to the different oils—that is to say, linseed oil, cotton-seed oil, and palm-nut oil?—Palm-nut oil is so much more digestible, which is its greater value. It has 98 per cent. of digestibility against 92 per cent. in the case of linseed, so in that proportion it is distinctly more valuable weight for weight.

448. Supposing you had a milch cow, what actual ration of oil would you give it per day, if you were asked?—That is not a question I could answer right off; it depends a good deal on the rest of the food. It is quite a good question to ask what the limits ought to be, but it is not a good thing to give quantities of oil to milch cows, because it spoils the product; there is no question about that, and the less oil you can do with the better, I think.

After a short adjournment.

(*Witness.*) I have the calculation made out. I sent to the Calculator of the Board of Agriculture, who

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is quite *au fait* with the sort of thing, and he worked it out. The unit value is 1s. 4d., as against 2s. for linseed.

449. (Chairman.) I asked what the comparative value was of linseed cake at 11l. and ground-nut cake at 8l. The comparative value is really as 3 to 2. You get half as much value again?—Linseed cake stands by itself, and it has a special value against any other cake. It has the quality of regulating the digestive system, and of preventing anything going wrong. That is one reason why it is so much dearer.

450. What quality is it that helps it to regulate the digestion?—It has to do with the oil, no doubt; it is very digestible; there is nothing indigestible in it.

451. All these oils have a physiological effect, have they not?—All of them have a physiological effect, but none of them has the physiological effect that I refer to. Linseed cake prevents death; that is to say, when you feed it in a mixture the death-rate is reduced considerably in sheep and cattle. It is difficult to explain it, but there it is, and that is why farmers like it so much in addition to its real food value.

452. (Mr. C. C. Knowles.) You do not think that palm-kernel cake is ever likely to be a good substitute for linseed cake?—I would not put it exactly in that way; I would say that nothing will put linseed cake out; it will always hold a high value in the market, for the reasons that I have given.

453. Therefore it would be hopeless to try to make farmers buy palm-kernel cake and use it for feeding, instead of linseed cake?—I would encourage them to do it, because they would save money.

454. But are they likely to adopt it?—Yes, they will adopt it beyond all expectation.

455. They will adopt it to some extent?—Very largely. It is merely a matter of time, and they will buy palm-kernel cake universally.

456. With regard to feeding, I see that you give a table of comparative analyses. Would it not be as well to give us the analyses of River Plate maize, which is used very very largely for feeding? They use that instead of cake very often very largely?—Yes, but it is only a one-sided food. The maize is so deficient in albuminoids that you cannot compare it. Maize should be mixed with those foods to supplement them.

457. As a seller of cake I know that as River Plate maize comes down to a very low figure the demand for cake goes off very considerably.—Yes.

458. I thought that it might be as well to tell us what the contents are?—That might be added. As I say, it is deficient in albuminoids, and therefore is not a complete food.

459. The oil is about 5·07 per cent.?—Yes.

460. Moisture 13·55?—Yes.

461. Albuminoids about 10·12?—Yes.

462. Fibre, which is very low, 1·13?—Yes.

463. Carbohydrates about 68·88?—Yes.

464. Mineral matters about 1·25?—Yes.

465. That is River Plate maize?—There is no very great difference. American and European seed vary 2 per cent. in moisture; fat is 1·4; nitrogenous free extracted matter, 8·9; American maize, 10·4, so that it is a small difference.

466. In your examination you said that it would not do to feed palm-kernel cake alone, whereas you could feed cotton cake alone?—Yes, you very often do. In the north of Ireland they do it.

467. When cattle are out on the grass you give them quite a lot of the cotton cake?—Yes.

468. Palm-kernel cake would scour them too much?—We have not tried that yet, but we know that cotton cake is peculiarly well suited for cattle on the grass because of its astringent properties which the other has not. It would not correct the tendency to scour.

469. In making experiments in the feeding of cattle does not a very great deal depend on the breed of the cattle?—Yes. These tests that we made were with good feeding shorthorns like North of England or Irish shorthorns—high-grade shorthorns. We select good beasts.

470. I am told that the quality of the milk depends more on the breed of cattle than on the food?—Yes, that is right—on the percentage of fat.

471. And it has never been found that to change their food, if they have good food, will improve the fat in the milk more than about 25 per cent.?—That is what I said before—that it is a fraction. The quality may change, but not the quantity of fat or solids. One may be badly flavoured and the other beautifully flavoured.

472. (Sir F. Lugard.) You say in your statement after the analyses "Results showed that palm-kernel cake was the cheapest food of the kind in the market." At what price was it when those experiments were made?—It has varied very much. Here are the prices: Bombay cotton cake, 5l. 11s. 6d.; palm-nut cake, 6l. 6s.; distillery grains, 6l. 6s. They run very close.

473. At what market price would palm-kernel cake hold its own in the market against its competitors?—At the present time the price of palm-nut cake is—

474. About 6l. 5s.?—It is over 7l.; it is 7l. 1s.

(Mr. C. C. Knowles.) About 5l. 10s. at Liverpool.

(Mr. T. H. Middleton.) At the ports?

(Witness.) It is 7l. in England. For palm-kernel cake to-day the retail price is 7l. 1s. 2d. per ton.

(Mr. C. C. Knowles.) What is it in your country?—That is Lever's price. He sent me the price.

475. (Chairman.) Is that delivered in Edinburgh?—No. That is the current price. It does not say Edinburgh at all.

476. (Sir F. Lugard.) At 7l. will it hold its own against competing cakes?—Yes. It is worth 50s. more at the present price than cotton cake at the price.

477. (Chairman.) I do not understand that.—It is cheaper by 50s.

478. Do you mean Egyptian cotton cake?—Yes. I reckon that it is worth 50s. more at 7l. a ton than the Egyptian or the other cotton cake at 8l. 10s. It is 1l. a ton more, the cake itself, and there is 1l. 10s. extra, which makes it of 50s. greater value to the farmer.

479. (Sir F. Lugard.) I did not mean the actual value but the comparative value. We were told that with linseed cake at 11l., palm-kernel cake value would be 7l. 13s. as against Egyptian cotton cake 6l. 12s.?—That is quite wrong. I am just comparing with Egyptian cotton cake. That is worth 8l. 10s. Palm-nut cake is worth 7l., so I reckon that the value of one against the other is 50s. in favour of the farmer if he feeds palm-kernel cake instead of cotton cake. In the précis of my evidence I give 1l. as the value above cotton cake, and cotton cake is 30s. higher in the market. That makes a difference.

480. In your memorandum you say that acids are liberated which give the cake a bad smell and a repulsive flavour. How can that be remedied?—It must be manufactured fresh. The sooner it can be used, the better.

481. But suppose that it cannot be dealt with fresh: take oversea transport, where the cake is made in West Africa and shipped home. Have you any prejudices against any kind of antiseptics for the voyage?—No, I have none.

482. They do not deteriorate the feeding value?—If you use, for instance, formalin in moderate quantities, it will not do cattle any harm, and it does not do people any harm. We have had nothing but bad milk in Edinburgh since they did away with the use of formalin. We are, unfortunately, worse off without it than we were with it.

483. At the bottom of the page, is the word meant to be "undecorticated" or "decorticated"? It says: "Decorticated ground-nut cake could fill the place of decorticated cotton cake in a mixed food." Is it a typist's error?—No, it is decorticated cotton cake. That is quite right.

484. On the last page it says: "One of the most successful ways to popularise it with consumers will be to keep down the price." How do you propose that it should be kept down?—The middleman would not take such a big profit. If he takes a tremendously big profit, the price cannot be kept down.

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485. (*Sir G. Fiddes.*) Who is the middleman?—The cake merchant.

486. Somebody intervening between the crusher and the consumer?—Yes. There is a danger of the price being run up in that way.

487. (*Mr. G. A. Moore.*) Have you any experience of the way in which farmers who buy these cakes approach the question? Do they look at the analysis, or what?—No, there is too little of that, but we are getting that brought in because our laboratories all through the country are making analyses. Bruce has conducted experiments, and one of his chief objects is to explain to farmers at meetings, and in other ways, the value of analyses. Board of Agriculture leaflets are circulated, and they are beginning to be read. Intelligent men read them, and calculate according to the rules.

488. When a dealer sells cake he has to give on the back of the invoice the analysis of that cake. That is the law?—Yes.

489. Do you consider that the farmer should be guided, in buying the cake, by that analysis?—Yes, certainly.

490. You do?—Most undoubtedly.

491. In that case, then, there is nothing to recommend palm-kernel cake over undecorticated cotton cake; the analysis is practically identical?—Then the price comes in.

492. I know that, and I am coming to that directly. If the farmer depends on the analysis, there is practically nothing to recommend palm-kernel cake to him in preference to undecorticated cotton cake, which he already likes, by looking at the analysis?—The analysis is not the only thing; that is one of the means by which he makes his calculation. Farmers talk amongst themselves, and they know how a thing is working in the feeding of their cattle.

493. That is the very point that I wanted to get at. Do you think that the farmer ought to depend on the analysis, or ought to depend rather on practical experience?—Upon both. The analysis gives a guide to the food value.

494. Have you any idea which they depend upon most, the analysis or practical experience?—Practical experience. Unfortunately they have depended too much upon that, but they are gradually being educated. Agricultural colleges are working as hard as they can to bring home to the farmer the fact that we can calculate the values of these things, and that we do it regularly.

495. You are rather impressing upon the farmer the fact that undecorticated cotton cake is of the same value as palm-kernel cake, when you show him the analysis as against his practical experience?—But he sees he can get one a good deal cheaper than the other, and he will take the one at less money.

496. That brings me to this point: the reason why, prior to the war, palm-kernel cake has not been freely sold in this country is because the Germans, for some reason or other, whether from practical experience or not (that is one of the things that we want to know) have been in the habit of paying something like 2*l.* a ton more for palm-kernel cake than for undecorticated cotton cake. Is there anything that you know of that we can put forward which will persuade the English farmer that the German is right in paying 2*l.* a ton more? The analysis does not show it?—No, but he has proved it by experience, and he has got over the difficulty that he had at first in giving the cake to the beasts. The beasts do not like it to begin with.

497. That has been got over by flavouring, I take it?—No.

498. By mixing with locust beans, and so on?—You can mix it with something.

499. In Liverpool, the people who devote themselves almost entirely to compound cake go entirely by the analysis?—Yes. I quite understand that.

500. And they tell me that they are quite prepared to buy as much palm-kernel cake as they can get to mix with compound cake, provided that they can get it cheaper, or as cheaply, as undecorticated cake?—That is quite right. That is exactly what I thought.

501. Showing that they look on the analysis as the only practical recommendation?—From their point of view it is quite right, because they can season it, and they do. These compound cakes are all seasoned with spices, and very often with locust beans, and so on, to get over the difficulty.

502. But the whole object of the Committee's work is to find out some reason why the British farmer should pay an equivalent price to the German farmer, namely, 2*l.* a ton more, in comparison with undecorticated cotton cake. That is about the average. Why should he pay 2*l.* a ton more? The only way in which we shall be able to keep this trade in the country, after the war is over, is by dealing with the price of the palm-kernel cake.—But is 2*l.* a ton more actually substantiated?

503. Yes, I think so; that is about the average?—That shows that men who have studied it from the scientific point of view and the practical point of view combined have proved that it is a very superior article, for cow-keeping particularly.

504. Do you believe that there is sufficient to enable you to press it on the English farmer at such a difference in price?—He will judge for himself.

505. With regard to what you were pointing out just now, you said 1*l.* a ton, but it will take a difference of at least 2*l.* a ton between it and undecorticated cotton cake to keep the trade in this country?—Well, the farmer, of course, will judge for himself.

506. In reply to Mr. Knowles you answered a question which I had written down, as to why you cannot give palm-kernel cake alone, by saying that it has not the anti-scouring properties that cotton cake has?—Yes.

507. Otherwise you could give it alone?—Yes.

508. Would it be more likely that you could give the extracted meal alone?—You cannot, owing to wind, give meal at the grass; it is not in a suitable condition.

509. (*Mr. J. Couper.*) What steps do you recommend should be taken to popularise palm-kernel cake directly amongst farmers?—By the experiments that we are conducting, and the publication of the results of the experiments.

510. You referred to practical experience as being probably a greater incentive than analyses, or anything of that sort?—People will follow the college experiments which are being made now all over the country. There is no doubt that they are followed very closely.

511. Let us suppose that palm-kernel cake is readily taken by the British farmer; would not that result in a reduction in the price of other cakes?—I do not think so, seeing the enormous quantities of other cakes that are used. It would have that tendency, but it would not be perceptible.

512. Do you think that there would be a proportionate increase in the general consumption of cakes?—Yes. After all, the amount of that cake introduced would not alter the values. The prices are not all made in England, and you have the values of the whole world to consider. You have to equalise them somehow.

513. (*Sir G. Fiddes.*) I was going to ask practically the same questions that Mr. Couper put to you. I do not think we have yet had, at any rate in one paragraph, a list of the different cakes that would compete with palm-kernel cake. What would you say they are—linseed cake, for instance?—All the cakes.

514. Will you let us have the names of them, for ignorant people like myself?—Cotton-seed cake, earth-nut cake, hempseed cake, linseed cake, poppy seed, and palmnut.

515. That we have got in the list?—Yes. Then rape seed, sesame seed (that is Indian and much used there), and sunflower seed.

516. Are they all of equal commercial importance?—No.

517. I am only concerned with those that really are of equal commercial importance?—The chief ones are cotton seed and linseed and earth-nut now; rape seed not so much. Cotton and linseed are the two chief.

518. Cotton, linseed, and ground nuts?—Yes; that is growing.

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519. Ground nuts are under our patronage now?—Yes.

520. If, as the result of this Committee's work, the consumption of palm-kernel cake in the United Kingdom it very largely increased, would that have the effect of substituting it in part for one of the other commercial cakes, or would it mean a general increase in the employment of cake?—I think that there would be a general increase. To some extent there would be substitution.

521. I do not know where the raw material for these cakes comes from, nor where the crushing is done. Is there any likelihood that if the use of palm-kernels went up, we should in effect be attacking an existing British industry and thereby diminishing it? Do you follow me?—Yes, quite. We shall do no harm in that way.

522. Where does the raw material of linseed cake come from?—The Argentine, Russia and British India.

523. Where is it crushed?—A lot of it is crushed in Hull and elsewhere in this country.

524. Do we import the cake, or the raw material?—We do not import the cake.

525. Similarly with cotton seed cake—we do not import the cake?—No.

(Mr. C. C. Knowles.) Some comes from America.

526. (Sir G. Fiddes.) A great deal of cotton cake comes from Bombay and Egypt?—Yes, from wherever cotton is grown.

527. Is it crushed locally in British India or Egypt?—I do not know that.

(Mr. Knowles.) Nearly the whole of it is crushed in this country. Very little comes from abroad, but some is dumped.

528. (Sir G. Fiddes.) Apparently there is a certain amount of cake that is able to defray the cost of its transport from overseas. Would palm-kernel cake, crushed in this country, be able to defray the cost of its export to the Continent, say? That is one of the points which came up in discussion whether it would pay crushers to erect mills in this country. Could they dispose of their cake, which is a by-product in a way, in this country, and if not, would it pay the cost of carriage to the Continent?—I take it that it would. It is cheaper to bring it here and crush it, if you can do it.

529. Yes, but supposing that you have not sufficient market in the United Kingdom when you have made it, would you say that the cost of the freight would exclude the possibility of a market abroad? To take a theoretical and absurd case, if all the German mills were destroyed, the cost of the freight would not make such a difference, would it, that it would prevent that possibility?—The old cost would not, but I do not know what the future cost would do, if many more ships are sent to the bottom. You must not allow money to be invested in mills and then compete with the industry in such a way as to extinguish it. If crushing is done in this country, the industry must be protected, though I cannot say in what way. It would be fatal to put a lot of money into mills, and then let German competition, which would be keener than ever, cut the throat of the industry.

530. Looking at it from the outside, which you must do, you mean that, *qua* milling, the millers must have some reasonable guarantee that they will not be undercut by German mills?—Certainly. I believe in competition, but not unfair competition. I think that the millers would be all the better for competition on a fair basis.

531. (Sir Hugh Clifford.) What do you call unfair competition?—Dumping.

532. (Sir G. Fiddes.) All export may be called dumping by an uncharitable person?—But I mean

dumping at something less than cost price, to cut the throat of an industry.

533. Do you think that it would be possible to discriminate between two cargoes of the same article, and say, "This one has been dumped; that has not"?—You got to know very soon whether a country is working in that way.

534. But what you suggest can only be dealt with by legislation, I take it, and can the legislature discriminate in such cases?—Yes, I think so, if they take the opinion of people in the trade, which they do not often enough do,—the real practical people who know the business.

535. If you were asked, would you be prepared to draft a clause in an Act of Parliament to meet that?—I would get the cake merchant to do it.

536. You would be responsible for its being produced?—Yes.

537. (Sir Hugh Clifford.) Instead of troubling the Imperial Parliament, could you not get the necessary tax imposed, say, on the West Coast of Africa, with which Parliament is not directly concerned, and remit it, say, in favour of kernels exported under a guarantee that they would be crushed in Great Britain or in a British Colony?—That is patchy legislation, I think.

538. In what way? For the sake of argument, suppose that an export duty was imposed on all palm-kernels, but that the tax was remitted in the case of palm-kernels exported under a guarantee that they would be crushed in a British Colony, or in Great Britain. Would that not have the same effect, and also have the effect of the Imperial Parliament not being troubled?—It is so important a thing that I think that the Imperial Parliament ought to be troubled with it. Beginning out there is the wrong end of the stick; it should be done here.

539. But on what grounds?—The whole question of protection will have to come up after this war. It will not apply alone to this cake.

540. Supposing that it was rather an urgent matter, and you did not wish to put controversial questions on the *tapis*, might you not possibly get a practical result in West Africa, whereas it could only be talked about in Great Britain?—I think that if you allowed it to proceed naturally, the mischief would be brought home to people here, and that would educate them more quickly. If men who put money in buildings here lost it, they would make a noise about it, and that would bring it home.

541. (Sir G. Fiddes.) Supposing that we are going to capture this trade for Great Britain at the conclusion of the war, obviously we must have mills erected and ready to work at the conclusion of the war?—Yes.

542. To get those erected, millers must be satisfied that they have a fair chance of making a living as soon as they start. I suppose that it is reasonable to assume that the German mills which are now lying idle are eating up interest on capital, and that, directly there is a chance of getting raw material, they will make tempting offers which our people cannot compete with, if only to start their mills?—The legislation will have to be passed pretty quickly, I think.

543. (Chairman.) The calculation which you have been good enough to get since this morning shows that if ground-nut cake was selling at 8*l.* a ton, and linseed cake at 11*l.* 5*s.*, ground-nut cake would be 1*s.* 4*d.* a food unit, and linseed cake 2*s.*, so that there is a good bargain in ground-nut cake?—Yes.

544. You will let us know as soon as the experiments are actually decided upon?—Certainly. After the first meeting of the Governors I will let you know at once.

The witness withdrew.

Mr. T. H. MIDDLETON, C.B., (Board of Agriculture and Fisheries), called and examined.

545. (Chairman.) You have heard all the evidence that has been submitted by the agricultural professors on the question of oil and albuminoids, a good deal of which is very conflicting. First of all, as to value in

albuminoids, what is the case really?—It all depends on what purpose you want the cake for. A cattle feeder growing carbo-hydrates very cheaply, wants albuminoids, and pays relatively more for albuminoids,

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but if he wants to supplement a good natural mixed diet which you get on pasture, albuminoids have less value, and oil and carbohydrates become of relatively greater value. You cannot compare their value until you specify the particular purpose for which the feeding stuff is wanted. It is all a question of the purpose.

546. I put it to Dr. Crowther in this way: If I wanted to fatten cattle, I should aim at one standard of nutriment in whatever food I gave; if I wanted to feed milch cows, I should aim at another and so on?—Yes.

547. Taking a given standard, in either case I would use all the local supplies I had got possessing carbohydrates or albuminoids, and I would buy cake to supplement them, so as to get as near my ideal standard as I could?—Precisely.

548. Do you think that there is a limit of oil to which people ought to go?—Yes, I agree with Dr. Crowther that the experimental evidence indicates that we do not want to feed to a cow more than about half a pound per day. I forget the amount recommended for fattening bullocks, but assuming the animal to be a 1,000 lbs. live weight animal, I should say that the limit would be somewhere about the same as for the cow, or perhaps a little more—that is about half a pound per day.

549. On the whole, would you use oil for milch cow purposes, and carbohydrates perhaps for fattening purposes?—There again it is a question of price. You want to feed cattle rather cheaper than milch cows, and I think that one would be prepared to pay rather more for oil for milk production than for cattle feeding.

550. It is really a question of the price at which you can market your product afterwards?—Yes. At the present time cattle feeding pays so well that one can pay high prices for what is wanted.

551. Do you know of your own knowledge whether there is anything in the question of palm-kernel cake increasing the amount of butter fat?—I have seen statements based on German experiments which have been already referred to. The only specific statements that I have come across which would indicate that a foodstuff permanently increases the percentage of butter in milk refer to palm-kernel cake.

552. Is it worth while to have experiments on that question?—I think that they would be very useful. That point is one of great importance to dairymen. In many cases they would do anything to get a fraction of 1 per cent. more butter fat in the milk. The man who is really troubled is the honest dairymen feeding cows in a district where the percentage of butter fat naturally runs low. There are districts in the country of this kind.

553. What do you mean by the percentage running low?—The percentage of butter fat runs near the 3 per cent. limit.

554. Is that owing to the breed of cattle, or the foodstuff?—It is very much a question of pasture and climate. I know certain districts where, given a certain type of weather, the composition of mixed milk from a herd of cows falls to nearly 3 per cent. of butter fat—morning milk especially.

555. You think experiments worth while?—Yes. Every milk seller would welcome a food which would have any effect on the percentage of butter fat.

556. A small fractional increase in the amount of fat you think of real value?—Of very great value when milk is near the 3 per cent. limit.

557. It is not to be neglected?—Not by any means.

558. We can ask you later about getting conditions under which an experiment can be properly tried in some way?—Yes. We have a difficulty this year in arranging for co-operative experiments of the type that Dr. Crowther mentioned, because many of the people whom we should want as assistants are on military service, but I think that we could arrange for extensive co-operative experiments.

559. Have you any real knowledge as to the extent to which farmers are getting acclimatised to the use of palm-nut cake at the moment?—I wrote to a number

of correspondents, as you see from the Note which I have put in. My correspondents are in daily touch with farmers, and I have got from them a pretty clear idea as to what is happening. I should say that the consumption of palm-kernel cake has been increasing fairly quickly within recent months. The information that I got was that when it was first tried in the early part of the winter a good many farmers made mistakes, possibly in regard to keeping it or in treating the palm-kernel cake and got it into bad condition. In some cases, at any rate, they were unsuccessful in getting cattle to take it, but we do not now get the same number of complaints that we did formerly on that point. I think that the farmer's stumbling block up to the present has been the non-palatability of the cake and the fact that it does not keep well, but goes rancid. If the farmer manages to keep the cake well and to get the stock to eat it freely then the consumption will increase very rapidly, I think. I have one letter, dated 17th August, from a farmer who has used about 100 tons of palm-kernel meal, and has now a contract running for 300 tons more. He says "We have used a large quantity of palm-nut meal." "We have used the palm-nut meal for dairy cows and for pigs and poultry. So far we are satisfied with it. We have not given the cows more than three or four lbs. per head per day in conjunction with other meals. We have used it largely for pigs in the proportion half and half with sharps on old pigs and strong stores, and one-quarter palm-nut meal and three-quarters sharps on younger pigs just weaned. We have not definitely noticed any ill-effects, though at one farm about three months ago some 40 strong pigs were fed entirely on palm-nut meal for three days, owing to the man being out of sharps. At the end of the third day he reported they were going off their feed and they certainly were not eating well for another week, but whether it was entirely due to the palm-nut meal or not we are unable to say."

560. With regard to rancidity, you say that it goes rancid?—That is my information. A great number of correspondents have said so.

561. Have you any idea why it should be so, particularly when we have other cakes with as much oil in them of which it is not said?—I think that you yourself have given the explanation—the nature of the oil is different and the volatile acids decompose more easily in this particular cake.

562. From this particular oil?—Yes. Decomposition might be set up by moisture.

563. Would it be possible to ascertain that more definitely by experiment?—I think it very necessary to investigate this point; it is one of the most important points that we could go into, because the whole future of the demand depends on getting a cake that will keep reasonably well.

564. How long would you give it to keep? Perhaps it is rather an unfair question to ask?—If a cake is to be generally useful I think that it ought to keep from three to four months at least.

565. We have been saying that it will keep for six months?—I know a case in point. The cake which was sent by Sir Owen Philipps to Aberystwyth kept for six months in very good condition, but I have heard of other cases where it has gone rancid after one month.

566. Under what conditions?—In the cases in which it has gone rancid the conditions have not been reported to me. I have no definite evidence that a particular sample of cake which was kept for one month under proper conditions has gone bad.

567. Perhaps we might enquire what the conditions were in the instances that are referred to in these replies?—Yes.

568. One essential point is its keeping quality?—Yes.

569. Will you write to the correspondents?—Yes. I will write to those who have indicated that it does not keep well and get them to question the farmers.

570. Have you had much information with regard to extracted meal?—No.

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571. You were talking of meal just now with regard to pigs. I did not know whether it was extracted meal or not?—The correspondent does not say. He simply says "We have been using a large quantity of palm-nut meal, which I believe is practically the same thing." The farmer is in Worcestershire, and he would purchase, I should think, from the Liverpool district.

572. Do you know what they feed them on in Switzerland? Sir George Fiddes raised the point.—No, I have no special knowledge of Switzerland.

573. It might be worth while to inquire?—I should say that they feed dairy cattle in much the same way as in Germany, Denmark, and other countries that go in for dairying. I do not think there is any marked difference.

574. (*Mr. C. C. Knowles.*) They feed very differently in Denmark from Germany?—Possibly.

575. Yes. Now you told us that half a pound of oil was the total that you considered safe to give in a day?—That I considered economical.

576. What would be the total weight of food. What percentage would that be of the total weight of food?—It would mean a ration of about 16 lbs. of digestible dry matter—there or thereabouts; it is a small percentage of the total.

577. About 3 per cent.?—Yes, something like that.

578. Provided that the cattle are quite healthy and have good food what increase of butter fat have you ever heard of as possible by improving the food—by giving them any cake or any other food?—I have not any case in mind in which there has been a permanent improvement except the cases to which Dr. Crowther alluded in feeding palm kernel.

579. You know that Messrs. Bibby of Liverpool have an experimental farm?—Yes.

580. And they have for very many years kept cattle for the purpose of experimenting as to the value of feeding cakes?—Yes.

581. Mr. Bibby, the elder, told me that it has never been known that the butter fat could be increased more than 25 per cent. no matter what food was given to the cattle?—That may be right. It is very small, provided, of course, that the previous food has been sufficient and that you have not been starving the animal.

582. Of course. Do you think that cotton cake would keep better than palm-nut cake if they were put into the same warehouse together? Do you not think that one would keep as well as the other?—Cotton cake keeps sufficiently well for all practical purposes.

583. And would not palm-kernel cake if it was put into a dry warehouse? Of course you can put a thing into a bad warehouse?—I infer from the answers I have got that palm-kernel cake does not keep as well as cotton cake or any of the ordinary cakes, otherwise there would be no complaint about it.

584. There is lightly pressed palm-kernel cake, and there is palm-kernel cake that is very very hard. The latest machinery is constructed to get as much oil out of the kernel as possible, and the more oil you get out the harder you have to press the cake, and that makes it a harder cake. Now do you think that a hard cake would keep better than a soft cake because of being hard?—I think it is likely that it would, because the air would not penetrate so readily.

585. Our experience is that you can keep palm-kernel cake just as long as you can keep cotton cake. I have known of large cake merchants who have bought enormous quantities of palm-kernel cake for eventual shipment to Germany and have held them in public warehouses in Liverpool for at least twelve months, and then shipped them and got the same price as for freshly made cake?—The atmosphere of the warehouse would be always dry, every opening would be shut down. In a farm building air circulates freely and you get damp air when the weather is damp and that makes the cakes go off condition.

586. That is my point. If a warehouse is properly constructed and is dry, palm-kernel cake will easily keep for six months. I want to know whether you agree.—The conditions we have to meet are different; the

farmer has not got a store which he can hermetically seal in damp weather.

587. Do you think that in damp stores, ordinary farmers' stores, cotton cake will keep better than palm-kernel cake?—All I say is that we have no difficulty with cotton cake. I have kept it in ordinary stores for quite a long time.

588. Do you not think that a very great deal has been made out of the question of rancidity. I must say, as a maker of cake, that I remember very seldom hearing about it until I came to this Committee?—Well, I can only give you the information that I have got from correspondents. It seems to me that there must be something in the question of rancidity. It would seem to be the chief stumbling block in selling palm-kernel cake at the present time.

589. If one has anything to sell one generally gets complaints, but I must say that seldom if ever do we hear the word "rancidity" mentioned. But the rancidity point has been made quite a lot of at this Committee?—It is a point that has come up in response to inquiries.

590. You have no special evidence that the cake gets rancid the more oil there is in it, and that it gets rancid quicker than other cakes?—No. I do not know whether you saw the notes from the county instructors which I gave on pages 2 and 3 of my Memorandum.* In these notes there are quite a number of cases in which rancidity is mentioned, especially in the south of England, where little is being sold.

591. Do you think the palm-kernel cake can ever be a good substitute for linseed cake?—Yes, at a price it can.

592. But leaving price out of it altogether, if you keep cattle and you usually feed them on linseed cake at, say, 11l. or 12l. a ton, do you think that you could feed them on palm-kernel cake at 6l. or 7l. a ton. Could you substitute it for linseed cake, and if so, why has it not been done?—Did you notice one particular case at a Norfolk farm this year where they compared linseed cake with palm-kernel cake. It is mentioned on pages 4 and 5 of my notes. That experiment was made on a farm in the middle of one of the best feeding districts in Norfolk, where they are well accustomed to feeding bullocks. They made a careful experiment, and the result was that the palm-nut cake and the linseed cake had approximately the same feeding value. The differences between the two lots of bullocks were considerably smaller than the probable error of the experiment. I have a letter from Professor Wood which says: "In my opinion those fed on it (palm-kernel cake) made slightly more per live cwt. than those fed on linseed cake, for the reason that they looked better in their coats, and butchers bid very freely for them."

593. If we could only see a way of making the farmers believe that palm-kernel cake is of equal value for feeding with linseed cake we should have no more trouble at all in disposing of palm-kernel cake. You know that enormous quantities of linseed cake are used?—Yes.

594. (*Chairman.*) To avoid misconception, might I ask whether the comparison was a comparison of absolute amounts or a comparison of amounts in proportion to the price?—The amounts in both cases were the same, 3 lbs. linseed cake and 3 lbs. palm-nut cake.

595. Was the gain absolute?—The gain was absolute. The cattle made very nearly the same gains.

596. (*Mr. C. C. Knowles.*) That is very favourable evidence for our scheme.—This particular experiment mentioned the bloom on the coats of the cattle, and the Northumberland one did the same, and that drew my attention to the specific effect of the oil on the coat. It seemed to me to indicate that one cake might become a substitute for the other to some extent.

597. Could we go further and investigate the experiment?—The experiment was made by Professor Wood, and no doubt he would come before you and give his views on the subject.

598. I think it very important, because it is the most valuable cake that we have, and if we can only

* Not printed.

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[Continued.]

substitute the palm-kernel cake for the most valuable cake we shall get over a very great difficulty.

599. (*Sir Owen Philipps.*) If it comes out in evidence that it does improve the coat, and if we can satisfy farmers in the country that their cattle will look better after being fed with palm-kernel cake, that alone will help a great deal in getting farmers to buy it?—Undoubtedly, if you can prove this point, of which we have at present an indication. You want to follow it up with further experiments to get the point proved.

600. If we could also prove that there was even less than 25 per cent. improvement in the butter fat of the milk, even if it was a little over 1 per cent., it would do a great deal to increase enormously the demand for it?—Yes, it would popularise it.

601. With reference to the keeping qualities of the cake has it occurred to you that possibly the complaints may have arisen from the fact that very little of this palm-kernel cake has been sold in the past and therefore dealers may have had it lying in stock in England for very long periods before it got into the hands of the consumer?—I think that that does not account for the recent complaints. It may have accounted for the old complaints.

602. You referred just now in your evidence to a ton of cake that I sent to North Wales last winter as an experiment. That was the ordinary product of a mill that does not press so hard as some of the more recently erected mills. As that was proved to have kept for six months would it not also go to show that it was not necessary to press it so very hard to get it to keep?—In that particular case it is evidence in favour. Can you remember when you sent that cake out from the mill?

603. I could not remember the date, but they were all about the same time?—Somewhere about December?

604. They were all about the same time. I could look up the date and give it to you.—It was keeping well about a month ago or less.

605. (*Sir F. Lugard.*) May I ask whether you see any reason why cake made in West Africa and treated by machinery erected there should be in any way inferior to cake made in this country, if it is proved that the cake can be kept well for six months and that rancidity is not an absolute deterrent?—It has always got the voyage against it. Cake made in this country would have a better chance of being fresh, one would suppose, but if you can get over the keeping difficulty then there is nothing to prevent the cake coming from West Africa.

606. (*Mr. G. A. Moore.*) In regard to the experiment which you set out as taking place at the Armstrong College, had you anything to do with that experiment?—No, I had nothing directly to do with the experiment. I obtained the information for my Memorandum.

607. I suppose that you would agree that the results were absolutely negative. They are referred to in your memorandum. The cows after being fed for seven weeks on palm-nut cake gave 103 pints, and after being fed for seven weeks on cotton cake gave 94 pints. Then in the second period, after being fed for seven weeks on palm-nut cake, they only gave 68 pints. It would puzzle anybody to draw a conclusion from figures like that.—There is a reduction of about 9 per cent. in one case.

608. And about 25 per cent. in the other. I take the two worst instances. They are both in opposite directions.—They are both in the same direction.

609. In the same direction in one way, but one is a reduction when the change is from palm-nut cake to cotton cake, and the other is a reduction when the change is from cotton cake to palm-nut cake?—The reduction is taking place because of the extended period of lactation—the cows are going off milk.

610. It is not an average reduction. It is an extraordinary amount.—It has been got over by putting each lot of cows on the two foods for an equal time. The reduction is taking place more rapidly in lot 2 than in lot 1 apparently.

611. They are in opposite directions although you change in one case from palm-nut cake to cotton cake, and in the other case from cotton cake to palm-nut cake.—The change in food does not affect the

natural drying up of the milk, and for that reason the two lots of cows have each been fed for some time on the two diets, so as to eliminate the lactation difficulty.

612. Another point that struck me as curious is that the cows used in the experiments were mostly pregnant, and yet you say that they were milked morning, noon and evening?—Yes, up to a month or two before calving that is done very often with a heavy milking cow.

613. The feed that you experimented with in arranging the ration only constitutes about 7½ per cent. of the total. Is it possible to arrange a ration in which the experimental feed shall form a larger percentage and so give a more definite result?—In experimenting with an unknown food it is not desirable to give too large a quantity to begin with, because we do not know what specific effect it may have on the animal. The feed given here is 6 lbs. in each case, I think. That is about a maximum ration of palm-kernel cake.

614. You heard the questions that I put to Professor Wallace with regard to the difference in price obtainable here and in Germany?—Yes.

615. Do you see any reason in the quality of the cake to make you hope to be able to persuade the English farmer to pay an equivalent price to that which the Germans will pay in proportion to other cakes, by that means keeping the trade in this country. That is apart from any fiscal proposals which have been put to you?—I think that there is a strong probability that when the English farmer has been accustomed to palm-kernel cake he will pay a substantially higher price for palm-kernel cake than for undecorticated cotton cake, but whether he will pay as much more as the German now pays I am not prepared to say.

616. The whole point is whether he will pay as much more?—Yes.

617. That he may pay more does not help as much, but if he pays as much more it may enable us to keep the trade in this country.—I cannot forecast what the result will be.

618. I am not asking you to do that, but I am asking whether there is any reason in the quality of the cake or anything of the sort to hope for such a consummation?—I have reason to think that there is a strong probability of increase. First, we may be able to substitute it to a certain extent for linseed cake in cattle feeding and for sheep feeding, and so on. Another reason is that palm-kernel cake has quite a value in pig feeding, and therefore the market for palm-kernel cake is a wider one than the market for undecorticated cotton cake, for example, which cannot be used for pig feeding.

619. (*Mr. L. Couper.*) We are anxious to divert a certain trade from Germany to this country. Now with regard to the crushing trade, it seems to me that we are clearly entitled to handle the oil which we take now from Germany, at all events to that extent?—Yes.

620. I do not know what quantity of oil Germany supplies us with, but I have heard a figure of 25,000 tons a year mentioned. Can you say what would be the quantity of cake which would be the residue of 25,000 tons of oil?—In the case of palm-kernels, I understand about 50 per cent. roughly.

621. Assuming that figure to be correct, that means 25,000 tons of cake obtained from the oil supplied by Germany to England?—Yes, there or thereabouts.

622. Now assuming that trade to be captured by the British, would there be any difficulty, in normal times, in placing 25,000 tons of palm-kernel cake on the market? What proportion does that bear to the total amount of cake consumed in this country?—I think that the total amount of cake consumed in this country has run from about 1,200,000 to 1,300,000 tons in the last year or two. Mr. Knowles can tell us.

(*Mr. Knowles.*) I cannot give the exact figure, but it is very, very large.

(*Witness.*) So that the 25,000 tons is negligible.

(*Mr. L. Couper.*) Quite so; I see that. Now do any foreign countries outside Europe make extensive use of cakes—such countries as Argentina, Canada, or any cattle-raising countries?

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Mr. T. H. MIDDLETON, C.B.

[Continued.]

(Chairman.) You mean could we build up an export trade?

(Mr. L. Couper.) I mean is it in existence already?

(Witness.) There is an enormous demand in the United States for feeding stuffs, for instance.

623. We have heard to-day of cake sent to this country from America?—Cotton cake.

624. Do you think it would be possible to export?—I should suppose that we were a much better market than the United States for feeding stuffs.

625. You think that it will be a long time before we have to look outside for any market?—Yes.

626. (Sir G. Fiddes.) One of your correspondents mentioned that he had been feeding meal to poultry. Have you had any other evidence of its being used for that purpose, or of its being useful for that purpose?—I have had no other evidence with regard to poultry. It is the first time that it has been mentioned.

627. Would it be worth while to experiment as to its value for fattening, or as an egg producer?—The consumption is very small.

628. Have you any knowledge with regard to Germany of the methods of those who express the oil and sell the cake?—No.

629. I have had it suggested to me that they manage to make the thing pay by watching the respective prices of oil and cake, and switching from one to the other. I do not understand the statement; I can only suppose that it means, if it is true, that when the price of oil is high they press more oil out of the cake. If that were done, I think that it would absolutely destroy the standard of the cake, and the cake buyer would never know what he was getting.—He gets an invoice with every consignment.

630. But it does not follow that he would get a consignment with the same oil contents on two successive occasions.—He must.

631. I do not think you follow me. If it is true that the Germans press more oil out when oil is dear, and less oil out when cake is dear, then it follows that the oil content of the cake that is supplied at different times varies?—It must be so, as with other oil cakes.

632. Would it not be very unsatisfactory to the English purchaser if the same thing prevailed here?—I do not think so. He would soon get to know the general composition of the cake, and what he should expect. Our English oil cakes vary very much in composition.

633. I have not made myself clear, but I will not pursue it. If you were asked to advise a crusher as to the oil content that he should aim at in his cake as a standard not to be departed from, what would you put it at—8 per cent? Perhaps I ought not to ask you that?—I am not in a position to advise at the present time, but I should suggest somewhere about 6 to 8 per cent.

634. As a feeding stuff?—As a feeding stuff.

635. As the ideal form of palm-kernel cake?—6 to 8 per cent.

636. You said just now in your evidence, and I think that others have done so, that the harder you press the cake, the less likelihood there is of rancidity?—Yes, I think that is probable.

637. On the other hand, Professor Wallace pointed out, rightly or wrongly, that the hard pressed cake will not be eaten so readily by the cattle?—There is that difficulty.

638. Therefore you have to find the happy mean. Taking it all round, would you say that cake with 6 to 8 per cent. of oil in it is about the standard, balancing the oil contents and every other consideration such as keeping quality and palatability?—I do not think we know enough of palm-kernel cake yet to fix the desirable quantity of oil. In the case of linseed cake,

one would say that 8 to 10 per cent. is a desirable percentage, but it is quite possible that in the case of palm kernel it might be desirable to work down to 4 per cent.

639. You mean that we are not at present absolutely satisfied as to the physiological effect?—It is rather physical than physiological. The hard-pressed cake may become too hard for use in feeding.

(Sir G. Fiddes.) That is one factor.

(Chairman.) One of two interacting factors.

640. (Sir G. Fiddes.) You have to find the balance between two things which apparently are opposed?—If the percentage of oil is low the price will be lower, and you will buy more and feed more.

641. You think that the price will vary according to the amount of oil in the cake?—Yes.

642. One witness said that the albuminoids determined the price.—Several things determine the price of feeding stuffs.

(Mr. C. C. Knowles.) You may take it that the crusher always gets as much oil out of the kernel as he can. He does not consider the cake. It is not worth considering when cake is worth about 5*l.* or 6*l.* a ton, and oil 38*l.* a ton.

(Sir G. Fiddes.) Will that always be so, in your view?

(Mr. C. C. Knowles.) Yes, speaking generally.

(Sir G. Fiddes.) As far as the crushers are concerned, it is a case, then, of taking it or leaving it.

(Mr. Knowles.) Yes. The cake is only a by-product; the valuable product is the oil.

(Chairman.) Mr. Knowles has just said that the cake is a by-product, and that the crusher will always get all the oil out that he can. How is it, then, that the cake is all-important in the question of establishing the industry in this country.

(Mr. Knowles.) It is not all-important. We are making it much more important than it really is. The oil is the important thing.

(Chairman.) Although the cake is of importance, it is only of minor importance. It is a by-product.

(Witness.) It is in a very different position from linseed oil.

643. With regard to oil contents the amount of oil in the cake, at any rate as far as the farmer is concerned, makes a great deal of difference. A farmer will pay more or less according to the oil, up to a certain limit?—Yes.

644. Therefore it is just as well that the farmer should know exactly what he is purchasing?—Yes.

645. Therefore, on the whole, it is well to have a more or less standard contents of oil, if possible?—Yes, within a reasonable limit. All our cakes vary very much. I do not think the farmer worries very much about purchasing a cake which is quite uniform.

646. To put an analogous case, if I buy basic slag in the market, I shall be done down completely unless I take good care with regard to the chemical analysis. Does that hold good with regard to cake?—Exactly. You buy on composition.

647. Does the farmer generally buy on composition?—I do not know that he generally does, but a very great many do.

648. If they do not buy on analysis it is just as well to have a more or less standard quality supplied, if we are going to get it into good repute?—It is just as well.

649. (Sir Owen Philipps.) We are told that the Germans consume all their own by-products. They take the palm kernels and crush them, and they also import some into this country. Could you tell the Committee whether palm-kernel cake, or meal, is used in Germany in conjunction with wet slips of sugar beet?—Sugar-beet pulp is one of the chief cattle fadders in Germany, and I think it is unquestionable that palm kernel cake is fed along with it to a very large extent.

The witness withdrew.

Adjourned to Wednesday next at 11 o'clock

THIRD DAY.

Wednesday, 1st September 1915.

Colonial Office, Downing Street.

MEMBERS PRESENT:

SIR G. V. FIDDES, K.C.M.G., C.B., Assistant Under-Secretary of State (*in the Chair*)

Sir WILLIAM G. WATSON, Bart.
Sir HUGH CLIFFORD, K.C.M.G.
Sir OWEN PHILLIPS, K.C.M.G.
Mr. T. H. MIDDLETON, C.B.
Mr. L. COUPER.

Mr. C. C. KNOWLES.
Mr. G. A. MOORE.
Mr. T. WALKDEN.
Mr. T. WILES, M.P.
Mr. T. WORTHINGTON.

Mr. J. E. W. FLOOD (*Secretary*).

Mr. C. A. BIRTWISTLE called and examined.

Mr. Birtwistle handed in the following memorandum:—

Experience in West Africa confined practically to Nigeria, and dates back to 1889. The only official tour made outside Nigeria was to Togoland in 1909.

Before joining Government service in 1905 was fourteen years actively engaged in the Lagos trade, and at the time retired from business was the general manager out and home of the Lagos Stores, Limited.

During the last ten years have travelled a good deal through portions of the districts lying within 100 miles of the coast line, and in 1907 trekked by road from Ibadan to Kano and Sokoto before the railway had been extended beyond Oshogbo.

My tours have, for the most part, been within the so-called palm belt, and for several years I have given particular attention to matters affecting the output of palm produce, especially kernels.

Although I have passed through districts in the north where ground-nuts and shea-nuts are raised I am scarcely qualified to speak authoritatively concerning that product or benniseed.

With regard to palm produce, I have travelled mainly through the oil-producing districts of the old Lagos Colony and Protectorate, but two years ago made a six weeks' journey through the country feeding Opobo, Calabar, Bonny, and Degama with produce.

Have not copies of my reports by me, but certain outstanding features are well in mind.

The exports of palm produce for the last full year before the war (1913) were from Nigeria only:—

Palm oil,
" kernels,
" kernel oil,
" " cake.

Incidentally, it may be mentioned that the above export figures by no means represent the total production of palm oil, for enormous quantities are consumed by the natives as food, and in several districts, especially in the old Lagos Colony and Protectorate, I satisfied myself that quite as much, and probably more, oil was eaten by the natives as that exported overseas. In addition to the palm oil consumed by natives as a foodstuff, relatively very small quantities are used locally in the manufacture of "country" soap with the aid of the so-called "potash" from Northern Nigeria.

With regard to palm kernels, a certain rather negligible quantity is used by the natives in the manufacture of crude palm-kernel oil, and in some districts the raw kernels are eaten to some extent by the natives. The local consumption of kernels is, however, extremely small in comparison with that of palm oil, and that the figures indicated by the export figures may in this case be taken as approximating the present production.

The palm-kernel oil and cake exported from Nigeria was manufactured at the oil mills erected by Messrs. Lever Brothers at Opobo and Lagos. For some obscure reason, these mills were shut down when I left Lagos at the beginning of the present year.

With the exception of Messrs. Lever's kernel crushing mills referred to above, the only other power mills for working palm produce in Nigeria are the nut cracking ones owned at Brass and Degama (and possibly one other station) owned by the Company of African Merchants.

It may be stated that the entire output of palm oil in Nigeria is obtained by native hand labour, and that the exports of kernels from ports other than Brass and Degama are practically all obtained without the aid of power machinery.

A small number of machine crackers worked by hand have been introduced by Miller Brothers into certain districts of Nigeria, but the cost of these cleverly constructed appliances (10*l.* or 12*l.*) is unfortunately beyond the means of the small native producer, who continues to crack each nut separately between stones or pieces of hard wood.

(?) Describe methods of preparing palm oil and kernels for the market.

From the export figures, and allowing for the very small number of power mills at present erected in Nigeria, it will be readily understood that an enormous amount of manual labour is expended on this industry, which, however, is largely worked by women and children.

The feasibility of introducing more power machinery into the country to replace the present primitive methods of manufacture will doubtless engage the Committee's attention, but in my opinion this is not nearly so simple a matter as might superficially be supposed, owing to the very large proportion of waste material (shell and fibre) in the fresh palm fruit, and the consequent heavy cost of portage on fruit or uncracked nuts from outlying districts to the mills.

Mr. Moore will be able to give the Committee the benefit of his long experience of the power nut-cracking mills, and, if I may suggest it, I think Sir William Lever's evidence would be of great help not only with regard to the kernel crushing mills erected in Nigeria, but also concerning other mills which I understand he controls in the Congo for working fresh palm fruit.

Realising that the mechanical crackers are too expensive for the rank and file of native producers, the Nigerian Government is making an experiment in the way of introducing a simple and cheap hand cracker for use by poor natives, more particularly in districts where stones are not available. These crackers—an iron "dished" base with a dumb-bell shaped hammer—can be landed on the coast at a cost of about 2*s.* 6*d.* a set only, and if only the natives can be induced to take

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Mr. C. A. BIRTWISTLE.

[Continued.]

them up, it is believed the output in several districts will be materially increased.

Apart from labour-saving mills or appliances, the Committee will doubtless wish to consider other means of increasing production in the future. With this aim in view the first point is that of the proper and systematic cultivation and care of oil palm trees in districts where soil and climate are suitable.

I remember submitting in 1905 or 1906 a report after a tour in the southern part of the Ilorin Province calling attention to the haphazard manner in which oil palms were treated by natives, and suggesting that much good would result if only the farmers could be induced to realise the potential value of these trees, and to see that they were properly cared for.

Since that date, and when in palm-raising districts, I have very many times spoken with the native farmers and others on the same subject, but I am sorry to say my advice was generally received with indifference or suspicion.

Although in some districts I have been told that the natives did plant up oil palms, I have only been fully satisfied in one part of Nigeria that they really did so. The whole of the rest, so far as my observation went, were chance growths and the result of natural regeneration.

As an illustration of the curious attitude of certain natives to this very important question, I remember at a meeting which I attended at Aba the chiefs flatly refused to entertain the scheme of planting oil palms and scoffed at the idea.

In connection with this effort to induce the natives to plant out oil palms freely in favourable localities, it should be remembered that during the last decade there has been ever so much more inducement and security for the farmers to take up the cultivation owing to the much higher prices realised in Europe for palm kernels. Twenty years or more ago value of this produce ranged between 10*l.* and 13*l.* a ton on this side, and I remember that when a spasmodic and short advance to 14*l.* a ton was seen in 1893 that was considered a phenomenal price for kernels. Yet in 1913 and 1914, owing to the steady and increasing popularity of margarine made from vegetable oils, palm kernels commanded well over 20*l.* in Europe, and even 25*l.* was touched.

The point to be emphasised in connection with the above figures is that in current normal times when the world's markets are open the native farmer would now receive at least double the price for his palm kernels as compared with twenty years ago.

Obviously there is every justification for endeavouring to induce the native farmer to now plant up oil palms freely, but the West African native is a curious and very conservative person who clings tenaciously to his old habits, and it is a very difficult matter indeed to get him out of the groove in which he was brought up.

For some years past the Nigerian Forestry Department has given particular attention to this phase of the question, and has been experimenting with various types of oil palms to see which gives the best yield of oil and kernels, and two or three years ago one of the Assistant Conservators (Farquhar) made a special tour through oil-bearing districts in Nigeria, and his report, edited by the Chief Conservator, was subsequently published.

It is probable that in the course of time the natives will see the wisdom of planting out oil palms, but I am sorry to say that so far as my observation went I was not convinced that any appreciable progress had been made in the direction indicated up to the time I left the coast.

It is true, of course, that the exports from Nigeria have very largely increased during the last twenty years, but this result has not, in my opinion, been due to any planned cultivation of trees, but rather to the better facilities of transport afforded owing to Government works in the way of roads, river and creek clearing, and railways. Also undoubtedly to the more settled conditions in the country generally and to the much higher prices already referred to, which have resulted in

produce being worked in some districts which at the old low values would have been neglected.

The erection of more crushing mills at the coast ports to deal with the kernels as now exported would appear to be a matter worthy of inquiry, as with such mills out there the manufactured products (kernel oil and cattle cake) could in normal times be exported overseas *direct* to the most favourable consuming markets. Possibly, however, there is some reason which Messrs. Lever may have discovered why these crushing mills cannot be run profitably out in West Africa.

With regard to kernels brought to this country for treatment, dock dues and freights (both rail and steamer) are important factors, and the Committee will doubtless have evidence as to how these charges in the United Kingdom compared with continental rates.

650. (Sir G. Fiddes.) You are late Commercial Intelligence Officer in Nigeria, now retired?—Yes.

651. You have had considerable experience, of course, in the palm-kernel industry?—Yes, I may say that I have.

652. Is your experience confined to that? You have not paid any particular attention to the other articles that we are inquiring about, have you?—I do not feel that I am qualified to speak with authority about them.

653. You are not qualified to speak about shea nuts or ground nuts?—No.

654. You speak simply about the palm. To supplement what you have said in your précis, you have no definite information as to the experiments that have been made in connection with cultivating the palm?—No.

655. You simply know that experiments have been made?—Yes.

656. You refer us to Mr. Farquhar's report?—Yes. If I may say so, if Mr. Thompson is coming home I think that he would be a good authority for you to consult.

657. These experiments have been going on for some years now?—Yes.

658. I have a copy of Mr. Farquhar's report. Do you agree generally with his conclusions? I do not know if you recollect them.—I cannot say that I do.

659. One is that the oil palm responds readily to cultivation both in increased weight of bunches and increased number of bunches.—I am not in a position to say.

660. Another point that he makes is that under the present haphazard system there is a tendency for the survival of the unfittest, that is to say, that the best nuts are treated by the natives and the worst are left to the last, fall to the ground and spring up, with the result that there is a tendency to perpetuate the least favourable varieties. Have you had any experience in that direction?—I have not.

661. I suppose that you really have not gone into the question from the botanical side?—No, not at all.

662. But simply from the commercial side?—Quite so.

663. Possibly you would be prepared to give us a brief description of the methods of preparing palm oil and kernels for the market?—Yes.

664. Would you do so, please?—I take it that members of the Committee know that these palm nuts grow in what we call cones, locally known as heads, on the coast of Africa, at the top of the palm tree. I have never seen women going up the trees to cut down these nuts; it may be that in some parts they do so, but so far as my experience has gone the work of cutting down bunches of palm nuts has been entirely done by men.

665. The bunch is of very considerable weight, is it not, as it comes down from the tree?—Yes, I have no special figures, and I cannot remember the weight.

666. I have seen specimens, and no doubt other members of the Committee have, of the head (a sample was produced)?—It is a very small one. There were three large ones sent home to the exhibition at the Agricultural Hall in July twelve months ago.

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Mr. C. A. BIRTWISTLE.

[Continued.]

667. What would you call the average weight of a head?—I am sorry that I cannot say. One of the very largest I should say would be a fair load.

668. For a man?—Yes.

669. (Sir Hugh Clifford.) Weighing about 60 lbs.?—I should think that the largest would weigh up to 60 lbs., but I have no figures. As I say, the work of cutting down the bunches of palm nuts, as far as my observation has gone, has been entirely done by men. With regard to some districts in the Western Province, in the old Lagos Province I think it may be said that with the exception of marketing the oil or the kernels the rest of the work is done by women, children, and young girls. After the bunches are cut down I have seen them lying by the side of the tree. Of course I have not stayed there to see for how long they remained, but I understand that it is necessary before the fruit will come off readily that it should be allowed to remain for some time—that some days must elapse before the fruit can readily be shaken from the cone. I think that I had better now speak of the manufacture of palm oil. Members of the Committee probably know that there are two well defined qualities of palm oil. There is what is called the soft oil, of which the Lagos quality is the standard grade, and so far as my knowledge goes that is fairly uniform in quality; then there are various grades of what is known as hard oil, oil which commands a lower price than a soft oil, owing largely, I believe, to the smaller quantity of glycerine, amongst other things, and to the greater percentage of impurities. The process which I have seen employed over and over again in the manufacture of soft oil is that after the separate berries or fruit have been taken from the cone the fresh fruit is placed in large earthenware pots in which a quantity of water is placed, and the pots are kept boiling for, so far as my memory serves me, eight or ten hours. The idea of that is to soften the pulpy, fleshy part of the palm fruit and detach it from the inner nut. To the best of my knowledge it is that boiling which accounts for the difference between the hard and soft oils. With regard to the hard oil I will speak later. After the nuts have been softened by this boiling process they are placed in various classes of receptacles, the commonest of which, perhaps, in the Western Province, the Lagos Province, is an old caudex, and there the fleshy part, the pulpy part, is trodden off, usually by young girls. Only once in my tour did I see men pressing off the pulp from the nuts, that was in the Epe district. Of course, there are other methods which come to the same thing for taking off the pulp. You see wooden mortars in some cases and women either stamping it off or knocking it off with a wooden pestle, but the principle is the same, to get the fleshy part detached from the nut.

670. The result of this treading is to leave a mangled mass of nuts and pulp in the canoe or other receptacle?—Yes.

671. The nuts still have to be removed?—Yes. They are usually fairly clean by the time that they have done with it in the canoe after the treading off.

672. The nuts have to be separated?—Yes; that comes in the next process. You will find in most of the little hamlets and villages tanks or cisterns, as they are called locally, dug in the ground; "pits" would be a better description. Water is put in the pits, and the mass of pulp and nuts which you have mentioned is thrown into that pit, and the oily scum which comes to the top, including the fibre, is squeezed by hand and skimmed off, and afterwards, in the case of the soft oil, it is refined by boiling, when the impurities drop to the bottom or are skimmed off at the top and the water stands at the bottom. In the case of hard oil, although I have not actually seen the manufacture of the oil, I understand that the nuts are softened by placing them in a heap for some time, when I suppose some sweating process or fermentation goes on, and then I think the extraction of the oil goes on much the same as in the other case.

673. Is it a wasteful process, or is practically the whole of the oil recovered in this way?—I should say that it is not all recovered. I was interested some years ago in trying to get some simple appliance which the

natives could use for squeezing. I thought of something after the style of a lemon-squeezer, something cheap which they could use for squeezing the pulp instead of using their hands. After they have finished with the pulp, when all the oil is supposed to be out, it is sold in the local markets and used for lighting fires and also for caulking canoes, like oakum. There is no doubt a very heavy percentage of oil still left in, but what that percentage is, I cannot say. Shall I go to the kernels now?

674. If you please.—After the pulp has been removed from the inner nut it is not possible to crack the kernels at once, because there would be a tremendous waste in cracking the nut, as the kernel would adhere whilst it was in that state and would become very badly mutilated and the shell would cling. Very often in parts that I have passed through, the nuts are stored for two or three months. I am told that in districts where the natives have not to treat a very large quantity, by exposing them to the sun and turning them over frequently in the hot weather in the dry season they crack in a fortnight. I have been informed by natives in some parts of the Eastern Province that they store the uncracked nuts at the top of their houses, so that the heat from the fire inside the houses will dry the nuts. That is probably due to the fact that they do not seem to have such runs of hot dry weather in those parts of the Eastern Province as in the Lagos Province.

675. The general object of the treatment is to shrink the nut away from the kernel?—Quite so. We have now come to the palm nut ready for cracking. Generally speaking, in the Lagos Province, from which over a third of the palm kernels of Nigeria are exported, the cracking is done between stones, but in the Eastern Province and parts of the Central Province in many districts there are no stones, and all sorts of odd things are used for cracking the nuts—gun-barrels, pieces of wood, and so on.

676. Are they expert crackers?—Those who do the work regularly are very expert, cracking them one by one.

677. How many can they do?—I am sorry that I do not recollect. It is in my reports.

678. It is done very rapidly?—Very rapidly. The natural result of this miscellaneous lot of so-called cracking implements which they have in the Eastern and Central Provinces is that very much more labour is involved than if they had stones, and there are very many more or less mutilated. The Government of Nigeria is making an experiment with a few hundred metal crackers which it is thought will help the production.

679. Do you know if the natives have taken to them?—I do not think they are out yet; they are ordered. I think that they were ordered three months ago. A circular plate of iron is dished like a saucer, not too deep in the centre, and there is a dumb-bell hammer which does not need gripping, but clings on to the hand by the weight; the head of the hammer is concave.

680. Slightly hollow?—Yes. (The witness made a drawing.)

681. What, exactly, is done? Does the cracker throw aside the nut as it is cracked on to a heap, or how?—The expert woman or the child cracking will move the cracked nut away as quickly as it is cracked and brush the shell off the stone in a lot. They crack them separately, take out the kernel, and dust away the cracked stuff.

682. Has this method the effect of mixing a lot of impurities with the nuts when they are finally collected?—Not if they wish to do it well.

683. Are there not fragments of shell and dust mixed with the nuts?—Only through carelessness does that occur.

684. In practice, on the average, are they collected fairly cleanly?—Yes, if the merchants will not buy them otherwise. If it is of interest, I may say that I remember that a good number of years ago in Porto Novo we had 13 or 14 per cent. of shell, and two or three agents there commenced to buy on the five per cent. basis.

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[Continued.]

685. Five per cent. of shell?—Yes, that was the allowance in Liverpool in those days. I do not know if it is so to-day.

686. Yes.—And we got it down to 6 or 7 per cent.

687. They lowered the prices, and they lowered them progressively if the sample showed more than 5 per cent. ?—It may sound rather strange, but when that arrangement came into force each firm took an average sample of the different lots coming in and paid according to quality. They were brought in by middlemen in fairly large lots, and whatever there was over 5 per cent. was deducted from the weight, and then there would be portorage on the waste, necessarily. I do not know whether there is anything else that I can tell you with regard to palm kernels except that the work of which I have been speaking is almost entirely done by women, old people, and children, so far as I have seen.

688. Then as regards the disposal of the kernels, what is the method?—They would be taken by head load to the nearest railway station or to the nearest creek or river.

689. Taken by the actual proprietor or his family?—By him or his family.

690. We have not reached the stage of their being purchased at all?—No. They would be taken from the little hamlets to some local market first, and then possibly be bought by middlemen and taken to the canoe at the river side, and then to the factory.

691. Would the middleman be an agent of the factory, or on his own?—To the best of my knowledge, generally speaking, on his own.

692. Does the middleman pay cash to the people who bring them in, or what is the method of payment?—That is a rather complicated question. In the Western Province he would pay cash.

693. Cash meaning coin?—Yes. In other provinces he might give manillas, or brass rods, or tobacco—there would be more or less a system of bartering.

694. Was the system of giving manillas or brass rods in existence up to the time that you left?—Yes.

695. How does the native know, if he does know, what he will get for the kernels that he brings in?—He can only know by what he obtained last time, and what he hears people are paying.

696. Do you find that there is a price below which he does not bring them in?—There are undoubtedly times when he holds them up. If a sudden drop in prices occurs he will hold them up, undoubtedly, hoping that they will go back again.

697. I suppose that the tendency then is for buyers to put up their prices, to entice them?—That depends on whether they can afford to do so; they cannot always afford to.

698. Have you anything to say as to the proportion of palm oil consumed locally and the proportion sold?—I omitted to tell you that a fairly large amount is used as an illuminant. I speak in my statement of a very large consumption as a foodstuff and of a relatively small quantity being used in the manufacture of country soap; I ought also to have said that a fair amount is used as an illuminant; but palm oil formerly used as an illuminant, and still used to an appreciable extent, is gradually being displaced by imported kerosene.

699. Your view seems to be that at present at least 50 per cent. is consumed locally?—I am certain that in many districts it is so; but the consumption of palm oil is not nearly so great in the Eastern Province, as far as my observation has gone, as in the Western Province, and that accounts very largely for the disparity in the kernel exports.

700. I gather that you have some doubts as to the expediency of trying to promote the establishment of crushing mills on the Coast?—Yes, I have, unless it is in very rich palm-bearing districts. I think that a factor which the Committee needs to bear very carefully in mind is the heavy proportion of waste fibre and shell, absolute waste, which is contained in the fresh palm fruit.

701. And which would have to be transported for considerable distances?—Yes, the offal.

702. Have you any views as to the commercial

advantage or disadvantage of an establishment on the coast as compared with one in England, and the relative costs. Have you ever considered that question?—Do you mean with regard to fresh fruit?

703. No; the advantage of crushing on the Coast as compared with crushing in England, or the disadvantage from the point of view of the cost of doing it, not the cost of the carriage, but the cost after it reaches the mill?—I should say that the labour would be cheaper, but the supervision would be dearer. Spread over a very large mill, I should say that it ought to be cheaper. If you had only a small plant and had to have a manager and two or three Europeans, it would be very expensive work; but if the management expenses were spread over a very large mill it ought to be cheaper than here, I should think.

704. (Sir Hugh Clifford.) In reference to the cultivation of the palm, from your experience in Nigeria would you say that the majority of the palm trees are self-sown?—I should say without any exaggeration nine-tenths of them.

705. Practically all of them?—Practically all of them.

706. In the sense that there are very few natives who have ever planted a palm tree on their own account?—Yes. I have only been satisfied, as I state in my notes, with regard to one district.

707. Is not cultivation rather a question of thinning out existing trees than of planting out new areas?—Not entirely.

708. Not?—I should say not. I think that there are suitable palm lands where the palm trees are very scanty now.

709. As against that, are there not immense areas covered with palms where the palm is never worked to any great extent?—I believe that there have been, but I do not think that there are neglected areas to any great extent to-day.

710. Nigeria differs from the Gold Coast in that respect, because there are such large areas on the Gold Coast.—I can only speak of Nigeria.

711. I want to know whether the conditions which prevail on the Gold Coast prevail also in Nigeria. I take it that they do not, and that the much larger population practically works all the palm areas to some extent?—I would not say that in some parts of the Eastern Province every palm tree is worked, but by far the greater number is.

712. The vast majority?—Undoubtedly.

713. That differs very widely indeed from the conditions elsewhere. Now with regard to the possibility of putting up a factory on the Coast, quite apart from the question of the cost of labour and the cost of European supervision, what is your view with regard to the life of machinery in West Africa?—I have no experience.

714. You have no experience of the life of machinery there?—I have no experience of the life of palm machinery in West Africa.

715. But of any machinery?—I cannot say that I have any experience. There is very little machinery there.

716. For instance, have you ever inquired into the average life of mining machinery in West Africa?—No, I have not. I have no knowledge whatever of that.

717. I venture to suggest to the Committee that that is one matter which will be of considerable importance in any calculation as to the working of a factory on the Coast.—Exactly.

718. (Mr. T. Wiles.) I am sorry that I was not here when you commenced your remarks. When were you last in Nigeria?—In January this year.

719. You have only just returned?—Yes.

720. I see that you refer in your statement to 1906 and 1907?—I only brought that in to show that I have travelled in the north, and that my experience was not entirely confined to Lagos.

721. Do you find that in the gathering of the nuts or harvesting of them the trees are damaged very much?—I am not in a position to speak as to that.

722. You have not noticed the trees being damaged by tearing off the fruit?—No.

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723. How do they generally get the fruit off?—They get it off with an axe, which, strange to say, is often made from imported files. Files 14 to 16 inches long are imported into Lagos, and they are worked by native blacksmiths into axes. It sounds incredible, and you would not think they could do it, but they do do it.

724. Why do they prefer the files to ordinary axes?—Because of the quality of the steel. They get a good edge.

725. As far as you have seen, are any palm trees cultivated?—I have only been satisfied that they have been cultivated in one district.

726. To any large extent?—I daresay some thousands of trees.

727. Quite a small proportion?—Quite a small proportion.

728. It would not affect the question?—No.

729. We may take it that the nuts principally come from wild trees—95 per cent., say?—I should think so, clearly.

730. Have you any idea of the life of the tree?—I cannot say.

731. What is the age of the tree before it will bear fruit?—I should think that you would get the first in about six years. I had in my garden a small tree four years old. It was bearing very tiny fruit before I left.

732. (*Sir George Fiddes.*) Mr. Farquhar says that in four years trees fruit freely.—It was beginning to bear at four years.

733. (*Mr. T. Wiles.*) I want to know whether, having regard to the way in which they are treated, the number of trees is kept up; or is the quantity diminishing through the cutting in the districts which you know?—I should say that it is not diminishing.

734. We may take it that in the districts that you have travelled in, the supply of palm trees is likely to be kept up?—Yes, in the absence of blight or some disease which we have not yet heard of.

735. You do not know of anything of the kind happening?—No, except that coconut palms were attacked by blight two or three years ago.

736. Only the coconut trees?—Yes. Perhaps I may say, in regard to what I said about axes, that it is not general throughout Nigeria for files to be used as axes. May I say, suggested by your question, that I think that the trees are very much neglected in the way of pruning, and that we should get a greater yield if the trees were pruned and looked after better than they are, apart altogether from the question of planting more trees.

737. You would suggest that a system of supervision of the trees would be an advantage in regard to getting more kernels?—It would undoubtedly be an advantage if the native would do what he was told to do, or what was suggested to him.

738. I suppose that the Government of Nigeria does not take any action?—The Government teaches the natives as much as possible the value of pruning and cultivating various trees.

739. Has it a Forestry Department?—Yes, we have a large Forestry Department.

740. Do representatives of the Government go about trying to teach the natives how to preserve the trees?—Yes, amongst other things. I do not know that as a fact, but I believe they do.

(*Sir Hugh Clifford.*) Yes, they do.

741. (*Mr. T. Wiles.*) Do you think that if better cracking tools were supplied to the natives you would get a larger supply of nuts?—Yes, I think so. I think that you would get a larger tonnage.

742. Why would that be?—Because of the greater ease with which they could be worked. In the districts where they have stones, for instance, the ease of cracking is much greater than in other districts where there are no stones, and there is a greater inducement to the native to crack when he has suitable implements than there is in districts where he has not.

743. Does the native go out and gather where he pleases? What is the ordinary course?—There are trees that certain natives consider that they are the owners of, as far as I know.

744. May I take it that generally the trees are earmarked as belonging to certain families of natives?—I could not say definitely.

745. I suppose that there is no admitted system?—They tell you there is.

746. Do the palm trees grow all through the country?—No.

747. Are the best districts for the growing of palms that yield nuts near the sea, or away from the seaboard?—A short distance away from the sea. You have, of course, the mangrove swamps first. If you said within a hundred miles of the sea, I think that would be right.

748. What is the average distance that the kernel has to go when it has been cracked?—It is quite impossible for me to say; it would all depend on the system of rivers, roads, creeks, or railways.

749. Do they generally go down by water or by railway?—In Lagos, where we have a railway, very large quantities go down by the railway.

750. Further inland, I take it, they would be carried?—They would be carried, or if a river were there they would be brought by the river.

751. Is the middleman a local person? Is he a local dealer who buys the nuts from the native direct?—In the Western Province I should say yes. In the Eastern Province I think he is generally a man from the port.

752. His office would be in the port?—Yes, if he had an office.

753. Does he send for the agents, or does he go himself?—He sends his boys, as they are called there.

754. (*Sir Hugh Clifford.*) He is usually a negro?—Yes.

755. In ninety-nine cases out of a hundred he does not have an office?—No. In Nigeria the middlemen are all natives.

756. (*Mr. T. Wiles.*) Have you any idea of the cost per ton of getting the nuts to the coast, or to the shipper?—6d. to 8d. a day is an average, I think, for a 18 to 20 mile run with a load of about 70 lbs. That is what the middleman would have to pay. It is very hard to say what a native gets.

757. He carries them to the station?—Yes; that is what the middleman would have to pay.

758. Would the native sell to the middleman delivered to the railway station?—The native would sell at a little country market probably, and also at the railway station.

759. You say that cash is paid in one province, and that there is bartering in the other province?—Largely bartering.

760. Do you think that any improved system could be arranged which would result in a larger supply of nuts, either by paying cash or giving better terms to the growers?—In my opinion, if you have cash as the currency, instead of manillas or barter, the production and trade must increase.

761. If cash could be paid instead of the doubtful system of barter, you think that it would induce them to collect more nuts?—Yes, assuming that cash was popular with the natives, and that they had no difficulty in changing from one native to another.

762. Would it be possible for the native to collect more nuts if cash was paid; I mean by that, are there many thousands or hundreds of thousands of palm trees which are not harvested, the fruit not being picked?—I think that the greater the freedom you have in trade it naturally must follow that you get the maximum production of the country.

763. But you cannot tell us what percentage of the trees is picked?—No.

764. Was it apparent to you in your travels that a large number of trees never have their kernels picked?—Well, I was rather disappointed in that respect. I anticipated that I should find that a tremendous number were not worked, but I came to the conclusion that the number had been exaggerated and that there was not such an enormous number left unworked as we had been given to understand.

765. Could you give me an idea of the percentage?

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—No, not at all. It is such a vast country that it is impossible to say.

766. Is it your impression that it is 30 per cent., for instance?—I cannot say. You cannot fix me on a percentage.

767. Is there much competition in purchasing from the natives? Do many buyers go about to buy from them?—Do you mean middlemen?

768. Yes?—I should say a reasonable number.

769. Sufficient to make a standard?—The conditions vary so much in Nigeria. In certain places you have open markets into which anybody can go. In parts of the Eastern Province you go along a creek and find So-and-so's market; the market of Cookey Gam, a chief of Opobo; and another market is Ja Ja market, and so on. The natives going to such a market could only deal with the boys of the particular house.

770. The one family; therefore, there is no competition in those cases?—There would be the market a little distance away of another chief, where they could offer their kernels if the price at the other was not satisfactory.

771. Would the chiefs have any conference together so that the same price would be given in the different markets, or would it be open competition?—I think you might say that it is reasonably open competition with the handicap of the markets being some distance apart, as it were.

772. If local mills were established, do you think that there would be a regular supply of kernels to keep them going? Is that your experience?—A regular supply brought to the mills?

773. Yes.—I am very doubtful. It would all depend. If you had 20 square miles with nothing but palm trees, then I think if the price were right, the mill would get an ample supply.

774. If mills were established, you do not think the nuts would be held up?—Not if the native could get a price which would pay him as well as working to support himself. You speak of fresh palm fruit?

775. Yes.—I see no reason why he should hold them up if it would pay him as well to bring them to the mill.

776. (Mr. L. Couper.) You have said that you have no evidence to offer on the subject of a large number of kernels being unpicked; but surely it is a common enough thing in Nigeria for kernels to be allowed to rot on the ground. The Chairman has just handed me Mr. Farquhar's Report, No. 220, which says: "Mr. Birtwistle, Commercial Intelligence Officer, estimates that at least 50,000 tons of kernels are lost in the Central and Eastern Provinces."—Yes; that was before I made a six weeks' tour in the Opobo district two years ago. That estimate was made on the exports of palm oil in comparison with kernels from Lagos and the export of palm oil and kernels from Opobo in the Eastern Province. After touring the country, I was satisfied that the consumption of oil in Lagos was much greater than in the Eastern Province, and that accounts largely for the disparity in the figures; but still an enormous quantity more can be produced, I think.

777. It is not entirely a question of attention to agriculture on the part of the native that we should look to for an increase in kernels. If all were gathered there would be a large increase in the tonnage, you think?—Yes, I should say so.

778. That, I think, is the experience in other West African colonies, such as Sierra Leone.—But at the same time in the districts that I went through in the Eastern Province I was not satisfied that such an enormous number of trees was left untouched as I had been given to understand before was the case.

779. What is the chief factor, do you imagine, in the mind of the native in regard to his production and marketing of kernels? Is it first of all a question of supplying his own requirements, and after that is it a question of price, or is it entirely a question of market price?—You mean if he wants a certain amount of money to satisfy his immediate requirements, will he sell kernels to that amount and hold the rest?

780. Yes.—I think that he would probably hold

them for some time, at all events if there was a very heavy drop in price.

781. You have referred to-day to the natives holding up their kernels sometimes over a large district because of the price being unfavourable?—Yes, for some time they will hold them up.

782. Is that less common now than it was some years ago, do you know?—In Lagos, since the war started, there has been a heavy drop in price. That was the first time that I had heard of its being done for some time.

783. As to the price, what part does the middleman play? Does he benefit to a greater extent by a high price than by a low price?—I should say that he would benefit by a high price.

784. He is not content with an average commission, shall we say? He is really a merchant?—Yes.

785. There is a certain price at which he will sell, and he makes the best terms for himself?—Generally speaking, yes.

786. Have you any idea as to the average difference between the price of kernels in Lagos and in Liverpool?—That, of course, would depend on what the market price in Liverpool was.

787. For instance, to-day the price in Lagos is about 9l. 15s. 2?—Yes.

788. The price in Liverpool is 15l. 5s. 2?—It would leave a profit of 30s. to 2l. a ton.

789. (Mr. T. Walkden.) Not since the war?—My basis is the old rates of freights. I do not know what the present rates of freights are, or the insurance.

(Mr. L. Couper.) There is a present difference of about 4l. to 5l.

(Mr. T. Walkden.) Yes.

(Witness.) With regard to marketing kernels on this side, I do not mean that the difference between the Coast and here is 4l. to 5l. It is not nearly so much.

790. (Mr. L. Couper.) But if you compare figures over some years you generally find a difference of, roughly, between 4l. and 5l. 2?—Yes.

791. Up country the price gets less and less?—I have seen kernels on the coast at a price below the margin required to allow for freight and shrinkage in weight.

792. The fact that the price varies when you go further is entirely a question of carriage and demand. To-day the price at Ibadan is only 5l. 10s. to 6l.; at Abeokuta it is 7l. 15s. 2?—There is some arrangement, I should say, by the merchants to keep the prices down.

793. The price is a great factor in the mind of the native?—Yes. But I remember the natives selling kernels quite freely twenty-five years ago at 6l. 15s. and 7l. a ton.

794. In Lagos?—Yes, to the middlemen in Lagos town. Latterly up to before the war they had been getting as much as 18l. in Lagos. Even to-day's prices in Lagos must be much more than they were a good number of years ago.

795. Would a stable price increase the confidence of the native in producing and bringing to the market a larger quantity of kernels?—I do not think so.

796. You think that he is content to take the market price?—Yes. He is accustomed to fluctuations with regard to his own native foodstuffs.

797. Do you think that the native, particularly the native chief, has a natural antipathy to machinery, or fear of machinery being erected in his neighbourhood?—I could not say that he has.

798. I have heard that native chiefs, perhaps in their wisdom, are very fearful of any machinery being erected which will put their wives and children out of employment, and it is not unnatural to suppose that, for more than one reason, they like their womenfolk to be kept employed.—It is quite possible that that is a view which they would take, but I have not heard it expressed.

799. (Mr. T. H. Worthington.) Bearing on what you were saying about the Government Forestry Department, is there any system in the colony similar to the system in Brazil of giving licences to cut in a certain district?—For rubber, yes; but not for palms.

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800. Can a man go and cut palms anywhere he likes?—Yes, so far as European supervision is concerned.

801. Outside the town there is no such thing as freehold property; you cannot buy freehold property?—The land question in West Africa is a very involved one, and I am not competent to speak about it.

802. Reverting to another matter, we have heard, at least I have heard from information that has come to us, that German firms used to do better for the native in the way of buying produce, particularly palm kernels, by themselves going up and paying cash. Is there anything in that, do you think?—I have not heard of that. I have heard (this is only a report in Lagos) that the Germans are inclined to give more credit than British firms.

803. That is with regard to selling goods; but I am talking of buying.—I mean money to buy produce.

804. You mean advancing money?—Yes.

805. I have heard that they go more direct to the native up country and take the cash with them.—Not so far as my experience goes.

806. (Sir William Watson.) In connection with the production of oil in Africa, as against the production of oil in Europe, I would like to know whether there is any demand for feeding cakes in Africa—I suppose not?—Not yet; but there might be in the north.

807. Is any wood suitable for the making of barrels or casks produced in Africa, and are they made there?—They are all imported, I believe. I have not seen a native making casks there.

808. I understand that there are some mills at Opobo, mills owned by Messrs. Lever. Are they the only oil-crushing mills in West Africa?—To the best of my knowledge those are the only ones in Nigeria. Those are all that I can speak of with regard to crushing kernels, extracting the oil and making cattle cake.

809. Those two mills were closed when you were there last?—Yes.

(Sir William Watson.) No doubt Mr. Knowles can tell us later why they were closed.

810. (Mr. T. Walkden.) With your experience commercially, and the information which you got during the time that you were Commercial Intelligence Officer, you know the prices that have been paid by merchants to the natives for kernels, and do you consider that they have been fair prices; has the merchant been making a big margin of profit?—I think that if you averaged it up to the time that I left the coast before the war it would not average out at more than 10s. a ton, spread over a good number of years.

811. Previously to your leaving, I think they had in Lagos a sort of pool. They probably had been making 10s. a ton; but previously to that pool, do you not think that if they were making half-a-crown a ton, that would be as much as they did make? Have you considered that?—No, I should not say so.

812. You have known the time when prices were paid on the coast which did not allow of any profit? They were speculating on an advance in the price of the products?—The position at the time that I was thinking of was largely owing to competition. German firms had their own boats out there.

813. Not only German firms, but Messrs. Holt had a steamer at those times probably which would pay an amount that did not leave any margin?—It was so in those days, but not so much latterly.

814. Take Sierra Leone or even French Guinea. At the present time merchants would be willing to have the produce brought home without any margin of profit; is that so? Have you had any experience of that?—It possibly is so now, with a view to getting remittances home.

815. On the figures that Mr. Couper gave just now, a merchant would only get a fair profit?—I should say rather a large profit.

816. Mr. Couper gave figures prior to the war. Now with regard to the war risk and extra freight, you might say 2l. a ton, and then there is the question of the kernels having to wait on the coast for two or three months before shipment, or having to wait up country to be brought down to the coast. There may

seem to be a big margin, but I think that if you lock into it that margin vanishes?—Possibly.

817. You mentioned that at Porto Novo kernels were brought into the merchants' premises with 14 per cent. of dirt and shell?—Yes.

818. I have known 16. Now it is 5 per cent. The latest reports show that it has even gone down to 3 per cent. owing to the supervision arranged by the merchants themselves with the protection of the French Government?—It was done originally without any interference from the French Government.

819. With regard to the merchants, there is an arrangement, and an inspector can come in and take a sample, and the kernels have to be cleaned until the percentage is below 5, or they can be refused. Is it not a good idea?—I have never been in favour of Government produce inspection.

820. With regard to making the cake, we have heard that if you get too much shell and dirt in, it will depreciate the value of the cake; and in Lagos we found on analysis that there had been improvement since they had had inspectors?—No doubt; I admit that; but at the same time I think that it could have been done just as well by the merchants themselves.

821. We have in our own markets, with regard to butter and other things, inspectors to test the purity of foodstuffs?—Yes, foodstuffs.

822. We want the article as pure as possible. In Sierra Leone and the Sherbro district they have not any such control or inspectors, and the merchants are asking for it. Owing to there not being inspectors the analysis shows 10 per cent. or more of impurity, and that is why we as merchants have found it very beneficial to have control.—May I say why I object to produce inspection?

823. (Sir George Fiddes.) Please.—If you have it in West Africa you must employ an enormous number of natives to act as inspectors—that necessarily follows; and you know what natives are. They are open to bribery and to showing favour to one man and being down on another, and that sort of thing. I do not see any reason why the merchants themselves should not be able to get the percentage of impurity down without Government interference, if they would only say: "We will not buy produce containing 10 or 12 per cent. of shell."

824. (Mr. T. Walkden.) When you buy even a few bushels of kernels it is very difficult to say what they contain?—But surely the European merchant whose business it is to know the quality of produce, is much better able to judge than a native inspector.

825. That would be so if the system is wrong and you cannot get reliable native inspectors; but I would not like to say that you could not get natives beyond bribery. I do not think we have any trouble at all in Porto Novo or any part of French Guinea. They want them to come here as pure and as void of shell and dirt as possible.—Exactly.

826. You mentioned cracking tools. I have seen specimens on exhibition. The last occasion was when there was a trial trip of the "Abosso." They were introduced by a Birmingham firm, and they seemed to me to be very useful instruments; but it struck me that, as the nuts are cracked by very small children and grown-up women, you would want several sizes. The one that I saw exhibited could not be used by a child. I have seen children quite as expert with small stones as grown-up women with large ones. I quite agree with what you say about cracking instruments.—I think your suggestion is a very sound one.

827. With regard to damage to trees, which has been mentioned, you know that the process of taking the fruit is by climbing the tree with a rope round the body of the tree and round the body of the native, who walks up?—Yes.

828. You would not think that any damage would be done by the cutting down of the bunch. The bunch is dropped down by another rope?—I should say that there is no damage done in that way.

829. (Mr. T. Wiles.) I am told that the native sometimes hacks the tree in cutting so that it bleeds, and that must be injurious to the tree?—He does that certainly to obtain palm wine for drinking; but I do

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not think that he damages the tree in cutting down bunches. He purposely makes holes in the tree to get palm wine.

830. (Mr. T. Walkden.) You did not seem to consider that many of the palm nuts were not gathered at the present time?—I should say that in the Western Province practically all are gathered.

831. It really rather surprised me, because of the information that we have received. Mind you, I admit that there are more now than there were a few years ago, owing to railways and roads, but it is supposed that, in the Sherbro district especially, not 25 per cent. are gathered.—Not now?

832. Not now; and I was under the impression that even in Nigeria in the Western Province there were a very great number not gathered.—Not in the Western Province; in the Eastern Province, yes.

833. Would it be possible to extend the area of so-called palm-oil belt; is there no suitable land beyond that so-called belt?—You see isolated palms in districts far distant from the coast.

834. Take the other side of Nigeria, getting to Ilorin and Egba and the Northern Nigeria district.—I should not say that it was so; but it is a matter for experts.

835. Suitable land runs parallel with the coast for about 150 miles, it has been found.—Yes.

836. Now, with regard to middlemen, I understand that they are principally sent by the merchant to small markets with cash advanced by the merchant?—But I do not think that they can be looked upon as the agents of the merchant.

837. Money is advanced?—Yes.

838. German firms have probably advanced more money than other European firms?—Yes, but as traders.

839. As traders, I agree. It would apply to salt or cotton goods sometimes?—Yes.

840. They obtain whatever price they can get in the markets; it is left entirely to them?—Yes.

841. Do you not find that each time that the middleman goes to the market he is notified of advances or reductions of prices at home?—I would not say that he knows the prices at home. He would know the prices ruling in Lagos.

842. The Lagos papers contain information supplied by telegraph of the state of things at home?—I do not think that the bush middleman sees those papers, generally speaking.

843. The competition between middlemen is so keen, because there are so many of them, that they are satisfied with a very nominal profit, are they not?—I think they will get as much as they can.

844. Yes, but there are a great many of them; there are many thousands of them even in Lagos, and therefore they are satisfied with small profits?—It would depend, of course, on the district.

845. I want to prove that there is not a big margin of profit between the producer and the importer, the merchant.—In normal times possibly not; but I certainly think, taking 5*l.* at Ibadan and 15*l.* in the United Kingdom, that there is a very substantial margin for somebody.

846. At the moment, yes, but there is getting the produce down to Lagos and waiting for the opportunity of bringing it home, and there are fluctuations which may take place. Kernels have dropped from 20*l.* to 15*l.*?—Yes.

847. (Mr. G. A. Moore.) A good many questions have been asked you about the cultivation of the palm, and I am not going over them again, but, in your opinion, has as much been done by the Forestry Department in that direction as you think might have been done. The Liverpool Chamber of Commerce on various occasions when there has been an inclination to look for new products, have impressed on the Government the necessity of thinking first of the oil palm, and we do not think that they have done quite us much in that way as they might have done. I think that the Conservator has done as much as he could with the staff at his disposal.

848. As much as could be expected?—Yes.

849. We cannot get from any given district a yield which in any way approximates to the calculations made by Mr. Farquhar, for instance. So many trees to the acre, and so many gallons per tree make a very delightful balance sheet, but we cannot get anything approaching that in anything that we have done in the way of collection.—Allowing for local consumption and foodstuffs?

850. Yes. We do not know where the difficulty arises, and we have been very anxious that the Forestry Department should elucidate that question for us. You do not think that they could do more than they have done?—If the Conservator had many more Europeans no doubt he could, but he has the mahogany trees and rubber licences to look after.

851. He has not paid much attention to the oil palm, as a matter of fact, has he?—I would not say that.

852. You do not think that the Forestry Department has done so, do you?—I would not say that at all.

853. Have you read Mr. Farquhar's pamphlet?—I read it when it was published.

854. Has it been carefully compiled?—I believe that it was edited by Mr. Thompson.

855. There are not many things that the ordinary man can check, but there happens to be paragraph No. 202, which I am particularly in a position to check, and I am astounded that such a paragraph should have been written. It is the paragraph about my machinery. Have you read that?—No.

856. The paragraph is absolutely incorrect from beginning to end, and if it is a sample of the way in which the pamphlet generally is made up, it does not speak very well for it. Now again, turning to page 23 of Mr. Farquhar's pamphlet, he says, that by ordinary native methods only 5·10 per cent. of pericarp oil is obtained from the fruit. Have you any idea whether that is a correct statement or not?—I cannot say.

857. Would you be surprised if I told you that my son saw the natives preparing oil at the back of the Opobo and that he collected a quantity of fruit at Brass River. Mr. Railston gives 10·57 as the pericarp oil of the whole fruit. He got between 9 and 10 per cent. by native efforts. That is not quite according to general belief, is it?—Those samples may have been taken from different varieties.

858. That was hard oil; it was Brass oil. We are not told here what the actual variety was, but that was the result of his experiment, and it is the only result which I know of which I have been able to get which checks those statements.—I think that the Imperial Institute has some analyses. Are they not quoted?

859. Now you spoke about the fibre left containing a considerable quantity of oil?—An appreciable quantity.

860. Railston puts it down at about 36 per cent. of the whole fruit. It contains about 14 per cent. after being prepared in that way. It was tested by Norman Tate. You have considerably modified your opinion with regard to the quantity of kernels wasted since those figures quoted by Mr. Couper have been given?—Yes.

861. The discrepancy between Lagos on the one side and Opobo on the other has been accounted for, you think, in Lagos by the amount of oil consumed locally?—Very largely.

862. Therefore, there is not anything like the waste of kernels in Opobo that you were inclined to think there was in the earlier days?—No, but I think we shall get considerably more out of Opobo.

863. You have seen my nut-cracking mills?—Yes.

864. You know the principal difficulty I have had in connection with the mills?—Yes, in the quantity.

865. Exactly. I have had a mill in Opobo for five or six years, as you are aware?—Yes.

866. I do not think I have had much more than enough nuts to make a couple of hundred tons a year. You know the way in which the natives work in the district. Now can we put it down to anything but the bulky nature of the nut? I have paid as much as the kernels were worth, apart from the cost of cracking. Can you think of any other reason besides the

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bulkiness of the nuts why I have not been able to get them?—I cannot think of any other.

867. Is not that going to be the great difficulty that machinery of all kinds will meet with at the ports of West Africa—that if we attempt to do anything we shall not be able to get the quantity of raw material to the mill?—It will be the difficulty with regard to fresh fruit, but not with regard to getting kernels to the mills at the ports.

868. Take Opobo, for instance. If you got every kernel that comes down to Opobo it would not be enough for a large mill, would it?—I cannot say.

869. The kernels would hardly satisfy the African oil business in Liverpool if you got every one of them?—No?

870. You cannot call it an excessively large mill?—No. I do not know what quantity they require.

871. With regard to cracking the nuts, you mentioned different methods. The flagstones imported into New Calabar are used for the same purpose?—I was given to understand so, but I was afterwards told that they were more particularly bought and used for grinding corn.

872. There is no corn there?—Is there none?

(Mr. G. A. Moore.) No, I have never seen it there. There are very small quantities of maize. It never comes into commercial channels. We never see it.

873. (Mr. T. Walkden.) Is there no Guinea corn?—No.

874. (Mr. G. A. Moore.) You mentioned competition in the market, and you mentioned Chief Cookey Gam. Do you not think that your information is rather old, and that to-day the competition is just as keen as amongst the merchants?—I was particularly speaking of the time when I was there, three years ago. It may have changed since then.

875. If you tried to buy produce there, I think you would find a dozen people competing very keenly?—I mention that as an exception. Generally speaking, there was fair competition.

876. Our experience is that one of the difficulties which we have to contend with is the insane competition among the small traders themselves.—Yes.

877. You were asked a good many questions by Mr. Couper about the merchants, and you were inclined to think that very large profits have been made. Of course you understand that the present conditions are quite abnormal?—Yes.

878. Just to give you one instance, I have palm kernels to-day lying in Opobo which I have not yet been able to ship, and since the kernels were bought the freight has been raised 5s., and it will be raised a further 10s. probably before I can ship them; so that there is 15s. a ton gone on those kernels, besides loss in weight?—Yes.

879. You will admit that we cannot afford to buy on pre-war terms under present circumstances?—No, naturally.

880. With regard to the prices paid to the native, I gave the Committee a list of the conditions that I think have affected the price paid to the native, and I want to ask you whether you agree with them. The first and foremost is the market value delivered in Europe (that goes without saying) and the locality from which they are shipped, as the quality varies in different parts of West Africa?—That would have a greater bearing with regard to palm oil.

881. With regard to kernels, there is a difference of 10s. to 15s. a ton between Sherbro and Lagos kernels?—I have no experience of Sherbro produce.

882. Then there is the distance to the buying stations and the consequent extra cost of carriage?—Undoubtedly.

883. That runs up, in some districts of Sierra Leone, to as much as 8l. a ton. Then the rate of freight from the nearest shipping port varies very considerably, of course?—Yes.

884. The standing expenses of the merchants' factories are an unknown factor. It varies considerably according to the number of tons in a year which each station, in normal times, buy and ship?—Yes.

885. The greater the tonnage the less profit you

can work at?—And the larger the tonnage the better the price you can pay.

886. (Mr. T. H. Middleton.) Mr. Farquhar, whose report we have been discussing, is a member of the Forestry Department, is he not?—Yes.

887. I happen to know Mr. Farquhar, and I do not think that he would be regarded as having expert knowledge of machinery, but from personal knowledge I should consider him a very capable forestry officer.—Yes.

888. The question was put whether the Forestry Department has been paying much attention to this particular subject. From conversations I have had with Mr. Farquhar, I should judge that the Forestry Department has been giving a great deal of attention to the question. Is that your view?—With the staff at the Conservator's disposal, I think it may be said that that is so. In addition to Mr. Farquhar's report, I know that Mr. Unwin went on a special tour through the Eastern Province with regard to the question of kernel shortage.

889. From conversation with Mr. Farquhar I came to the conclusion that, provided the market in Europe could be developed, the production of the nut in Africa could be very greatly increased; but I did not cross-question him on the subject, and my impression may not be a correct one. What is your general opinion?—With regard to the increase of cultivation?

890. The possibility of increasing the output of palm-kernel. Would you suggest improved cultivation, and more attention being paid to the subject?—Primarily I say that the natives should be induced to plant.

891. Do you think that better supervision should be available?—The native is a very curious person. You may talk to him and he will take your advice, but afterwards you will find that he has not done anything. What kind of supervision do you mean?

892. I thought that possibly, by increasing in amount the sort of supervision which the forestry service is at present able to give, the output of the kernels could be increased and improved.—I think that that is possible.

893. (Sir Owen Philipps.) You have told us that in several districts, especially in the old Lagos Colony and Protectorate, you are satisfied that quite as much, and even more, oil is eaten by the natives as is exported over seas?—Yes.

894. Could you suggest to the Committee any course that the local government of Nigeria could take to ensure that less is consumed locally and more is exported?—But it is used as a foodstuff; it is one of their staple articles of food.

895. Are there any cheaper forms of foodstuffs that would be available if the country was opened up by railways. As this is now so valuable in Europe, cannot less be consumed locally, and other foodstuffs used as the country is more opened up by railways, so that a greater quantity can be exported?—Only to a very very small extent. You know the size of the gin bottle?

896. Yes.—You can buy a gin bottle of palm oil in Lagos town for 3d. The price of butter or lard, which you probably have in mind, imported into Lagos would be much higher than the price of palm oil which can be obtained on the spot. That is apart from the question of what they like.

897. The London Chamber of Commerce have taken a great interest in the question of machines for cracking palm kernels.—Yes.

898. We have just heard of difficulties in connection with big power machines. Could you tell us what is the chance of hand machines being more largely used?—For cracking kernels?

899. Yes.—Not for extracting oil?

900. No, for cracking kernels.—The kernels then being sold to merchants?

901. Yes.—The difficulty is the price.

902. If a really effective machine could be put on the market in West Africa at 10l., would it have any chance? Do you see any prospect at all, through the help of the local chiefs, say, with Government assistance,

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of its being adopted?—Not largely at that price. I see no chance of it.

903. Take the small hand machines, the dumb-bell machines that you have mentioned; if they were largely imported into Nigeria and distributed amongst the natives would that greatly increase the output?—In certain districts where there are no stones I think it would, and the quality of the kernels would be better; they would not be so mutilated.

904. (Mr. G. A. Moore.) Is not a great difficulty in connection with any machine the separating of the kernels afterwards?—Yes.

905. And also there is the question of labour, which I forgot to speak about when we were talking of the output. There is a scarcity of labour in the country, and the population is not increasing as it ought to.—If you had machines in common use, you would need to have fewer people to crack the kernels with the machines than if they were cracked by hand, and that would help the labour question.

906. (Mr. C. C. Knowles.) Can you give me some idea of the quality of the oil that the natives eat. Is it of a better quality than that which is exported, or is it similar in quality to that which is exported?—Generally speaking, you can say that in Lagos Town it is of better quality. It is doubly refined.

907. In getting the kernels, more particularly from up-country markets, where do you get large quantities accumulated? There must be centres on railways and at other places where the quantity becomes large. In the small markets the quantities are very small, and they accumulate as they get down to the coast. Where do you think large quantities are stored on the way down?—Stored?

908. What I mean is, are they accumulated at any point in Nigeria other than at ports such as Lagos?—Do you mean kernels held up by natives which they will not sell at a price?

909. I mean kernels that are sold?—The property of the merchant, but in transit?

910. Yes—where are they accumulated?—I could not say.

(Mr. T. Walkden.) Would you not say at Ibadan?

(Mr. C. C. Knowles.) I suppose they would not accumulate much until they got to Lagos?

(Witness.) Under ordinary conditions they would not, but occasionally the railway is held up for want of empty trucks, and then you have congestion of traffic generally.

911. (Mr. T. Walkden.) Are there any centres besides Lagos where large quantities are brought into the station?—Yes. Abeokuta would be the first very large place and Ibadan another, and Oshogbo further on.

912. (Mr. C. C. Knowles.) What quantity would accumulate at those centres at one time—5 tons or 1,000 tons?—You mean assuming that the railway had the rolling stock to bring them down?

913. Yes?—Not 500 tons, I think, in the merchants' hands.

914. I am of opinion that a great deal is lost in forwarding the kernel and the bagging of it, and I was thinking that some system of elevator might be considered. In America the elevator saves enormous sums, and also in the Argentine and large cereal shipping places. Can you give us information that would help us with regard to that point?—In my early days practically all kernels were shipped in bulk and not bagged at all. You may say that 25 years ago all were shipped in bulk; but merchants have found it safer to ship in bags.

915. Yes, I know that.—And what has had some bearing on the point is, that in dealing with a number of branch factories (which were not general twenty years ago), you have a better check on the clerks in charge if the produce is put in bags. That is apart from the question of convenience of shipping.

The witness withdrew.

Mr. J. DAVENPORT called and examined.

916. (Chairman.) You are aware, generally, of the nature of this inquiry?—Yes.

917. I need not recapitulate it?—No.

918. You are a member of the firm of J. H. Rayner & Co.?—I am not a member of the firm. I am London manager.

919. They are produce merchants?—Produce brokers.

920. I imagine that from your experience you have acquired a general knowledge of the working of the oil and kernel trade?—Yes.

921. Have you any information that you would care to give us as a statement, before we ask you questions?—I am not prepared with any statement. If it is the wish of the Committee that I should make a statement I should be glad to do so, but I should naturally want a little time.

922. As regards the prices ruling now, do they vary very considerably from the prices ruling before the war?—Yes, very considerably. For two or three years before the war I suppose the prices fluctuated from 18s. 10s. to —

923. Which produce do you speak of?—Palm kernels particularly. That is the article you are dealing with, is it not?

924. We are concerned with the various edible and oil-producing nuts, and if there are any that you are more intimately connected with, or more intimately acquainted with, we should be glad to hear about them?—The others are of comparatively minor importance as regards the edible product.

925. Copra?—The quantity from Africa is practically negligible. As to the relation of copra to palm kernels, I think that I am qualified to give you information.

926. Have you any experience of the buying methods on the coast?—None whatever.

927. They do not come before you at all?—No.

928. You have no knowledge as to the arrangements for buying on the coast?—I know nothing but

what I may have heard occasionally. I cannot say that I have learned anything about it by actual experience.

929. You have no knowledge of the prices paid to the natives?—None whatever.

930. Nor of the trading methods of merchants in that connection?—I have not been able to get information first hand; I only know what I have heard.

931. That applies equally to German merchants and to English?—Yes.

932. (Mr. T. Wiles.) When you say that your firm are brokers, I take it that you simply sell on commission between one firm and another?—Yes.

933. You are not importers in any way?—No.

934. I wanted to get the term "broker" defined?—We have nothing to do with bringing over produce from the country of production.

935. Do you trade with the shipper on the coast of Africa?—No, with the importer here.

936. The importer here usually has his own house in Africa, I take it?—In most cases, I suppose so.

937. What happens to the kernels after the native have sold them to the merchants at the sea-port. Does your firm then buy them?—Only from the agent or from the actual Liverpool representative of the shippers in Africa. We have no direct dealing with Africa; our buying is confined to West African firms on this side.

938. You, in turn, resell?—Yes, chiefly to the consumer.

939. (Mr. L. Cowper.) Do you act purely as brokers?—I would not like to say that we do in every instance.

940. Do you carry stocks on your books?—Occasionally we might do so, but we do not make it a recognised thing. Unfortunately in business in those days it is sometimes necessary to carry little stocks on the books for the purpose of hedging or in view of the market; but the greater part of our business is brokerage business.

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941. Is the business, so far as you see it, initiated by the West African merchant. Does he, in effect, come to you and say: "I have so many kernels to sell"; and do you look round then for a purchaser?—It is largely a question of the market. There are occasions when buyers are more plentiful than sellers, and *vice versa*. The business, I suppose, really always originates with the shipper. You cannot do anything without the shipper.

942. As to finance, is it a cash transaction when kernels are sold?—Yes; practically everything is sold for cash. There may be instances where individual firms will give credit; but the general rule of the trade is cash fourteen days after the last day of weighing.

943. Is the purchaser of the kernels usually the miller?—The final purchaser.

944. The man who buys from you, I mean?—Yes; practically all the business now is done with the miller—the crusher.

945. Do you imagine that a large proportion of the kernels which come here are sold through brokers like yourselves, or are there many direct sales by merchants?—I think that practically all the business in palm kernels is done through brokers.

946. Have you any knowledge of the system followed by Germany prior to the war?—Yes.

947. Would you give the same answer to my question as to finance—is that a cash sale?—Practically always.

948. Have you any knowledge of German banks assisting in the transaction at any point?—Yes; they were in the habit, I am sure, of assisting the purchaser in Germany; but that was a matter entirely between the crushers and the banks. It had nothing whatever to do with us as brokers.

949. Do you think that there is any evidence of considerable financial assistance being given to the German trade in kernels by the large German banks?—Do you mean the crushing trade, or the shipping trade?

950. Anything.—I cannot express any opinion on that.

951. It is freely urged that the German Government is behind these German banks, and that the German banks give facilities which are quite foreign to any banking practice in this country.—Yes. It is customary to a German, but foreign to the custom here, as you say.

952. Obviously it is a matter on which it would be rather difficult for any Englishman to produce evidence?—Yes, unless one absolutely knew the management of German concerns before the war.

953. In pre-war times did you sell freely to Germany?—Yes.

954. Your market was just as much a German market as an English market?—It was practically all German market then. The imports into Liverpool were practically nothing.

955. Did you see any advantages as to price in selling to Germany. Did you generally find a higher market price ruling in Hamburg than in Liverpool?—It is very difficult to compare, because there was practically no market in Liverpool, as I say. The average monthly imports into Liverpool were something like 3,000 or 4,000 tons, and with regard to Germany 20,000 to 25,000 tons.

956. (Mr. T. Worthington.) You are a broker, and you sell, on account of the importer, to buyers through the country?—Yes.

957. I suppose that you know all those buyers pretty well?—We should do so, if we do not.

958. Exactly. You, I think, are practically the principal sellers of kernels in Liverpool, are you not?—I think we do as much as anybody else.

959. You probably keep a pretty good note of the kernels that come, and you know, if you do not sell them, who does sell them?—Well, as I say, we ought to.

960. I should think that you do. What I want to get at is this: You said that nearly all the kernels were sold through brokers; but I have rather an idea that there is a good deal that is not sold through brokers, but that goes direct from the merchant to the

consumer. I should think that you had watched to find out how it was that you did not get them?—My experience of the West African trade in kernels is that the broker is more loyally supported than in many other trades; I think that there is very little business done direct between the consumer and the producer.

961. Have you ever made an estimate? You know what your own firm have sold. Have you ever compared it with the total imports, to see what you were not controlling?—No, I cannot say that we have.

962. You sell copra largely in London?—Yes, very considerably.

963. I think that is the principal article in which you deal in London—at least you are looked upon as one of the principal people who deal in copra?—Yes; one of the principal.

964. How far does it compete with palm kernels? Do your buyers, for instance, come in and definitely say, "We want palm kernels"; or do they come in and say that they want to see what the market is, and that they will take copra at such a price, or palm kernels at such a price?—No. In this country there is hardly a crusher who can interchange from one to the other; but in Germany it is rather different. The German crushers would buy palm kernels or copra—or many of them would—according to which was the cheaper.

965. Would the same machinery deal with them both?—I think it is possible to have machinery which will deal with them both; but, as far as I know, most of the copra machinery in this country is not adapted for palm kernels. Whether the palm-kernel machinery is adapted for copra, or not, I cannot say.

966. Have you any idea of what the comparative prices are in the market?—I have no technical experience; I can only go by my experience of the relative values of the articles for some period before the war.

967. At that time it was a question of selling mainly to Germany, and you could then say that if palm kernels were at a certain price copra should be about so much?—Yes. We had actual experience amongst some of our buyers, that whichever was the comparatively cheaper article they would buy.

968. What were the comparative prices—do you remember. If kernels were 18*l.*, what would copra be?—We take Java copra as a standard. That is the best of the intermediate description. I think that the difference was about 5*l.* a ton.

969. I have forgotten which is the dearer?—Copra is the dearer.

970. But now with the German demand gone, you could not name a price?—Markets have got to such a stage that people make as much as they can now.

971. People generally do that, we know.—Certain elements of competition are eliminated, and it is easier to do so. I am speaking from the crusher's point of view.

972. Is there more demand here to-day for copra than for kernels?—There is considerably more demand for kernels.

973. More demand in England?—Yes.

974. That would not have been the case five years ago, would it?—No, I suppose not, but five years ago there was very little crushing of either copra or kernels in this country.

975. (Sir William G. Watson.) With regard to the use of oil in Germany, is it not a fact that of late years the greater part of the oil produced in Germany has been used for edible purposes, whereas in England prior to the war the greater proportion of kernel oil was used for soap-making?—For a good many years past the bulk of the palm-kernel oil produced in Germany has gone to the edible trade.

976. That is what I said.—Yes.

977. Whereas in England what has been produced has been chiefly used by soap makers?—I can hardly say that. I think that the use of palm-kernel oil for edible purposes began perhaps seven years ago, and since then it has gradually increased.

978. Has the palm kernel that is used for edible purposes been crushed in England?—that is my point.

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Are there any people who refine palm-kernel oil from English-crushed palm-kernel oil?—Yes, there are.

979. Were there before the war broke out?—Yes, to a limited extent.

980. Can you give the average prices of palm kernels, taking the fluctuation of prices before the war and since the war. You said that they varied before the war from 18*l.* 10*s.* to some other figure which you did not mention.—That was over a considerable period. The prices immediately before the war were about 19*l.* 5*s.* to Hamburg. We were doing business at about that figure when war broke out.

981. Since the war they have varied between what?—Since the war the market price has gone down to 16*l.*, and it has gone up to 20*l.*, and then down to 13*l.* 5*s.*

982. In other words, it has fluctuated between 13*l.* 5*s.* and 20*l.*?—Yes.

983. With regard to refined kernel oil and refined copra oil, margarine makers can absolutely interchange it, and use one or the other in accordance with the price, can they not?—In many cases: it is a question of preference. The margarine maker when he could not get refined coconut oil would be able to do very well with refined kernel oil. I understand that refined coconut oil is preferred, but it is not essential, and it can be replaced by refined kernel oil.

984. (Mr. T. Walkden.) With regard to the prices ruling before the war in Hamburg and Liverpool, Hamburg gave the price of palm kernels and Liverpool had to follow?—Yes.

985. As brokers, do you consider that all kernels that were imported by German firms to Hamburg went through a broker, or did they go from the importer direct to the crusher?—I think they all went through a broker.

986. Would you consider that all J. L. Gaiser's went through a broker. They would be the principal importers?—I should imagine so, but I could not say with absolute certainty, naturally.

987. You know that Gaiser's have their own crushing mills, or they are interested very largely in crushing mills in Germany?—I do not know that.

988. As it is so, naturally they would not want to go through a broker. Why I mention that is this: on the coast they have been able to pay a larger price for their kernels than probably another importer could do?—If it is only a question of brokerage, that hardly accounts for it, because it is never more than one-half per cent.

989. But it probably does not remain at one-half per cent.?—I do not think any of the firms ever pay more than half.

990. I want to come to the final purchaser. In Liverpool some years ago, previous to the war, the importer naturally wanted his broker to sell to a crusher; but did the broker always sell to a crusher, or did he sell to a group of so-called brokers or friends, and did they hold up the kernels and sell them to the final purchaser whom you mentioned?—There have been many occasions in the last few years where the market has given opportunities to people to either buy and hold, or sell.

991. I once heard a very large crusher say that one reason why he wanted to go direct was because he was held up by the brokers. The importer sold to, shall we say, a middleman, and that middleman held them up until such time as the crusher wanted them?—That is quite likely.

992. I know what has been the feeling between the importer and the crusher. The importer has felt that he has had a grievance, and the crusher has felt that he has had a grievance. The importer probably sold them, quite reasonably, at a $\frac{1}{2}$ per cent. commission thinking that they were going to the crusher; but, on the other hand, the crusher had to pay considerably more probably?—That has happened in a good many cases, no doubt.

993. Do you not think that that has been the ruling state of things for some time?—It is always going on.

994. I do not want to labour it.—It is not confined to kernels; it applies to every article of produce that is dealt in.

995. (Mr. C. C. Knowles.) There is speculation?—There are times when the consumer will not buy.

996. (Mr. T. Walkden.) We want the broker to sell at the very best price possible. He is supposed to look after our interests.—He does. The speculator takes his chance on the market.

997. The broker acts, therefore, as a speculator?—No.

998. He should not do so?—He is a broker pure and simple unless he is interested in speculation.

999. That is the point. It has caused a good deal of trouble. I mention this because the Germans have probably been able to do better by going direct to the importer instead of going through a broker. Lever Brothers are certainly doing without a broker, and are going direct to the importer. That has been caused by speculation by brokers.

1000. (Mr. G. A. Moore.) As a matter of fact, there was at one time a very large speculative business done in palm kernels and copra, in London especially.—Yes.

1001. The speculators sometimes came off best, and sometimes they did not. That is really the whole position. We know of one or two firms that did not come off very well. We, as importers, very often sold to a speculator when we could get 1*s.* 3*d.* more from him than we could get from the crusher.—Yes—to the best buyer.

1002. I suppose that there would be something like 100,000 tons of palm-kernel oil crushed in Germany. Is that about the quantity?—Yes.

1003. You have had dealings, I take it, in kernel oil shipped from Hamburg and otherwise coming out of Germany?—Yes.

1004. What proportion of the 100,000 tons comes out of Germany? can you give me any idea?—The average for the three years 1911, 1912, and 1913 was something under 30,000 tons.

1005. Per annum?—Per annum.

1006. May I take it from that that there is about 70,000 tons left to Germany?—Yes.

1007. Some of that, I suppose, is exported overland into Austria, and places like that?—Yes. Probably some goes to Holland.

1008. You do not know?—Yes; I know that much kernel oil goes to Holland. Whether it goes to Austria or not, I do not know. I do not know if the tariff allows it.

1009. Is there a duty on importations of palm-kernel oil into Germany?—There was.

1010. Before the war?—Yes.

1011. And, as far as you know, it still exists?—Yes.

1012. What was the amount of it?—I think it was about 2*s.* per cwt.

(Sir William G. Watson.) The duties on all edible articles have been taken off since the war.

1013. (Mr. G. A. Moore.) But we may assume that they will be reimposed after the war. I do not want to discuss war conditions, because I do not think they will interest the Committee. What I want to ask the witness is this: with regard to the 100,000 tons crushed in Germany, if by any means we were able to divert the crushing of the palm kernels to this country, would we be in as good a position to sell the palm-kernel oil as the Germans are, do you think?—It is difficult for me to answer that question. I can only tell you what the conditions were previous to the war.

1014. That is what I want to deal with. The point is this: you say that, as far as you know, 70,000 tons out of the 100,000 tons are left to Germany, and out of that 70,000 tons a certain quantity goes from Germany into Holland and other places. Would we not be able to sell to Holland just as well as Germany does? Is there any difficulty in the way?—Germany has always been able to sell the oil cheaper than British manufacturers. She was able to ship the oil to Liverpool, and compete.

1015. That was because of the large surplus which was not wanted. It was dumping, in fact?—I would not like to say, because I do not know.

1016. (Mr. C. C. Knowles.) You know pretty much the object of this Committee, which is to try to retain

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after the end of the war the trade which we are now getting—in other words to get from Germany the trade in crushing, of palm kernels more particularly. Will you give us your views as to the best way in which to do it? It is rather a big question, but I know that brokers and merchants have views upon the subject and it would be interesting to hear them.—Does this inquiry refer only to the United Kingdom?

1017. No, not necessarily.—Or does it refer to the West African trade generally?

1018. We want to create the industry here of crushing palm kernels; that is one of the things that we want to do. I have heard many views expressed on 'Change, and I am sure that you have views, you being in touch with the markets in the United Kingdom which have hitherto dealt with this trade.—I think that the extra demand for crushing which was caused by the shutting-off of German supplies has been met to a sufficient extent to meet the consumption in this country under present conditions.

1019. You see, we have consumed a certain quantity of palm-kernel oil, principally, as Sir George Watson says, for soap-making in this country. We have consumed or crushed comparatively little for edible purposes, and a great deal of the oil that we have consumed for soap-making has come from Germany simply because it has been cheaper?—Yes.

1020. It could always be bought from Germany cheaper than it could be purchased here?—Yes.

1021. Now the reason for that, I think you will agree, is that in making contracts the Germans always stipulated when selling to the United Kingdom that the oil should not be re-exported. If it was to be sent to the United States, perhaps 10s. a ton more would have to be paid, and for re-export to Australia and other countries the price was actually prohibitive?—They would only sell to certain countries. They would not as a rule sell to English firms oil which could be re-sold to Germany. They barred certain countries, and Austria was one; and I think that at certain times France was prohibited. As far as the United States are concerned, you could bring the oil to London and ship it to the United States, that being a free market.

1022. But it meant extra freight?—Yes.

1023. They refused to ship it direct to the States?—Yes.

1024. In other words, there is no question that they used to dump oil here. They used to send their surplus oil here at a cheap price? Is that not your view?—Yes, I suppose so, seeing that they kept the price for the home trade much above the export price, one must admit that it was dumped.

1025. (*Sir Owen Philipps*.) Is it actually the case that they would only sell to England with definite limitations with regard to how it was used when it came here?—Yes, there were certain stipulations.

1026. It is most interesting.—I have bought what is called free oil in Germany which I could re-sell in Germany.

1027. (*Mr. C. C. Knowles*.) But not bring it out?—I could either re-sell it in Germany or bring it out.

1028. (*Sir Hugh Clifford*.) You could do what you liked with the free oil, I take it?—Yes.

1029. (*Sir Owen Philipps*.) Ordinarily when palm-kernel oil was sold to an Englishman, it was not sold as free oil, but it was sold with certain limitations, I understand?—Yes, as a rule. It was very difficult to buy. You could buy it, but you had to know more about the method of buying than the man in the street.

1030. (*Mr. C. C. Knowles*.) In a great many instances, in buying oil from Germany, whether for export to the United Kingdom or export to America and other places, you would approach Germany, and they would cable back "Offer us kernels and we will offer you oil." Many deals were done in that way?—Yes.

1031. If you wanted 500 tons for big users in the States, they would say, "We cannot offer you oil unless you offer us kernels," and you would do the two deals together?—Yes.

(*Sir Hugh Clifford*.) I do not quite follow that. Do you mean a kind of barter?

1032. (*Mr. C. C. Knowles*.) Yes, simultaneous barter. (*To the witness*.) You agree that if we are going to retain the crushing trade here of palm kernels after the war, we have to find a way to create a demand for the product. The oil cake you know nothing about, I think?—Very little.

1033. But you do know about oil?—I do not pretend to know very much about cake; I have never had any dealings worth mentioning in cake.

1034. Do you agree with me, that to retain this trade we must be able to use the oil?—Yes, it is necessary for the home consumption of oil to be increased considerably.

1035. Now, I think you know that there are something like 1,500 tons of margarine a week imported into this country?—Yes.

1036. It is really made, or a big proportion of it is made, from palm-kernel oil. Now, if we made that margarine in this country, it would consume whatever quantity of palm-kernel oil that was necessary to make it?—Yes.

1037. And that would give us, of course, so much more outlet?—Yes, it need not be palm-kernel oil, of course.

1038. No, not necessarily, but without a demand, without an outlet, do you see how we can possibly retain the crushing trade here? How can we do it without creating some extra demand, something more than we now have?—I do not think that it would be possible ultimately to retain the business unless the market were protected in some way from foreign importation.

1039. But putting aside all question of protection, leaving that outside, I think you agree with me that there is no chance of retaining the trade unless we create some extra demand?—Ultimately, yes. Of course, one's views are rather obscured just at present by the actual circumstances, and nobody knows what will happen immediately after the war.

1040. But we have to create a demand?—With the German mills free to crush, it would be very difficult to consume the output of British mills.

1041. Quite so. I think you know that in Germany and Austria a great deal of palm-kernel oil has hitherto been put up in packages—refined palm-kernel and coconut oil called *parmene* and other names?—Yes.

1042. It is used as cooking fat for various purposes, and a very, very large trade has been done in it?—Yes.

1043. A great quantity of coconut and palm-kernel oil crushed in Germany has been used in that way, and not for margarine-making?—Yes.

1044. Should you estimate it at 50 per cent.?—I am not in a position to say the percentage. I could not give an opinion. It is in small packets.

1045. A very large quantity has been consumed in that way, has it not?—A considerable quantity.

1046. Now none of that trade has been done in this country?—Attempts have been made to do it, but they have been unsuccessful, I believe.

1047. Hitherto we have not been able to build up such a trade. We have not been able to create a trade in oil for cooking such as they have had in Germany. The oils suit Germany and they suit Austria?—Palm-oil itself has become more popular.

1048. If we could make the margarine in this country it would help us greatly in getting rid of the product of the crushing of palm kernels?—Yes.

1049. At present it comes in from Holland, and a good deal of the oil before the war came from Germany?—You are looking at it from the point of view of the crushers, are you not?

1050. Yes.—From the point of view of the West African trade it does not matter where it is crushed.

1051. I think that the West African traders are in sympathy with us. They want an industry created here rather than that it should go to Germany. I know that hitherto they have not cared whether it was Germany or any other country. It was a question of price.—Yes.

1052. You remember some of the difficulties that the crusher in this country had before the war. If

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a crusher wanted to buy a lot of kernels in Liverpool he would go to the broker and say to the broker, "I want a thousand tons of kernels." The broker would say, "I must look about me; I cannot make you a price." If I am wrong you will correct me. He would go to the importer and say, "I have a crusher who wants a thousand tons of kernels to Liverpool." Most of the importers would say, "I am sorry, but I cannot make you a price." If you said, "I want a thousand tons to Hamburg," as a rule the shipper would immediately make a price?—The shipper?

1053. I mean the importer. Do you agree with what I put?—I do not quite agree. I do not see why you should not be able to buy to Liverpool almost as easily as to Hamburg. I will not say quite as easily, because there was not the same speculative market, but the steamers were quite regular to Liverpool.

1054. You have always traded in London?—Yes.

1055. You have not traded in Liverpool, and perhaps you do not know quite what took place. Practically any moment of any day you could get a price named to buy or sell kernels to Hamburg?—Yes.

1056. There was practically a free market?—Yes.

1057. There were always speculative accounts open on this side. You could buy as easily as you can deal with Consols on the Stock Exchange. It was easy to do business?—I cannot say that it was as easy as with Consols.

1058. With regard to Liverpool there was no market?—The market would have been created if there had been a demand.

1059. But, as a matter of fact, there was no market. What happened was that the crusher generally had to pay something more to induce the importer to bring the kernels to Liverpool?—I do not agree with you there.

1060. I know that you do not trade much in Liverpool, you trade in London, and probably have not come across what I put to you.—I remember only small transactions. The impression that I had was that one could buy small lots in Liverpool. Quantities of no importance, 10 or 15 tons, were constantly arriving.

The witness withdrew.

Adjourned for a short time.

Mr. J. H. BATTY called and examined.

1072. (*Sir G. Fiddes*.) You are a director of the firm of Messrs. F. and A. Swanzy?—Yes.

1073. And Messrs. Swanzy have been established in the West African trade for many years?—Yes.

1074. I should imagine that your principal work was with the Gold Coast?—Yes.

1075. But still you have considerable knowledge of the palm-kernel and other edible nut trades on the Coast generally?—Yes, more particularly so far as the Gold Coast is concerned, of course.

1076. I think I am right in saying that your firm works in rather intimate relation with, at any rate, one other firm?—Yes, with Millers; that is so far as their branch in London is concerned, which is a separate business from Miller Brothers of Liverpool, and that is connected with the Gold Coast only.

1077. You are in a position to speak with considerable knowledge about the trade in edible nuts that we are concerned with?—Well, up to a point, I should like to say.

1078. You are aware, of course, of the terms of reference to this Committee, generally?—Yes.

1079. You know that our object is to promote the establishment of the nut trade and manufacture in this country, with special reference to the question of whether we can remove them from the Germans into whose possession they had got before the war?—Yes.

1080. Our inquiry extends not only to palm-kernels but to the shea nut, ground nuts, and copra; but that palm-kernels are the chief of these from our point of view. Now, having regard to the inquiry that we are engaged on, would you care to make a statement with regard to your views in respect of palm-kernels, taking

1061. Small lots of 10 or 15 tons do not matter. I am talking of large quantities.—But what were the imports into Liverpool?

1062. I want to point out the difficulty of the crusher, and the reason why kernels have not been crushed here in large quantities before the war. The crusher was always at a very very great disadvantage in buying?—I am sorry that I cannot agree with you there.

1063. Perhaps you have not the experience?—If anybody in Liverpool had wanted to buy kernels to any extent, the kernels would naturally have been attracted to Liverpool.

(*Mr. C. C. Knowles*.) I consider it a very important point, and I want to bring it out. The English crusher should have the same free market as the German crusher.

1064. (*Chairman, to the witness*.) I understand your point to be that if there had been signs of a demand in Liverpool, they would have gone to Liverpool?—Yes. If there had been a demand they would have gone to Liverpool.

1065. Liverpool would have responded very quickly to any demand, you think?—Yes.

1066. (*Mr. C. C. Knowles*.) I suppose you know that if kernel oil was low enough, a large quantity could be used in this country for soap-making?—Yes, a tremendous quantity.

1067. Not for any other purpose, I think?—No, I do not think so.

1068. I think you will agree that another reason why there has been a comparatively small demand here for coconut and palm-kernel oil is, that we have had very few refineries?—Yes.

1069. Practically, until lately, only one, Loder's. The Southern Cotton Oil Company is only recent?—Yes. There is a small one in London hardly worth mentioning.

1070. The refined oil that we wanted here for margarine and other purposes we had to import?—Yes.

1071. We had not the means of refining it. Large quantities have hitherto been imported?—Yes.

the subject under heads. I suppose you would say that the question of transferring the trade to Great Britain is largely dependent, amongst other things, on shipping facilities?—Yes, amongst other things.

1081. Have you any observations to make on the present shipping arrangements?—Only so far that I think that if we are going to compete with Germany we should have direct shipping facilities on the East Coast.

1082. On the East Coast of England?—On the East Coast of England.

1083. Perhaps we might hear your views on the East Coast question?—If we are going to find a market for the cake after crushing the palm-kernel, I think the crushers of England will require to have facilities for supplying the Scandinavian ports, quite apart from whatever consumption of the cake there is in England.

1084. In other words, the question in your mind is increased transport facilities between the East Coast and Scandinavia?—Yes, and obviously it should be easier and cheaper to ship the cake from an East Coast port rather than from, say, a port like Liverpool.

1085. Do you look upon Scandinavia as a promising market for cake?—Yes, I do.

1086. Do you know anything of the present shipping arrangements between the East Coast and Scandinavia? Do you suggest that they are insufficient at present?—That I could not say; but I do think it advisable, if I may be permitted to say so, that the Committee should try to satisfy themselves on that point, because you see Germany has certainly the immense advantage of waterways, which are obviously cheaper than railways;

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and therefore we should endeavour to find out as far as is practicable, the facilities that, for instance, Northern Germany has for conveyance to Scandinavian ports as compared with the facilities and cost from England to Scandinavian ports.

1087. As regards shipping facilities from West Africa, you do not suggest that they are not sufficient to Liverpool on the west coast, but your point is that there ought to be also facilities for, we will say, to give it a name, Hull on the east coast?—Yes, there should be equal facilities, so far as the cost of freight is concerned, for making direct shipments from West Africa to, say, a port like Hull.

1088. I suppose you say that the rates should be the same to Hull and to Liverpool?—Yes.

1089. And I suppose the question of dues at Hamburg has some importance in connection with this question?—Yes.

1090. Do you know whether they are lower than English dues at present?—I have some figures made out which I think might be interesting to you, and, if might hand those to you, you will be able to follow me probably (*handing a paper to the Committee*). For instance, take palm-kernels. The only expense incurred in Hamburg at the rate per ton, according to the figures I have been able to obtain, is 8*d.* Now the expenses in Liverpool are 3*s.* 3*d.*

1091. The 8*d.* being made up how?—Weighing, which is 7½*d.*, and then you pay a bill stamp, which is a fee of 1 mark irrespective of the size of the shipment.

1092. You would average that out at the odd half-penny?—Yes.

1093. The Liverpool charges are what?—Master portage, 1*s.* 3*d.*

1094. (*Sir Hugh Clifford*.) What is "master portage"?—Master portage has reference in particular to weighing.

1095. (*Sir G. Fiddes*.) We might take the 1*s.* 3*d.* as against the 7½*d.*?—Yes.

1096. Just double, in fact?—Yes. Then there are dues on entry, 2*s.* 0*d.*

(*Sir G. Fiddes*.) What are the dues?

1097. (*Sir Owen Philipps*.) Could you divide that up?—I am afraid that I am not able to.

1098. (*Sir G. Fiddes*.) The dues are Liverpool harbour dues?—Yes.

1099. Mersey Dock Board charges?—Yes.

1100. At Hamburg there is apparently nothing of the kind?—I am speaking now so far as importers are concerned. We pay nothing except the 8*d.*, as against, if we sell in Liverpool, 3*s.* 3*d.*

1101. The English importer is at once handicapped to the extent of 2*s.* 7*d.* a ton?—Yes, 2*s.* 7*d.*, assuming that the price he obtains is the same at each place.

1102. Exactly. Now what about London charges?—I have not any figures.

1103. You have no experience?—None at all.

1104. (*Mr. L. Couper*.) Nor of Cardiff, nor Hull?—No. Then I also give you a table for Marseilles that I thought might also be interesting to you. There is a bill stamp fee of 1.20 francs, which we have put down at ¼*d.* That is a similar fee to that paid in Hamburg. Then there are Customs charges that will work out at about ¼*d.* Then you pay _____, which is .25 francs per 1,000 kilos. That comes out at 2½*d.* Then unloading fees, 2.50 francs per 1,000 kilos, which comes to 2*s.* 0*d.*, and delivery fee comes to 2*s.* 0*d.*

1105. What does the "delivery fee" mean—from quay to warehouse—is that the idea?—Yes, or to any other part. They always make those terms.

1106. You have always to pay that?—Yes. The unloading and delivering fees you always pay. Then there are weight notes. They are the official weight notes that they give you after weighing your shipment, and they charge for that. That totals 4*s.* 6½*d.*

1107. Those are paid by the buyer or the importer?—They are paid by the importer.

1108. I suppose that affects the price in a way indirectly, does it not?—Yes, probably it does. It is exactly the same if you go back to Hamburg; any other charges than those I have stated are paid by the buyers.

1109. (*Sir Hugh Clifford*.) Do you know what those charges are?—No; we have no means of knowing.

1110. (*Sir G. Fiddes*.) Then copra and ground-nuts?—I refer to West Coast copra, which, so far as we are concerned, comes from Addah, Quittah, and Lome. So far as our knowledge goes it has always been shipped to Marseilles.

1111. It is not an important matter as regards the West Coast?—No.

1112. (*Sir Hugh Clifford*.) It shows some tendency to increase?—It is quite likely to increase.

1113. (*Sir G. Fiddes*.) The ground-nuts you have given us some information about?—The ground-nuts go to Marseilles. All that the importer pays is 4*d.* per ton in this instance.

1114. Then, also, you have handed to me some rates of freight. Are those pre-war rates, or rates existing at the moment?—They are pre-war rates—rates that had been paid up to before the declaration of war.

1115. The rates for Liverpool and Hamburg are identical?—Yes, so far as copra is concerned—in fact, all of them.

1116. That is so, apparently?—That, we understand, was on account of a working arrangement.

1117. And the rates you give here are net rates per ton?—The other rates, to Marseilles, are by French steamers. There you have copra at 30*s.* 3*d.* per ton to Hamburg and Liverpool, and to Marseilles, 34*s.* 1*d.* So that there is an advantage in favour of Liverpool and Hamburg of 3*s.* 10*d.* Then palm oil to Hamburg and Liverpool 47*s.* 6*d.* per ton as against 31*s.* to Marseilles.

1118. An enormous difference?—Yes: 16*s.* 6*d.* Then palm kernels 35*s.* to Hamburg and Liverpool, and to Marseilles only 22*s.* 2*d.*; a difference of 12*s.* 10*d.*

1119. (*Mr. G. A. Moore*.) These are Gold Coast rates?—Yes, these are Gold Coast rates. Then the rate for ground nuts is 38*s.* 6*d.* to Hamburg and Liverpool as against 34*s.* 1*d.* to Marseilles.

1120. (*Sir G. Fiddes*.) How do you account for the fact that copra is carried more cheaply to Liverpool and Hamburg whereas all the others are so much higher?—On account of the price you get in Marseilles. We always reckon to get anything from 20*s.* to 30*s.* per ton extra on copra.

1121. I do not think you follow me. The shipping rates are much better to Liverpool and Hamburg than they are to Marseilles in respect of copra?—Yes.

1122. But in respect of all the others it is the reverse?—Yes.

(*Sir G. Fiddes*.) How do you account for that?

1123. (*Mr. C. C. Knowles*.) Copra never comes to Liverpool.—I suppose that there is so little coming to Liverpool that there has not been much attention paid to the rate.

1124. (*Sir G. Fiddes*.) The rate is nominal, in fact?—Yes.

1125. That is your explanation?—Yes.

1126. Do these rates strike you as being fair rates having regard to selling prices. Have merchants complained of them? Of course, as we have said already, these are pre-war rates?—Yes.

1127. And have no relation to the rates existing now?—They have no relation to the rates existing now.

1128. We are really not concerned with the abnormal rates of the present time?—No, I have not prepared figures of those.

1129. Going back to my question about the incidence of rates on the trade, what do you say?—That rather involves a large question, and naturally as merchants we do not consider that we should be called upon to pay rates very much higher than those that you can get on the open market.

1130. Shipping rates, do you mean?—Yes. That is to say, with regard to the rates existing, so far as the merchant is concerned he does not want to pay any more to the steamship company than those existing on the open market, speaking generally.

1131. I am afraid I do not understand what you mean by "the open market." Do you mean that you

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could get a quotation for transport other than through the established lines?—Yes, and at a cheaper rate.

1132. You could?—Yes, generally.

1133. Then why do not you do it?—That involves two things: one, that you require to load the steamer that you charter, and the other that, under existing arrangements, you would forfeit your rebate which is due to you at the end of each six months by the established steamship companies.

1134. If I understand rightly, you mean that if you charter a whole steamer your rates per ton will be less than the rates which the established lines charge you?—Yes.

1135. Then again it is *if*. It is the question of wholesale and retail, is it not?—That would depend on what might be the quotation in the open market for chartering.

1136. Do you attach a definite money value to the fact that you have a regular rate by the established lines. You follow what I mean?—Yes. One cannot ignore those altogether, because it may not be possible for you at all times to fill a steamer.

1137. Or to find a steamer at the moment you want it and know that it will turn up at the port on a certain date to carry the produce?—That I should think would not be very difficult under normal conditions. I do not attach any importance to that. If, for instance, one's interest were sufficiently large that he could load steamers either outward or homeward, I think it would be quite feasible at all times to charter for that purpose.

1138. But, going back to my first question, do you think that the rates have imposed an undue tax on the industry? Have they tended to throttle the trade in any way?—No, I would not like to suggest that.

1139. Putting it apart from the personal point of view, has the suggestion been made by merchants as a body that the rates are unduly high?—There have been instances when there have been discussions with the established steamship companies with regard to rates being unduly high. We have been able to show that we could charter, and in fact we have chartered, at rates considerably under those existing.

1140. In your own mind can you forecast the future in any way at the end of the war? If the condition of things for the moment became permanent, how would it affect the trade?—If I may express my own opinion quite openly and frankly, I think that some steps should be taken to stop the existing practice of rebates.

1141. That is a large question?—Yes, it is, but the whole question revolves on that.

1142. It has been discussed to my knowledge for fifteen years?—I maintain that merchants should be as free as steamship owners or any other class of dealers who are directly connected with the West African trade or with overseas trade. I do not think that merchants should be bound to any existing steamship companies and obliged to give their patronage to them because, if they do not do so, they will lose a rebate at the end of six months. Naturally, if merchants are bound in that way, the only conclusion you can come to is that rates will be kept up at a higher figure than if there is a free and open market.

1143. Before I leave the question of shipping facilities, I should like to ask you whether you have had any experience of injury or inconvenience to trade owing to defective lighterage and wharfage on the coast?—No, we have not.

1144. You have not found it necessary to formulate any complaint on that head as a body?—No. As a matter of fact, so far as that question is concerned, we do as much as we can our own lighterage, and that has been done on a definite policy.

1145. You do the lighterage for yourselves, only you do not lighter for other people?—Well, no, we do not generally lighter for other people, because ordinarily speaking, the rate quoted includes the lighterage, so that it leaves very little option.

1146. I notice that one of the suggestions which you make is that the question of erecting crushing mills on the East Coast will have to be considered?—Yes.

1147. What is your ground for that view?—My ground for that is to avoid as much as possible the cost of railway freight to the coast port.

1148. I take it that, speaking generally, you think there would be distinct advantage to the West African trade if the East Coast were brought into it more than at present?—Yes, distinctly so, and that not only refers to the articles that I have mentioned; I certainly think it will refer to cocoa.

1149. That is outside our inquiry?—If we are going to compete with Germany then we must compete to the nearest port to Germany. That is the fundamental basis of the argument as I understand it.

1150. You spoke just now of the advantage to Germany of her system of waterways. That would not apply, I take it, to the question of external trade, unless you mean that the raw material can be conveyed by waterway to a factory inland, and the product conveyed back to the seaboard for exportation. Is that your point?—Yes, that is my point.

1151. You made the suggestion of the East Coast as an ideal place, having regard to the Scandinavian countries?—Yes, because that is as near as we can get.

1152. Have you any views on the question of a greater market in England for the consumption of cake? I presume not?—No.

1153. That would hardly come under your notice?—No, it does not come under my notice.

1154. Putting it generally, have you any views as to the steps that the Government ought to take if we are to succeed in transferring this industry to Great Britain? Do you anticipate, for instance, that at the close of the war German crushers will give fancy prices at the beginning in order to attract the kernes to them instead of to us?—When the war is over you will have mills existing in Germany, and they must again be put into use. Germany has experience, which is an unknown quantity, of the past fifteen or twenty years in the handling, crushing, and disposal of this product. It is not reasonable to suppose that English crushers can start off with the same experience and on the same basis, and deal successfully with German competition. It takes years to gain experience, and experience as a rule is only obtained by purchase. You purchase it; you buy it. If the British Government imagine that English crushers are going to set up mills and exploit German markets without some assistance at first, I fear that they will be greatly disappointed. Some help, either directly or indirectly, will be necessary until our English crushers gain that experience which will enable them to compete openly with competitors who have been for so many years ahead of them. That is proved in all phases of business, whether in England, or in West Africa, or other parts of the world. A new firm established invariably loses a considerable amount of money at first for want of experience. English crushers will certainly lose in some form or other until they have gained the experience which will put them on the same level as the German competitor.

1155. What is the remedy, in your opinion?—The remedies, in my opinion, are two. One is that the Government should not allow Germany to import palm-kernel oil into England free. Some assistance should be given to the crushers so that they can have an opportunity of marketing their oil in England at a price which will make it impossible for the German competitor to come here. That, I think, is very essential. How long that will be necessary, and what form it should take, I am not in a position to say. Then the second thing will be for England to take some steps to assist in finding a market at an equal price to that obtained in Germany for the cake. Whether that will take the form of special rates or facilities for exporting the cake to markets outside England I am not prepared to say; but, in my opinion, those two things will be necessary if we are going to succeed in coping with German competition, and if we are going to establish firmly here the oil-crushing process in dealing with palm kernels.

1156. Leaving kernels for the moment, have you had any experience with shea nuts?—With regard to

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shea nuts, the only experience we have had is that we have had to throw them away. A small quantity was imported, but there were no crushers in England who would crush the small quantity that we brought in, and apparently that was because the nuts required a special process in crushing, and so far as we could learn, there was only one concern (in Holland) that was prepared to purchase these nuts. The price offered was not sufficient inducement to import any further quantity.

1157. Was that De Bruyn?—Yes, I think so.

1158. He is not a Hollander, is he?—A Belgian. They would go to Holland.

1159. You did not dispose of them?—No.

1160. You did not repeat the experiment?—No. There is no doubt there are very large quantities of shea nuts in the Northern Territories of the Gold Coast. Whether the price obtainable here would enable us to discuss the matter with the Governor of the Gold Coast with a view to some reduction in freights, so as to bring them down to the seaport at a reasonable charge, remains to be seen; but there need be no question of the quantity obtainable there.

1161. With regard to ground nuts, I suppose you would say that Marseilles will continue to be the market for them?—Yes.

1162. They have a special value to the French which they have not to us?—Yes, I take it that they have.

1163. I suppose that as regards the methods pursued on the Coast itself, Captain Grey would be in a better position to give information than you are?—Yes.

1164. You would prefer not to go into that branch?—Yes, I would much rather not go into it. He is more up to date so far as that is concerned.

1165. You are not prepared with any definite concrete suggestions as to the means whereby we are going to get crushing into English hands?—No.

1166. I suppose that you would say, like everybody, that we are in the hands of the crushers; that if they will crush, they will, and if they will not, they will not?—Yes. At present I have not any suggestion at all.

1167. I want to ask you some questions arising out of what we heard this morning. Have you ever bought oil from Germany?—No, not from Germany. We would not have occasion, as merchants, to buy oil from Germany, you see.

1168. We heard this morning that it is very often or usually sold under certain restrictions as to what is done with it after it gets here?—Do you mean palm-kernel oil?

1169. Yes. You have not had experience of that?—No.

1170. (Mr. C. C. Knowles.) With regard to shipping facilities, I have heard it said by some West African merchants that if it could be so arranged that cargo boats could be run periodically, instead of passenger and cargo boats combined, the rates could be very much reduced. Have you any views on that?—Well, the only view which I could express on that is that you can charter a purely cargo boat at a very much cheaper rate than the rates generally charged by established steamship lines. Therefore the inference is —

1171. The inference is that the cargo has to pay for the upkeep of the fine passenger boat to some extent?—Yes, to some extent; and there are other things as well, of course.

1172. What has been your experience in bringing kernels over? I suppose that where you charter a boat you generally bring the kernels in bulk because it is cheaper to bring them in bulk.—That is the idea.

1172a. Have you found that most of the boats that you were able to charter were not boats suitable for carrying kernels—I mean to say, not ventilated in the same way as the West Coast boats, so that when the kernels come here the percentage of free fatty acid is very high compared with the kernels that come in regular liners?—I think it would be as well for me not to answer that question, because the experience we have so far as the Gold Coast is concerned is that the quantity of kernels shipped from there is not sufficient to enable us to charter. Any chartering that we have done has

always been in connection with cocoa, so that I would much rather you put that question to someone who is directly interested in the parts of Nigeria where chartering for kernels has been done.

1173. Have you been on the Coast?—Yes. I was there for nearly twenty-five years.

1174. I did not know that. You not being in Liverpool, we have not met; that is how it is. I take it that our object is to reduce, if possible, the price of the products of palm kernels on this side, paying a reasonable price to the native in Africa for the kernels, and to enable us to do that, if we can only cheapen the transit and the charges between the producer and the consumer, it will help us along that way?—Obviously.

1175. I put this question to a witness this morning: "Do you think that it would be possible to have a "system of elevators to receive the kernels?" Suppose, for instance, that at Lagos there was one large elevator, or there were two large elevators, controlled by the Government or by a company formed of the different merchants there—a common elevator, so that when kernels came in they could be stored in the elevator until such time as they could be shipped. Do you think that that would help to cheapen the transit?—I should not have thought so, because so far as I know elevators, the quantity of kernels handled at one port would hardly be sufficient to pay for the cost of the upkeep of an elevator. I think that in the end there would not be very much saving. You see you have to handle pretty large quantities to pay for the construction and the upkeep of an elevator, have you not?

1176. Yes. The kernels are bagged now, and the bags are very expensive.—Yes; they are bagged in some instances, and in some instances they are shipped in bulk.

1177. A great quantity of the kernels shipped from Lagos, for instance, are bagged?—Yes.

1178. Have you any idea of the quantity shipped from Lagos per month in normal times?—No, I have not, without referring to statistics. I have not been sufficiently in touch with the Lagos trade.

1179. Of course, it is very essential that the kernels should arrive in this country in good condition, more particularly having regard to edible oil?—Yes.

1180. And it must be obvious to you that if they are kept in West Africa for long they depreciate. The free fatty acids go up, and they get heated very often?—Yes, I have heard so.

1181. In an elevator, when they get slightly heated, they can be turned round very easily by the machinery, as is done with wheat and maize and other things?—Yes.

1182. Would not that help to improve the condition of the kernels?—Yes, I think it would, but whether the improved condition would pay for the expense is a thing that I am not quite certain about in my own mind.

1183. Do you think that it is worth going into more thoroughly?—Yes, I certainly think that it might be worth going into.

1184. You have told us that you think there should be a line of steamers direct to the east coast, in other words, to Hull?—Yes.

1185. You give that as your view, because you say that it is closer to Scandinavia?—Yes; it is the nearest port to the competitor. That is my point. If I want to compete with anyone, I want to get as near to him as I can.

1186. But do you not want to bring the kernels as near as possible to the market for the oil; because after all is said and done, oil is the principal product, and if you take it to Hull (I only point this out to you) there are really no consumers in Hull, or there are only very small consumers in Hull or near Hull. Have you thought that out?—No. That is a point that I am not capable of expressing an opinion upon. I have only just given you my views, and other witnesses may bring out such a point as you suggest, and upset what I have said. I am now talking as an importer. If I wanted to compete with Hamburg I should like to bring my produce as near to my competitor as possible.

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1187. Yes; but you see the question is, what does Germany do with its oil and its cake? We all know that the cake is used in Germany, and a lot of their oil is sent out of Germany?—Yes.

1188. I think you will agree with me that it is not necessary to bring it to Hull to be near the German market, because you would not send your product to the German market, except perhaps the cake?—Yes, but I take it that if we are going to be successful in handling and crushing palm kernels we shall require to find a market outside England.

1189. For the cake and the oil?—For a very large percentage. Therefore if you are going to ship your oil, if for argument's sake 40 per cent. is consumed in England, and 60 per cent. is exported you will probably find if you are exporting to Scandinavian ports or even to Germany, that it will be advisable to be on the East Coast. I maintain that if we are going to be successful in our efforts, instead of Germany selling us palm-kernel oil we must sell palm-kernel oil to Germany.

1190. You have Scandinavia in your mind as a great consumer of oil and cake, and I do not see why.—Not so much oil, but I think probably cake.

1191. As a matter of fact, knowing the market I can tell you that there was very little palm-kernel cake consumed in Scandinavia before the war, mostly it has been consumed in Germany. Lately there has been a little to Denmark but before the war, no.—Then surely my argument will be correct, that the cake and oil must be sold to Germany, and why not, if they had an east coast port instead of a west coast port?

1192. That is why you suggest it?—Yes.

1193. Suppose that you had to ship the oil that you could not use in this country principally to America, for instance?—Then my contention would probably be wrong.

1194. Now in selling kernels hitherto, have you found a very free market in Hamburg, but a very, very poor market in this country?—We practically did not sell kernels in England.

1195. Supposing that a crusher had come to you in England before the war and said that he wanted a thousand tons or two or three hundred tons any day and any hour, what would have been your reply?—We should not have had them to give him. We should have been quite willing to make a forward contract with him, provided that the price that he quoted was equal to what could be got in Germany.

1196. You would not want any more? You spoke of 3s. 3d. to Liverpool and 8d. to Germany. Would you not want the extra 2s. 7d.?—When I am talking of price, I mean on a parity.

1197. You and most of the importers shipped kernels from week to week to Germany because there was a free market there. They would not be shipped to Liverpool except on special contract. Liverpool is a difficult market for the crusher and always has been?—But surely that is the crusher's fault.

1198. I agree there; that is quite right. Now if a crusher wanted to make a contract to buy a thousand tons, as a rule he had to pay not only the 2s. 7d. more, but, say, 5s. a ton more, or 7s. 6d. a ton more, to induce the importer to sell him a round lot, 500 or 1,000 tons, the reason being given by the importer that he could send his kernels to Hamburg from day to day or week to week and he always had the option of selling them when it suited him. They might be on the water for a fortnight, three weeks or a month, and at any time, as the market suited him, he sold to the best of his judgment. With regard to Liverpool, if he made a specific contract for a thousand tons, they had to come to Liverpool and he could not play with them?—He could play with them just as much. An importer of palm kernels would have sold just as readily to a crusher in Liverpool as in Hamburg if he had got his price.

1199. Yes, if he got his price.—The only reason why automatically he shipped to Hamburg was that he invariably got a better price, and therefore in practice Hamburg became the open market.

1200. (Sir Owen Philipps.) You have told us how, in your opinion, it would be possible to keep the crush-

ing trade here after the end of the war if certain steps were taken by the Government?—Yes.

1201. Am I correct in understanding that your view is that the miller who invests money in machinery specially suited for palm kernels should have some security that he can carry on his business after the war without a loss. Is that the practical position?—I think that that is absolutely essential. You will not get people to put capital into the erection of mills here unless some assistance is given, whatever form it takes, so that the man who invests his capital may see a reasonable return. I do not believe it is possible for English crushers, without something of that kind being done, to compete with Germany, who have had years of experience.

1202. Now you have just been asked about elevators, and that is a matter of very great interest. May I ask you what, in your opinion, has been the principal difficulty about the erection of elevators? Has it been that if elevators are erected all the palm kernels will have to be graded? because I have been told that that is so.—As a matter of fact, I have never had occasion to discuss or think of the question of elevators until I came here.

1203. Could you tell the Committee what would be the saving in the cost of bags by shipment in bulk? What would be the profitable saving in bags alone, apart from other savings?—I could tell you roughly. It would be 5d. per bag. I am giving 5d., but the price is very different now. I think that you might take an average of 6d. per bag, and a bag holds 1½ cwt.

1204. Roughly, on the bags alone there would be a saving of 6s. 6d. a ton approximately?—Yes, 6s. 6d. a ton, but, mind you, I am not quite certain whether, as against that, you have not to take into consideration extra loss in weight and shrinkage by shipping in bulk; but that point you may be able to get out from somebody else.

1205. If by Government action the majority of this palm-kernel crushing trade could be brought to England, would not that fact alone enormously facilitate the carrying on of a bulk trade as against a bag trade?—Yes, I think it should.

1206. And therefore would it not tend to palm kernels being delivered in England more economically than is at present possible?—Yes, I think so certainly.

1207. Now you touched in your evidence in chief on the question of rebates. Without going into that question very fully, was it not the case that the evidence from West African shippers before the Royal Commission that inquired into that matter was that they contended that at that time a certain amount of merchant business was carried on by the shipping companies?—Yes.

1208. That was one of their principal grievances. It was a cause of great complaint at that time?—Yes.

1209. That cause of complaint has ceased for some years, has it not?—Yes. I think I am right in saying that the rebate question also existed; the two evils existed then.

(Sir Owen Philipps.) Certainly the rebate system did exist at the time.

1210. (Mr. G. A. Moore.) You have been bombarded with a great many questions about elevators and kernels, and I am sorry to have to ask you one or two more. An elevator in Lagos, for instance, which is of course the largest shipping port for palm-kernels and the place to which you would look for any progress in that direction, would only be of real value when the bar was such that ocean-going steamers could go in?—Well, I thought that that was a *sine qua non* now.

1211. It is of no use talking about an elevator until then?—No, certainly not. One would assume that, of course.

1212. Would not the principal saving on the other side be the fact that an elevator would enable the steamer to be given very much greater and more rapid dispatch than in almost any other way?—Yes.

1213. The actual saving to the merchant there in handling would be very small indeed, apart from the more rapid dispatch that the steamers would get?—

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Yes, I suppose so. I am not certain in my own mind that the merchant would have any saving.

1214. That is just the point. Another *sine qua non* would be that the merchants would have to agree to put their kernels together?—Yes.

1215. And that would lead to a certain amount of difficulty with regard to quality?—Yes, and analysis.

1216. The difficulty with regard to analysis and quality would not be very great if you were dealing with rather large quantities, but we deal with such small quantities in Africa at times that that is where difficulty would arise. Am I right with regard to that?—Yes, I think so.

1217. Now supposing that we got over those difficulties and succeeded in arranging for an elevator that should serve a common purpose for all the firms shipping from a place like Lagos, that would be of very little value in itself unless we had got corresponding facilities in Liverpool. I do not know whether you know that at present the facilities for discharging kernels in bulk in Liverpool are absolutely wretched. They have to be filled into bags in the hold and hoisted, and so on?—I see.

1218. Did you know that?—No, I did not know it. (Mr. C. C. Knowles.) I do not think that that is quite so.

(Mr. G. A. Moore, to the witness.) Is it not a fact that any consignee of palm-kernels has to send bags down to meet a bulk shipment to-day?

(Mr. C. C. Knowles.) It is quite the other way; we always send our barges and we empty all the bags into them.

(Mr. G. A. Moore.) That is not the point. I am asking about getting kernels in bulk out of a steamer. Am I not right in saying that they are filled into bags in the hold and hoisted?

(Sir Owen Philipps.) Practically is it not the case that the great quantity of kernels that come from West Africa to England to any port come in bags because it is a comparatively small trade?

(Witness.) Yes.

1219. The great quantity that go to Germany are in bulk because it is a big trade and they can fill a ship full?—Yes. With regard to Hamburg, one of the reasons is that they are shot into large lighters that go up the Rhine.

(Sir G. Fiddes.) Mr. Moore was following up the suggestion that there would be an improvement if they came in bulk from the West Coast.

1220. (Mr. G. A. Moore, to the witness.) I do not know whether it is quite fair to ask you this question, but the point has been laboured and I did not like to leave it exactly as it was left by previous questioners. My point is this: even supposing that we arranged to have elevators on the West African side they would be of little real service in reducing the cost of the kernels to the crusher, which is our great object, unless corresponding facilities were provided in Liverpool?—Yes, I am with you there.

(Mr. G. A. Moore.) So far as I know anything about it, the present arrangement is that palm-kernels are filled into bags on the quay, if they are brought in in bulk, and then carted away.

1221. (Mr. T. Walkden.) With regard to facilities on the East Coast, I am sure that Messrs. Elder Dempster and Company would be only too pleased, as they have said, to ship to Hull, or even Manchester, to relieve the congestion at Liverpool, but I think that the difficulty would be in bringing whole shiploads of kernels from the West Coast. They have had difficulty. There has been an option: "Will you ship to Hull?" The shippers have said, "No, we want to ship to Liverpool." There has been congestion owing to that. Another reason why I do not think Hull is quite suitable is that I imagine that we want to have all the crushing mills as near one point as possible. Why Hamburg has been at an advantage is because of the crushing mills lying alongside the Elbe. The steamships come from the West Coast to Hamburg full of kernels in bulk and they are shot into lighters of 600 to 800 tons. How could we deal with them in Hull?—Well, I am not in a position to answer a question like that. I have suggested an East Coast

port, and it is for you gentlemen to get other evidence to satisfy yourselves whether facilities can be obtained at Hull or at any other port which will put England on an equality with Hamburg. That is what you have to find out, that is what we have to do. If Hamburg handles palm kernels more economically than any port in England, then I say to England, "Do not try to compete with Germany."

1222. You see the difficulty about bringing them to Hull?—It is quite possible that if you are going to bring 200,000 tons of kernels to Hull in a year there will have to be improved facilities in Hull to handle the increased trade.

1223. With regard to Lagos and the difficulties that there would be in connection with elevators, you did not think the suggestion was quite practicable. The kernels not only come down the railways, but they come from the interior waters in the eastern and western district. They come from Porto Novo, they come from different markets, and they are probably only brought in small lots to the millers—John Holt's or any other firm.—I do not see where it would be feasible to erect an elevator. There must be sufficient room for warehouse and storage accommodation. You want it near the railway sidings. That shows the difficulty of utilising these elevators.

1224. (Sir William G. Watson.) You suggest that mills should be put on the East Coast because of their being in the neighbourhood of Scandinavia. I happen to be interested in a factory in Denmark. I do not know whether you are aware of that. Until the war broke out practically all the cakes were sent from there to Germany. I am interested in a factory in Russia, and we sent all the cakes from there to Germany. Germany, no doubt, is a great market for cakes, but, on the other hand, there is no doubt that oil mills should be established near where the great market is for oil, because it is far more expensive to transport oil, especially over sea, than to transport cake. You can get a comparatively cheap freight for cakes, but with regard to oil you have to buy very expensive barrels or drums. Very often with casks half the oil runs out before it reaches its destination. Now, if you bring the margarine industry here we are bound to have oil mills near them. With regard to the margarine factories in Holland and Germany, the oil can just be run into a pipe or put into a tank barge, and transported at very little expense.—That would rather suggest that one of the means of the Government helping to establish the palm-kernel oil industry in England is to keep an eye on the importation of margarine.

1225. That is what Germany and Belgium did. They put a tariff on margarine, and factories sprang up?—If such a state of things were brought about then a crusher might find that he had erected his mills in a wrong place. It is quite possible that in carrying on your inquiry you may have to take into consideration the question of margarine too, because it would be a fatal mistake for crushers to erect mills in a wrong district, and later to discover that to keep the industry in England it was necessary to form some policy which would establish margarine manufactories here.

1226. My firm, having a margarine factory in this country, bought from Germany about 30,000 tons a year, and it cost us about 45,000*l.* a year to transport oil from the factory in Germany to the margarine factory in England. We said: "This will not do; we must have our oil crushed in England." It is simply a matter of £ *s. d.*, after all, that governs all these questions to my mind?—It does.

1227. I agree with what you say with regard to experience in business being necessary. If you are in a business for ten or twenty years you begin to find that you know a little about it. You cannot suddenly jump into a business and compete with those who have been in it for years and years.—No. Usually if you start a new branch you have to support it until it gets firmly established. The same principle applies to an industry. If a new industry is to be formed in England, and taken away from where it has been firmly established elsewhere, there must be some means of protection. It is no use using any other word. There must be pro-

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tection until the industry is well established and is able to meet outside competition on all fours.

1228. (*Mr. L. Couper.*) Your firm, Messrs. Swanzy, is the only British firm in Togoland?—Yes.

1229. Could you tell us of any German practice there which indicated assistance, shall I say, by the German Government? Did you have any difficulties?—Do you mean so far as the German Government are concerned in fostering agriculture?

1230. Take that for example.—The German Government always took an active interest in formulating a policy in connection with agriculture. I will give one example. For some years the German Imperial Government insisted that Togoland was a good country for growing cotton, and they took the precaution of examining all cotton seeds, and distributed cotton seed every year. The cotton seed after the cotton was ginned was at the disposal of the Government, and Government officers connected with the Agricultural Department came round and selected what they considered the best seed, and the quantity required was distributed to the natives every year, and the natives were heavily fined if they were found sowing any other but Government seed.

1231. The kernel industry in Togoland was of small dimensions?—Of small dimensions. Then, with regard to rubber, all rubber had to be stamped by the district officer as being up to standard before it was allowed to be sold.

1232. You would probably agree with me that so far as our Committee is concerned the interests that we have to consider are four: the native, the merchant, the miller, and the consumer. Would you agree generally with that?—Yes, whatever may be the future with regard to the disposal of palm-kernels as regards England and Germany (which is the main thing that we are dealing with), the conditions in West Africa are not affected, that is to say, whether the palm kernels are sold in England or whether they are sold in Germany, the conditions in West Africa are in no way affected either with regard to what they were before the war, what they are during the war, or what they will be after the war.

1233. (*Sir George Fiddes.*) If one or two competitors disappeared would you say that the natives would get the same prices?—No, I am talking now of the conditions out there.

1234. Exactly.—With regard to establishing palm-kernel mills here there is no occasion to alter the conditions out in West Africa. It is not essential—I am not suggesting that it is not advisable—whether palm kernels are sold to Germany or to any other country, that the agricultural conditions in connection with palm kernels should not be improved, but, so far as the market here is concerned, there is no special point except in adding to the quality and the quantity of the kernels.

1235. (*Mr. L. Couper.*) Apart from the question of protection—to take the word which you have used—is there anything in your view that could be arranged for a few years succeeding the war in the shape of co-operation between the different interests concerned? For instance, would it be possible to arrange for so many tons of kernels to be brought to England and sold to the miller, the produce of the kernels being sold by the miller in his turn, so that the trade would be diverted here without any Government action?—Would you not be interfering very much with the liberty of the subject?

1236. Not if all were willing to come in. Do you think that what I put to you would be possible?—I think that combination would be impossible, because there are so many divergent interests with very little in common.

1237. (*Sir Hugh Clifford.*) You told the Committee that you consider that there would be no prospect of establishing the industry in England in competition with Germany unless some measure of protection was afforded to the new industry in England?—That is my opinion.

1238. What would be your view with regard to a suggestion which has been made that the object might be attained by imposing an export duty on the produce

locally, with a rebate, provided that the produce was extracted in English mills?—I am in principle against any duty imposed on the exports of a country that is undeveloped. Tax the imports as much as you like; but for a country such as West Africa I think the principle is entirely wrong of imposing a tax on the exports.

1239. Would you explain why?—Because the possibility of the salvation of a country is its exports and not its imports, and if you are going to make a country successful you should not tax its exports. In West Africa, and in all our Colonies, primarily for the benefit of the population therein, we must find a market for their produce, because it is the only thing that they have to exist on, speaking broadly. I would go further, and I would say that it is the bounden duty of our Colonies to deal with the Mother Country, and any produce shipped from our Colonies to foreign countries should contribute to the upkeep of our Colonies.

1240. Then in other words you would be prepared to see an export duty imposed, although you object to it on principle, provided that it was only put on articles shipped otherwise than to Great Britain or her Colonies?—Yes.

1241. Are you familiar with the history of the Malay States?—No, I am not.

1242. Are you aware that there was an export duty on the principal product of the Malay States, tin, even since the beginning of the protection system here?—No.

1243. And that, far from destroying the prosperity of either the country or the natives, it had altogether a contrary effect?—Tin may be different, but we are dealing here with agriculture.

1244. You would except a mineral?—Yes; minerals are different things, because invariably a mineral is dealt with by capitalists, and the natives are usually employed as labourers, and they get no direct benefit from the profit; but when you have natives who are tilling the soil, I say it is your bounden duty to find an open market for that which the soil produces. I make a distinction between the two.

1245. When you say to find an open market do you mean that there should be no tax of any sort imposed upon the produce?—Not an export duty. As far as the British Empire is concerned I think it is our duty to bring the produce to ourselves first instead of allowing it to be shipped to a foreign country.

1246. You spoke about shea nuts. The quantity is, of course, very great?—Yes.

1247. Have you gone at all into the question of where the necessary labour would come from if the industry was going to be worked on any scale?—No. First of all the essential thing is to find a market here. If you can see a market here one can tackle other difficulties, but it is no use tackling those difficulties if you find eventually that there is no market.

1248. Your experience is that the market is a very small one?—Yes.

1249. You do not think that it is likely to be greatly increased?—With regard to shea nuts I think that the great difficulty is the special machinery required for crushing them. The machinery used for palm kernels would be of no use for shea nuts.

1250. You are no doubt aware that shea nuts grow in the Northern Territories in rather remote districts, and that the transport would be a very heavy item indeed?—Yes, but we have got over the difficulty of transport for 120 miles from the coast, and I see no reason, if we put our backs into it, for not getting over another 120 miles.

1251. But you must remember that within the 120 miles from the coast you are dealing with comparatively thickly populated areas, but where you get to where shea nuts grow, even in Ashanti, before you get to the Northern Territories you are in very sparsely populated country?—Yes.

1252. The principal difficulty with regard to the export would be the actual labour to work the shea nut in the regions where it is grown?—But we have established industries and markets when difficulties have seemed insurmountable.

1253. That I agree. Now, has not the palm trade

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Mr. J. H. BATTY.

[Continued.]

in the Gold Coast suffered a great deal from competition from cocoa?—Yes. That is because the natives find it more profitable to give their attention to cocoa than to palm oil and kernels.

1254. The oil palm is in more accessible and populated areas, and it would have to be exploited before people would turn their attention to shea nuts?—We shall have, later on, to give our attention to any natural resources that can be developed, and, as far as I can see at present, one possible thing is shea nuts. How far we may be successful is another thing.

The witness withdrew.

Adjourned to Wednesday next at 11 o'clock.

FOURTH DAY.

Wednesday, 8th September 1915.

Colonial Office, Downing Street.

MEMBERS PRESENT:

Mr. D. A. STEEL MAITLAND, M.P., Under-Secretary of State for the Colonies (<i>Chairman</i>).	Sir OWEN PHILIPPS, K.C.M.G.
Sir G. FIDDES, K.O.M.G., C.B., Assistant Under-Secretary of State.	Mr. L. COUPER.
Sir WILLIAM G. WATSON, Bart.	Mr. C. C. KNOWLES.
Sir F. LUGARD, G.C.M.G., C.B., D.S.O.	Mr. G. A. MOORE.
Sir HUGH CLIFFORD, K.C.M.G.	Mr. T. WALKDEN.

Mr. J. E. W. FLOOD (*Secretary*).

Mr. J. E. TRIGGE called and examined.

1257. (*Chairman*.) We have the advantage of seeing you as representing the Niger Company, and I would like to ask you some questions particularly dealing with the points mentioned in the letter which you have sent to the Committee. When you speak of "more economic working in the collecting and shipping of palm kernels from West Africa" what exactly do you mean by that in reference, first of all, to the collecting?—Of course a change is coming upon us now with the new railway which is under construction from Port Harcourt to Kaduna, and I think merchants are alive to the fact that the time has arrived when covering West Africa with corrugated iron, so to speak, is ending, and the large merchants will concentrate at given centres and will co-operate with the smaller merchants and native traders who bring in the produce from the outstations. With the railway there will be a quicker means of transport to the coast, and the kernels will arrive home in better condition, and the free fatty acids will be less. The economy on the Coast will be that instead of each little merchant shipping home his 50 tons, 100 tons, or 200 tons, those kernels will be sold or pooled at the coast and then promptly shipped.

1258. Do you mean that they would bring them down more in bulk to the coast from the interior to start with, that is to say, from the collector to the port?—Yes.

1259. At the port, would you contemplate that instead of the kernels being bagged and sold in separate lots they should be made up into one bulk, and, if need be, graded, as grain is dealt with at Winnipeg, and then sold by description?—So far as Nigerian palm kernels are concerned I think the advantage of bulk shipment would be so great that the small difference in price would be waived and Nigerian palm kernels would come over as one quality.

1260. But you would put them all into one bulk instead of keeping them separate?—Yes. If you had been down in the hold of an Elder Dempster liner, as

1255. (*Sir George Fiddes*.) I want to be clear about whether I understood you rightly. Looking back on the growth of Hamburg as the free market for palm kernels, did you say that in your opinion the chief historical reason for it was the cheapness of the terminal charges there as compared with the terminal charges in England?—That is certainly one reason, and the other is waterway facilities.

1256. What importance do you attach to the question of the terminal charges, much or little?—Not so much as to waterways.

I have, you would see the way in which the cargo is stowed, and the waste of time and energy that there is.

1261. What you have said would apply to Port Harcourt?—To Port Harcourt, to Burutu and to Lagos.

1262. Would those be the only ports where you could ship palm kernels in bulk like that?—I have not sufficient knowledge of Opobo to speak about that.

1263. Is there water enough at those three ports?—Yes, there is at those three ports.

1264. Is there water enough at Burutu?—Yes.

1265. As the object of the Committee is to benefit so far as we can West Africa, and also to get the trade transferred here, would it make any difference in your opinion as between, say, the United Kingdom and Germany as a market for palm kernels? Of course what you suggest would increase the facilities of export from West Africa, but I am thinking of the place of destination.—In the early stages, at any rate, the trade would be in the hands of the English, and bulk shipments would save expense in shipping and should cause a saving in freight.

1266. Would that saving in freight apply equally to Hamburg and to Liverpool?—It should in my opinion save more in freight to this country, because the Hamburg trade would in the first instance be very small.

1267. Why would it save more in freight to this country, supposing the war is over, I mean?—The Hamburg trade on the coast would be small, but I do not say the trade to Hamburg would be small.

1268. I am keeping in mind at the moment the terms of reference to this Committee to consider the question of establishing in this country the industry of crushing the palm kernels. If you have increased facilities for shipment of course that would develop the trade so far as West Africa was concerned chiefly in the hands of merchants who already have made a start there, and who are British merchants?—Yes.

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[Continued.]

1269. I am thinking of the crushing industry in this country. Would the increased facilities out there affect this country more than Germany?—Not in themselves, no.

1270. Up to now has there been a greater shipment in bulk to Hamburg than to Liverpool so far as shipments in bulk are concerned, or has there been any difference?—Practically all the shipments to Liverpool are in bags, while the shipments to Hamburg and to Rotterdam are in bulk.

1271. Shipments are already made in bulk to Hamburg and to Rotterdam?—In a much larger proportion.

1272. Therefore if you increase the bulk shipments it would tend to bring an equal advantage to Liverpool as regards freights as to Hamburg, and it might be more advantageous to Liverpool than to Hamburg?—Yes, it would be more advantageous to Liverpool than to Hamburg. My first point is as to economy, and you have to consider the price when, after the war is over, Germany comes in again, and for that purpose you have to put your trade on a thorough working basis before the war is over.

1273. I have in mind the two ends—Liverpool as against Hamburg?—Yes.

1274. What you have spoken of refers to the shipping of palm kernels?—Yes.

1275. Have you anything else in your mind as regards the economic working of the shipping?—No, I think not.

1276. As regards landing charges, have you ever compared those in Hamburg and in Liverpool?—We are at a disadvantage in Liverpool of 3s. 9d. per ton as compared with Hamburg, where there are no dock and town dues and master-porterage charges. If a merchant wanted to get his last penny out of the goods he would have to give 3s. 9d. more to land them at Liverpool than at Hamburg.

1277. We know the fact of that difference generally, but we would like to have it in detail, setting out the various items which go to make up the port charges, if you will give us a statement of it?—Yes.

1278. As regards shipping facilities given by the steamship companies, have you found any difficulty?—Yes. On the ground that we neglected the trade in the early days, when the industry went to Hamburg, the late Sir Alfred Jones, for one reason or other, as I pointed out to him several times, seemed to favour the Germans, although I hold a letter, which I shall ever keep, in which he asked me if I was a German because I did not supply his mills with palm kernels. The trade in Germany had free transport from Hamburg to Bremen and to Rotterdam. I may be a little wrong in my figures, but I think it was 1s. 3d. to Stettin, 1s. 3d. to Flensburg, and 2s. 6d. to Petrograd. They had those transport facilities in the old days from Hamburg.

1279. They enjoyed those facilities of transit for what?—For palm kernels; so that, if kernels came into Hamburg at the same price they could deliver them at Bremen or Rotterdam. If you brought kernels to Liverpool and one or two crushers liked to sit upon them, and would not purchase them, you had to ship them to the Continent and pay another freight. So you were driven to go to the Continent because extra facilities were afforded to the Germans. The point I feel strongly upon with regard to increased shipping facilities from the steamship companies—and I know it is rather a delicate point—is that if the big merchants combine in the interests of the Colony, and put up plant to load the steamers quickly, they ought, in return, to have some facility for themselves. This is not the time to speak of a big trader as against a small trader, because they have to work together, but in fairness, supposing we put down very big plant at Burutu so that an Elder Dempster boat can go alongside and a small steamer can go alongside and take 3,000 tons of palm kernels, there should be some facility in the rate or some other advantage given over a shipper of 100 tons or 200 tons at a coast port. For instance, merchants will tell you that they have suffered in the past because, when they have put 50,000l. worth of seeds on a boat the boat will wait along the coast for ten days

to pick up another 300 tons, which is a disadvantage in many ways. I believe, myself, with the co-operation of the steamship companies and the co-operation of the merchants in the pooling of the kernels, the facilities that are now offered to the small trader in the shipping world on the ocean should be offered to the small trader in the Colony. I mean, if there is a small trader who wants to ship 50 tons, his kernels could be pooled with those of other people, and he would not be standing in the way by delaying shipment and prompt delivery.

1280. You find, however, that there is a difficulty about bulk shipments. How far has the trade with Germany been in bulk shipments?—I said there was a larger proportion sent in bulk to Germany than to Liverpool. As far as the interests with which I am connected are concerned, which are about one-seventh of the whole of Nigeria, I think from an economical point of view, if the produce bought in the interior is shipped down river 600 tons at a time and put straight on board an ocean steamer, there is a saving of expense and time.

1281. True, but how is it that you, the Niger Company, with a very large amount of trade, send so much more in bulk to Germany, or have been doing so, than to Great Britain?—Because of the advantages given to shipments to Germany. There were special boats to Germany, for palm kernels whereas the ships going to Liverpool carried general merchandise, and you were almost bound to bag the kernels or you could not ship them.

1282. With regard to the advantages given to shipment to Germany you have said that they give transit to Bremen and one or two other ports free and allow special freights to other ports as far as Petrograd?—Yes.

1283. Therefore the shipper had the choice of consignees—that is what it comes to?—Yes.

1284. And the shipper would not be in the hands of one or two milling companies as he would be in Liverpool?—That is so.

1285. Was not there a ring among crushers in Germany?—Yes, in 1907, when the merchants were very much to blame that they did not move, and again in 1912 or 1913.

1286. Were not 75 per cent. of the crushing mills in Germany before the war in the same hands?—Yes, they were combined. That was not even confined to Germany, because others were interested in it.

1287. No doubt the arrangement extended beyond Germany. Therefore the freedom of the consignor was not quite so great because, even though there were more mills, they were largely under the same control?—Yes, latterly.

1288. Did the combine fix prices so as to keep prices down?—Of my own knowledge, yes, they did in one or two instances which I proved.

1289. Do you know also whether there has been any agreement or arrangement between the merchants for getting some sort of standardized price on the coast?—No, I think the fault has been with the merchants who have not put their heads together sufficiently. Until the war broke out, the competition was such that there was a profit of about half-a-crown a ton on the kernel trade on the rivers.

1290. I may say that I do not regard such an agreement as an iniquitous thing.—Are you referring to a period prior to the war?

1291. Yes. Was there no agreement that you know of for fixing prices?—For selling or for buying?

1292. For buying the kernels out there, to start with.—You mean among the traders as a whole in a certain district?

1293. Yes?—No, I do not know of any; and I am certain there was not an arrangement.

1294. Would it be possible for them to arrange a selling price, or is the trade not sufficiently in their hands?—No, I do not think they could. I may say that on the outbreak of the war I recommended that both merchants and crushers should temporarily combine to that end so that they could have a regular trade in Nigeria. I should like to mention one thing with regard to my points one and two, that we have

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[Continued.]

every confidence in the co-operation of the steamship companies, and I do not want to feel that any remarks I have passed should be taken as against them.

1295. There is no idea of that. I have asked the Committee to realise that we cannot get to business unless we speak quite frankly on these matters, and everybody must regard it in that light. Referring to your point about the crushers, you know there are a number of mills which are now being worked in this country?—Yes.

1296. Is it your opinion that the machinery in those mills is really not up to date?—I think the cause of the trouble in the last year has been largely that the machinery is not up to date. The mills which have now taken up palm kernel crushing at the instance of the merchants tell us that they have to crush the kernels twice, and, therefore, it is more costly to work them.

1297. I do not know whether you have any particular mills in mind. The more recent mills, I suppose, are on the German plan?—Yes, but I doubt whether there are any mills which are actually right up to date, though there are some building and some ordered.

1298. What kind of co-operation have you in mind as between the merchants and the crushers?—When the war broke out, of course, it was patent that the trade was in a very limited circle, and those in it had to decide whether they were going to help the Colony or whether they were going to trade. I think I am perfectly justified in saying that I saw many of them—I will not mention names—and certainly one of the biggest crushers in the country said to me: "It is my business to make money; the Colonies may look after themselves, and after the war is over, the trade will go back to Germany," or something to that effect. Thus, having understood the position between man and man, I realised there was a necessity for the merchant to look after himself; but the crushers in this country have taken up the trade, and nearly all the crushers are now, I think, working palm kernels, and, of course, at the low prices now ruling other countries are taking them up. I think only to-day you will see a notice that 7,000 bags of palm kernels have been shipped to New Orleans from Liverpool. Italy also is taking up palm kernels because they are relatively cheap.

1299. What is the kind of co-operation you have in mind; what is the principle of the arrangement?—The suggestion I made, though I do not say it was workable, was to see from the merchants' point of view whether they could co-operate. We took out a scale of the prices obtained for palm-kernel oil over a period of five years and the prices obtained for palm kernels during the same period, and we found that the unit was 10s., that is to say, if palm kernels were selling at 19, palm-kernel oil was selling at 38, and on that basis it was suggested that we might approach the crushers and ask them whether they could enter into a working agreement for a period of years, say five years, on those lines and thereby keep the trade in this country. I may say frankly that the matter was not pursued to an end; there was no definite meeting held to try and force a conclusion, but it was known that that effort was being made. I think perhaps the terms were not suitable to the crushers, and probably they would have had to be modified, but the attempt was made or suggested, of course in the interests of the Colony. I was asked whether that should be limited to one or two crushers and I said, "No; in the interests of the Colony, we should get the whole of the crushers in this country to take it up," because it was probable that if a big combination were interested in pushing the trade on this side, they might not have the interests of the Colony at heart. Therefore, to protect both the merchants and the Colony and to assist the crushers and the trade generally, it was suggested that this sort of combination might be made of all the crushers in this country who would come in on such lines, but it was not pressed to an issue; and I only mention it to show that the merchants generally had such a scheme in view.

1300. (Mr. C. C. Knowles.) You say that you think

it would be very desirable to find a more economical way of collecting and shipping the palm-kernels. Do you think a system of elevators on the coast at the shipping ports, where you could collect a large quantity of palm kernels, would help matters; is that what you had in mind?—Yes. We did put up an elevator at Burutu, but it failed because it was not quite the sort of plant we should have sent. I take it that, say, 200,000 tons of palm kernels would be in the hands of a finance house at Burutu, Port Harcourt, and Lagos. That is my idea, and that every possible appliance should be utilised to ship them quickly and cheaply.

1301. I think an elevator system should be thoroughly investigated and gone into, and I agree with you that if the merchants pooled their kernels on the coast at some of the big shipping ports, it would help matters very much indeed. I suppose you know it is very important to get the palm kernels here in a fresh condition and keep the free fatty acids from coming out, so the elevators, by twisting them round and putting air through them, would help that very materially?—Yes.

1302. We heard from a witness who was here last week that, by chartering boats and not shipping the cargo by the usual line a very great saving had been made. Have you found that to be so?—I have found it so, and I ought to have referred to that under my point No. 2. I have mentioned to the steamship companies the absolute necessity of facilities being given for shipping palm-kernel cargoes to outside ports, and I think I have obtained the sympathetic ear of the steamship companies—not that the thing can be done to-day, but I think it will be done in the interests of the Colony and of the trade generally.

1303. You suggest that crushers should use the large profits they are now making, in order to erect up-to-date mills, and I think you said that in your opinion there were no up-to-date mills at present in use in this country?—I expressed a doubt on the subject, but I do not know definitely about it. There can be only one or two up-to-date mills, at the most. You are speaking of palm-kernel crushing, so I confine myself to that.

1304. Quite so. You speak about the crushers' large profits—that is since the war, you mean?—Yes.

1305. Do you know that before the war there was no crusher of palm-kernels in this country who ever made a profit on the crushing; in fact I may say they always made losses. Do you know that to be a fact?—I know that, prior to the war, losses were made by the crushers, but the loss was not a heavy one; it was a loss all the time, but not a heavy loss.

1306. It was always a loss?—It was always a loss, but not a heavy one.

1307. It depends on what you call a heavy loss. Would you call 1*l.* a ton a heavy loss on the palm-kernels?—I think you will find that it was not such a loss as that, but nearer 5*s.* a ton. That point can be ascertained quite easily.

1308. Do not you think it reasonable that a time arrives when the crusher expects to make some of that loss good?—Certainly, and my view is that if he has made, as I conscientiously believe he has, an abnormal profit since the war broke out, his abnormal profit should be used to bring us right up-to-date with crushing plant in this country, which, my conviction is, would enable us to keep the trade here other than as regards Germany's requirements.

1309. What profit per ton do you think a crusher has been making since the war started?—I am in a difficult position about that. I am a crusher in a small way myself, and I have two factories and know what it costs to crush.

1310. What profit do you think has been made?—When palm-kernels were 17*l.* and 16*l.* a ton, after the war started, and the crushers were selling the palm-kernel oil at 48*l.* a ton, they must have been making an abnormal profit.

1311. But that only lasted for a very little time?—It lasted for some months.

1312. A man cannot crush a lot, but only a little in a few months. What would you call a big profit?—I should call 4*l.* 5*s.* a ton a very big profit.

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[Continued.]

1313. Would you call 2*l.* a ton a reasonable profit for a crusher to make on the palm-kernels?—No, I should not expect him to make that.

1314. What would you expect as a reasonable profit for crushers?—It depends upon general trade conditions. Do you mean in normal times?

1315. Yes; in normal times what should he be satisfied with?—We know what he was satisfied with, and I should think he would be very well satisfied with 1*l.* a ton profit.

1316. What I want to get at is this: It has been pointed out by the West African importers, and by you in particular, that you want to protect the Colony and the natives, and that unless the price of palm-kernels is kept up, it would be a very serious matter for the Colony; the price, that is to say, that you could pay the natives?—I honestly think so, and I think it is the duty of the merchants to keep the trade going even without profit.

1317. At places like Lagos, since the war started what has been the profit which the importer has made? You tell us that, before the war, he could never make more than about 2*s.* 6*d.* a ton. What has been the profit which he has been making since the war, at such a place as Lagos?—I do not think that is a broad enough way of looking at it. Supposing, in the comparatively small portion of the trade at Lagos, the merchant should wisely protect himself, and take what we may consider to be an abnormal profit, that does not mean to say that that profit applies to the trade of the Colony. You have to bear in mind that the palm-kernel trade of Nigeria comes from Jebba downwards, and there are many here who know, probably, better than I do what in Northern Nigeria it costs to bring kernels down from Jebba to Lagos for shipment. If he happens to be in a fortunate position in the vicinity of Lagos, where a large profit can be obtained as compared with what can be obtained up the railway, the merchant is certainly entitled to take that profit because he would gain nothing by not taking it. Probably you would find that, speaking for myself, the profits made at one or two river stations have been given away at interior stations in order to keep the trade going.

1318. I am not saying that the merchant is not justified, but I am merely asking about it in reference to the 2*s.* 6*d.* per ton profit which the importer has been making on palm kernels before the war, and was perfectly satisfied with, because it was considered that the palm kernels were brought home more or less as a way of bringing home your money, and as a cheap way of bringing home your money for the goods you send out. Before the war, that profit was 2*s.* 6*d.* to 5*s.* a ton?—We did not make it.

1319. No, but you know that most of the merchants did?—I have heard it said.

1320. Since the war, what do you think has been the average profit that they have made on palm kernels?—I am not familiar with the river trade, but speaking from our own share of the trade, which is a very large one, we have not made an abnormal profit on our palm kernels since the war broke out. I do not suppose that to-day we are making 1*l.* a ton on palm kernels.

1321. You will hear what the merchants are making. Have you heard that they have made, since the war, anything from 15*s.* to 3*l.* a ton profit on palm kernels, instead of the old 2*s.* 6*d.* a ton?—Yes, at certain centres—at Lagos to-day—but that does not refer to keeping the trade in the Colony, or to the general profits of the palm kernel trade, but only deals with an isolated section of it.

1322. I am only trying to bring this out for the information of the Committee, to show that if the crusher has made large profits since the war, the importer also has made large profits since the war?—In some centres.

1323. Yes, in some centres.—If the trade was confined absolutely to the Coast, the crusher would not get the palm kernels to crush, and would have to pay more for them to-day. We must deal with the trade as a whole, and that is why I think the position as between the crusher and the local merchant does not quite apply.

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1324. You told us that you tried—and I know you did—by visiting most of the crushing centres, to get the crushing mills for the benefit of the trade to take up palm kernels and crush them. You will remember that there was a time when palm kernels were up in price to about 20*l.* a ton?—Yes.

1325. I think that was the time, or about then, when you went round to try and get the crushers to crush palm kernels. At that time, when palm kernels were 20*l.* a ton, there was a very handsome profit for the importer if he were able to obtain 20*l.* a ton?—I remember that well.

1326. The importers generally—I do not say you in particular—held out for 20*l.* or more a ton, and they got bids from important crushers, such as Watsons of Leeds, Bibby of Liverpool, and Silcock of Liverpool, round about 19*l.* 10*s.* a ton. If they had accepted those bids of 19*l.* 10*s.* a ton, they would have made a very handsome profit on the palm kernels they had purchased from the natives?—Yes.

1327. The crusher who could not get palm kernels at 19*l.* 10*s.* a ton, then looked about him and said: "Can I make more money out of copra, or out of cotton seed, or out of ground nuts, or other things?" and he found he could make much more money out of copra and out of ground nuts. Is not that the reason why, for instance, Messrs. Bibby bought large quantities of ground nuts, which have stopped them from crushing palm kernels practically up to date, and why Messrs. Watson bought large quantities of copra which filled up their crushing power? That is the reason why palm kernels then tumbled down in price to about 13*l.* 5*s.* a ton.—I do not think the question of market conditions will assist the Committee very much. I can answer you in exactly the same way: I had the pleasure of meeting two large crushers after I had studied the whole market from end to end, and I asked them to co-operate with me in the interests of the Colony; they said to me: "Well, we will buy your palm kernels at 14*l.* a ton," and they were so anxious to get them that they did not want me to leave the room until I sold them. They said, "The market is going down to 12*l.* 10*s.*; we will take 150 tons at 14*l.*" In my judgment it was a perfectly wrong thing to do, but I do not think I can blame the merchants for making a mistake when they were 20*l.* a ton, any more than I can blame them for doing the right thing when they were 14*l.* a ton.

1328. It has been brought before the Committee that palm kernels have come to such a low price that it is going to stop the trade altogether. I do not know whether I am right in bringing out the reason, for that low price, which was owing to the importers holding up the price of palm kernels at such a high figure, when at that figure they were making very much greater profits than ever they had made before, and that was the reason why the crushers went in largely for other seeds and material to crush, and filled up their crushing power, and then of course there could not possibly be the demand in this country for palm-kernels.—I do not hold that view, and my conviction is that the crushers did not co-operate with, or did not make any attempt whatever to assist, the merchants. Their ambition was to buy the palm kernels as cheaply as possible, regardless of the interests of the Colony, and it was thrust home to me that before the war they used to make 2*s.* 6*d.* a ton, and now they are making bigger profits; and therefore the price of palm kernels had come down. I do not think there was any attempt on the part of any crusher to co-operate at all.

1329. I do not say there was any attempt on the part of the crusher to co-operate with the merchant.—Or the merchant with the crusher.

1330. You have been asked if you had heard of any milling combination to keep down the price of palm kernels on this side. Do you know of any combination amongst the millers? Have the big millers combined?—At the present moment, or when?

1331. Have they ever combined, since the war started, to keep down the price of palm kernels?—When the war started there were only two mills which took palm kernels in any quantity.

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[Continued.]

1332. Did they combine?—As to those two mills, I can only refer you to a speech of the chairman of one of them, in which he said they had combined interests when they went into the margarine business.

1333. That is to combine their business in relation to margarine, but not in relation to crushing. I would like to point out to you that to my knowledge there has been no combination amongst the crushers. Has there, to your knowledge, been any combination amongst the importers to hold up the price of palm kernels? Have the importers communicated with each other for the purpose of holding up the price of palm kernels?—On the Coast, or here?

1334. Here.—They have had a meeting, as you know, and the result of that meeting was to try to co-operate with the crushers if possible. It was found it was not possible to do so, and they have had meetings since on the general situation of the trade of the Colony, but there has been no combination, and the bigger merchants are strongly opposed to any combination.

1335. To your knowledge, is there any combination on the coast to buy palm kernels? For instance, at a place like Lagos, have the merchants who buy palm kernels combined?—I believe they have wisely been working more together than they did prior to the war, when they were making little or no profits at all. It would be suicidal to do otherwise now, and probably that accounts for the local conditions to which you have referred.

1336. Owing to that arrangement they are able to make much larger profits than if they were in competition with each other?—You may refer to the local trader. The big merchants, speaking for ourselves, in situations where we are making extra profits, are using those profits to average the price of the palm kernels we buy in the interior, or else we could not keep the trade going.

1337. You know there are oils that come into competition with palm kernel oil. There are many such oils; for instance, coconut oil more particularly. There are certain hardened fats and other oils that will eventually come into strong competition with palm-kernel oil. There are other nuts such as the cohune family and the babassu nut?—The cohune is a long way behind.

1338. Do you know that since the war there have been 3,000 tons of babassu nuts imported into Liverpool from the Brazils?—I have heard so.

1339. Do you know that the Brazilian merchants are offering something like 10,000 tons a month over the next six months of babassu nuts, and guaranteeing to ship them?—Yes.

1340. My point is: Do not you think, in view of the many competitive seeds, it is most important that the price of palm kernels should be kept down as low as possible, if they are to command a market and a demand against these other seeds and oils?—My personal view is that the merchant should co-operate with the crusher, if necessary, at times to that end, and, when the competing article makes it absolutely essential, they should face the position and look a little ahead. I also think that the industry is now so important that the merchants should also put up an up-to-date plant for the crushing, extraction, and refining; they should work with the crushers, and should work independently of the crushers. The seed trade of Nigeria is becoming very large, and is going to grow enormously, and the merchants should be in a position to help it. With up-to-date plant, it is then purely a commercial proposition. As the other seeds come in, it is a question of supply and demand, and sometimes you will work one seed, and sometimes another.

1341. Copra comes only in very small quantities from the West Coast of Africa, and we are trying to support our West Coast colonies and keep the trade in palm kernels and palm-kernel oil in this country after the war. For that purpose we have to consider what is going to compete with those materials?—Certainly we have.

1342. Therefore, I take it, you agree that we have to economise in the transport?—Yes.

1343. And we have to see a way of bringing palm

kernels into this country to compete with those other things?—Yes, but that also applies to every seed from every other part of the world. The margarine trade and the edible fat trade all over the world is developing, and, although we are generalising if we talk about the increase there will be this year or next year, I think as time goes on we must face it.

1344. But it is not easy for the importer to combine with the crusher to build up-to-date mills if some other seed comes along in the meantime as a better product than palm-kernel-oil, and if the buyers who consume it for margarine manufacture and so on think another oil will replace it at a cheaper price?—I do not think all the seeds from Nigeria will suffer at the same time.

1345. But that is a point which ought to be considered?—If you have an up-to-date plant you can work palm kernels or ground nuts.

1346. But the crusher will look round and say: "What seed pays me best to crush." If palm kernels pay him best he will crush them, and if other seeds will pay him best he will crush them. That is what is done to-day?—Yes.

1347. Shea nuts you are deeply interested in. You speak in your notes about storing them for two years. Do you know that some were stored in Liverpool for about two years and after that time they had to be sold because they were absolutely useless?—It depends on their preparation. There are two ways to prepare them. If prepared in one way they will keep for four years, and if in another way they will only keep about one year.

1348. Shea-nut oil, I think you know, is very little use for soap-making, owing to the unsaponifiable nature of it?—Yes, but it has a very big future for vegetable lard.

1349. (Sir P. Lugard.) Have you any experience of mills locally erected? Do you favour local crushing as against crushing in England?—No. Some years ago I did, when it was only considered as a soap material, but when the mills were put up in West Africa I took the liberty of saying, before they were working, that they would not work for long. When you consider the duplication of staff necessary in a climate like that—and an expensive staff—and the cost of fuel and up-keep, I do not see how you can expect a crushing plant to pay when you can have in Liverpool, London, and Bristol an up-to-date plant for crushing, extracting, and refining.

1350. Would not you benefit by the cheap unskilled labour in Nigeria and cheap fuel when the coal-fields are opened?—The conditions may alter somewhat, but there is the collection of the nuts to the centre to be considered as well. Circumstances may change, but I should think for the present it is not advisable.

1351. If you turned out your cake and your oil separately on the coast, by manufacturing it there, you would be able to ship direct to the market that required it, direct to Germany after the war, if necessary, and direct to the United States, instead of the stuff going via Liverpool and there incurring port charges?—You could ship the cake; but as to the oil, I should like a technical man to speak to that. For soap-making purposes, yes, but not for edible purposes.

1352. Generally speaking you are not in favour of local crushing mills under present conditions, but you think if fuel cheapens it may be possible?—If fuel cheapens, but there is expert labour to be considered; conditions are altering, but certainly it is not advisable at present. In the Northern provinces of Nigeria it may be a little different. I have forgotten the name of this new extraction material, but I think, perhaps, small extraction plants in Northern Nigeria are worth consideration.

1353. Do you anticipate that after the war labour will be somewhat more expensive in this country. That will be a factor to be considered in favour of establishing a local mill?—Labour here will be dearer, but I think that the demand for material will so increase that it will counterbalance it.

1354. In your letter you speak of taking steps for promoting the collection of the shea nut crop this year, and of fixing an average of 10s. profit; what price would that mean?—To establish them you would want

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to put them in Liverpool at 9*l.* 5*s.* a ton and pay 2*l.* 10*s.* a ton to the native.

1355. No matter where you purchase them?—The merchants have agreed, regardless of where they are purchased, to pool their purchases at 2*l.* 10*s.* a ton, whether at Kano or at Lome.

1356. Do you think a similar system would be possible in the case of palm kernels?—No, the interests are larger, and I doubt whether such a system would work at present.

1357. That question turns largely on the railway rates?—Yes.

1358. Are you content with the present railway rates?—I am not content, but I do not want to express an opinion; I will leave that.

1359. You said you thought the effect of opening the Port Harcourt Railway, and the extension of railways generally in Nigeria, would be to make merchants concentrate and employ agents to collect?—That is so.

1360. You know that motor transport, apart from the cost of making motor roads, is not feasible beyond a 30-mile radius?—It is very costly.

1361. Beyond the 30-mile limit it comes out equal to head carriage?—Yes.

1362. If the Government made a series of radiating roads from railway centres, and the merchants established purchasing agents, say, at 25 to 30 miles from the railway centre, would that materially assist the collection and the economical working of the business?—That opinion has been expressed to me by local traders.

1363. Then why have the Niger Company never endeavoured to do it?—I think you will admit that the Niger Company have had their hands very full in the last few years.

1364. You spoke about the port facilities and said there was waste of time and energy in the present method of shipping. Apart from the boats, as to which no doubt Sir Owen Philipps will speak, are there any other facilities that you think might be afforded by the Government which are not at present afforded? To speak a little more precisely, you said if the merchants erected elevators or cranes, or whatever it may be, for facilitating shipment, they ought to get some corresponding advantage?—Yes.

1365. Would you think it better that the merchants should do that, or that the Government should do it in the interests of the trade of the ports?—I can only speak for one big group.

1366. You speak for Burutu, of course?—Yes, I should say that at Burutu, if the merchants did it, it would be better than the Government doing it. At the same time, I do not know whether, if the Government did take that step, the merchants would fall into line and be very glad.

1367. From your general knowledge what would be your view of that same question as regards Lagos?—I am not familiar with the Lagos trade though we ship considerable quantities from there. I should think the plant would be the same, and they would have hulks or stores for the kernels, so that there would be no delay, and when the steamer came alongside the palm kernels would just be taken out of the hulk and put into the steamer. You would have mechanical elevators, and if you had large hulks you could fill the steamer at once.

1368. If it was anything on the elevator principle it could only be easily worked if you shipped in bulk and not in bags?—Quite so.

1369. So the Government should not act until the steamship companies acted first?—The steamship companies would not object to export in bulk, I am certain.

1370. You have spoken a great many times about the merchant's duty being to act for "the protection of the Colony," and for the "benefit of the Colony," and I understand you to say that the benefit of the Colony would be promoted by cooperation between merchants and crushers to fix prices. You said they would fix prices for the benefit of the Colony, and I do not quite understand that.—I mentioned that during the time of the war I thought that was the best policy to adopt.

1371. Would not you extend that beyond the time of the war?—That becomes a commercial proposition. If the merchants, to keep the trade in this country, agreed with the crushers to a fixed price over a period of years, and if it was perfectly certain that neither at one end nor at the other could it become a combination that would press prices unduly against the Colony. I think such a course would be a good one at the present moment in order to keep the trade here.

1372. Then you would advocate a gigantic monopoly?—No, I object to a monopoly. That would not be a monopoly at all. If there were eight crushers to-day who would take up the palm kernel industry, and if the merchants themselves put up a mill in Liverpool and they had a combined price over a period of years for the palm kernels based on a sliding scale on the price of the oil—for instance, if palm kernels were 19*l.* a ton when they were selling palm-kernel oil at 38*l.* a ton, then if palm-kernel oil went down to 34*l.* a ton they would get the palm kernels at 17*l.* a ton, then you would have a fixed product over a period of years in order to keep the trade in this country.

1373. Then I understand you to say you would make that sliding scale applicable to the purchasing of the palm kernels in the Colony?—Yes, I would.

1374. Would not that operate against the benefit of the native rather than for the benefit of the native?—No, I believe violent fluctuation of price is against the best interests of the native and of the trade generally. The native would not suffer by that scheme, because if palm-kernel oil went to 40*l.* a ton and palm kernels to 20*l.* a ton the natives would be getting larger prices for the kernels than if the oil was down to 30*l.* a ton and the kernels to 15*l.* a ton.

1375. Then it would not be a fixed price, but would be a sliding scale according to the market value of the oil?—That is so.

1376. What do you consider to be the lowest feasible price below which the production would cease?—It depends upon the locality. It is a difficult question. Without answering your question directly I should say myself that, taking Nigeria as a whole, we have very nearly reached the price at which there is any hope of developing the trade.

1377. That is 9*l.* or 10*l.* a ton?—I am speaking on the basis of the competing price here of 14*l.* to 15*l.* a ton.

1378. With a local price of 9*l.* or 10*l.* a ton?—Yes. I am speaking broadly, and not about any given spot, but of the trade as a whole.

1379. My object is to elucidate your phrase that the trade had to decide whether to make money or help the Colony. I wanted to make more clear what your idea was of helping the Colony versus making money?—At the present moment if the merchant could reduce the price he is paying for the palm kernels there would be fewer kernels shipped, and he might possibly make more profit. At the same time if he buys on the basis all over Nigeria at the utmost price he thinks he can pay and is prepared to risk getting no profit, taking it as a business speculation for what it might turn out, that is the utmost position that any merchant could be expected to take up. That is the position the Niger Company have taken up; they are prepared to trade so long as they do not trade at a loss.

1380. With regard to the shea-nut trade you asked that the Government should advance a sum of money in order to enable the Niger Company to take the responsibility for the crop, the Government advancing the capital value of the nuts stored?—Yes.

1381. Is there any possibility of getting the money from other sources to finance the crop?—It is possible, yes.

1382. What would the amount of that money be—40,000?—More than that—call it 20,000 tons or 200,000*l.* You have to bear in mind that a great many seeds would have to be stored here, and the merchants generally are full up.

1383. Do you think any steps should be taken to increase the output of the palm-nut crop?—I believe the construction of railways and the general opening up of the country will do that as quickly as the increased output can find a ready market.

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1384. No doubt, but I was meaning in other ways, such as palm plantations or the reduction of local consumption. Mr. Birtwistle, in a memorandum he put forward, said that the local consumption was fully as large as the export of palm oil. I have it from other sources that it is only about 6 per cent. of the export. Whichever it is, if it is somewhere between 6 per cent. and 50 per cent. it might be reduced by providing other food stuffs or importing other food stuffs to replace it?—I doubt very much whether that would be advisable. It raises questions of health and many other questions.

1385. With regard to the machinery for cracking the nuts, which is quite separate from the crushing machinery, I think the firm of Miller Brothers imported a centrifugal machine which costs 9*l.* or 10*l.*, and the Government of Nigeria have imported a hand machine at about half-a-crown. Have you any views on that matter? There are two separate things—the crushing of the kernel, which is much harder, and also decorticating the ground nut.—I think generally they have not been received by the natives with favour. I do not think these small cracking machines are of much service to us.

1386. The point is that they would set free so large an amount of labour—largely women's labour—employed in cracking the nuts.—It is quite likely that on opening up the railway some larger nut-cracking machines at certain centres will be used.

1387. What is the difference between purchasing the ground nut in the shell and when decorticated: is it only the cost of transport?—The cost of transport.

1388. With regard to the output of palm-kernels do you think much of it is lost through tapping trees for palm oil?—There is a great deal of waste.

1389. Is it increasing?—No.

1390. Do you fear any serious result to the trade if the import of liquor (gin) were still more severely checked than it has been? I may say that I have had experience in Nigeria in two places with regard to tapping of the trees having increased with the increasing of the spirit duties.—I am one who holds the view that the merchants never made any money out of the spirit traffic, and I do not think it would materially affect the trade.

1391. There is another way in which palm trees are being destroyed very greatly in the Southern Provinces and that is by the system of shifting cultivation—the burning down of the forest for the extension of agriculture. Have you any experience of that?—It has not come to my knowledge, but I have heard of it. In the Northern provinces of Nigeria the shea nut is, in the same way, very seriously affected.

1392. But that is more by bush fires?—Yes.

1393. It is in the Southern Provinces where the shifting cultivation is undertaken?—Yes.

1394. Do you think legislation is required to deal with it?—We suggested it to the Government some two years ago.

1395. It is an exceedingly difficult matter?—Very difficult.

1396. One other point has been put to me as interfering very much with the collection of produce and that is barter trade as against cash trade. It is said that the cash trade introduces a greater variety of articles and the native who has cash can purchase anything he fancies, whereas if he barter he has to take what is offered, and he will not take the trouble, especially in places very distant from the centres of trade and where it is not greatly to his benefit to collect, to collect at all unless he has something to tempt his fancy.—I have heard that said very often, but I think too much importance is attached to it. The general transition is coming. If you take Nigeria as a whole it is gradually changing from barter to cash trade, and I think, myself, it would be a mistake to interfere with it, and that any sudden change would be to the detriment of the trade; but the inevitable change is coming, and it is only a matter of a few years.

1397. I have been arguing the point with the Niger Company for some years, and I expected no other answer from you. Apart from the actual barter trade do not you think the merchants would do well to refuse

manillas and brass wire, and so forth, and limit themselves to cash if they are doing a cash trade?—In our trade manillas and brass rods are very small, in fact nothing; but it may be different up the rivers.

1398. You are not concerned in these transactions?—We are not concerned at all.

1399. In our investigations when taking over German firms we have learned a great deal about their trade. They have been giving enormous credit, one firm alone 88,000*l.*, and the success with which they have traded as against British firms is said to be largely due to that fact.—I think that is the case.

1400. Have you any views to put before the Committee on that subject, which is a matter of enormous importance; viz., the question of the extension of credit to the natives?—We strongly oppose the trust system altogether, and although we cannot close our eyes to the fact that trust is given in some centres, we have very little trust. Did you mean to refer to the collection of the German trust out there, or only to the system of trading?

1401. I am talking of the system. As far as the collection goes they never intended to collect, but they held it over the natives as a threat.—

1402. (Chairman.) The question of the collection of this credit business would take us a little too far out of our course this morning, I think.—It is a vicious system, the trust system, and ought to be discouraged by every merchant.

1403. (Sir F. Lugard.) I quite agree. The Germans trade for the Syrians, and that class, on commission?—Yes.

1404. That trade, I understand, is now dead owing to the expulsion of the German firms?—The trade is in the hands of the Niger Company at the present time in Northern Nigeria.

1405. In what sense is it in the hands of the Niger Company?—We have many of the men in our employ.

1406. I mean the purchasing for them on commission, and supplying them with whatever they choose to order on a small commission?—You mean from Hamburg and Manchester. That business has fallen into British hands. We have taken over the Manchester business practically.

1407. My information is that there is very little going on now?—Not a great deal, but some is still going on.

1408. Why were Manchester goods so largely sent to Africa *via* Grimsby and Hamburg? Did the Germans enjoy special shipping facilities or get special rates so that there was a temptation to send goods by that route instead of direct?—I have no personal knowledge, but there seems to be an opinion that the Germans gave preferential treatment to merchants.

1409. On the question of produce inspection there has been in the Southern Provinces a system of Government inspection to standardize the produce, prevent adulteration, and so forth. There are two views about it: one is that it is not the business of the Government, but of the merchants to inspect, and that the Government doing it leads to bribery and very many evils. Are you in favour of Government inspection, or do you consider that that is a matter for the merchants to undertake?—Personally, I am strongly of opinion that it is a matter for the merchants. The complete answer to that is that, two years ago in the case of an export of, perhaps, 25,000 tons of palm kernels in the course of a year, on a 5 per cent. basis allowances were made on 800 tons only.

1410. Do you think it would be useful to endeavour to create a standardised form of produce, not by inspection in the local market but at the port of export?—I should say, no. At present the adulteration is very small.

1411. I am not now talking of adulteration but of the produce, whether adulterated or unadulterated, which is offered for shipment. Would not it improve the Nigerian markets at home if the produce were graded by an expert, and shipped in classes?—No, I should say not. Take palm kernels alone: I think they do not want grading at all. If you ship one class that would meet the demand of the market. Palm oil

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and hard and soft oils would be tested in this country and not locally.

1412. (*Sir Owen Philipps.*) You have been telling us how, in your opinion, this trade can be best brought to this country. Have you considered the other question, and that is how it can be retained here after the war?—Yes, a large share of the trade. The Germans exported an equivalent of 70,000 tons of palm kernels a year. Surely as we now have the trade in our hands, if we are thorough in dealing with it, these 70,000 tons ought to be kept here. We brought some 40,000 or 35,000 tons a year before war. That makes, say, 110,000 tons. The total trade that we are talking about is only 250,000 tons, but it is an enormously developing trade with fresh outlets. My conviction is that with a thorough organisation, economy in bringing palm kernels into this country and up-to-date plant, and encouraging the trade as far as we can with other countries, we can hold the trade quite well, other than the requirements part of the German trade for local consumption.

1413. Will not the firms who are now investing money in new machinery be open to very much more than keen competition after the war from the mills which are already erected in Germany?—I am afraid that has to be faced, and that is why I say there is an absolute necessity of our being up-to-date for working all grades of the seeds. The competition in my opinion is to be met by the increasing world-wide consumptive demand.

1414. But, given that during the war very British miller who deals with palm kernels has the most up-to-date plant, will they not be exposed to quite exceptional competition from the idle mills in Germany when the war is over? These men will want to get back their trade?—Naturally, but they will want to use their mills at a profit, and I still think that with increased outlets we ought not to fear competition if we are thorough. My own view is Germany would never have had the trade originally if we had set to work thoroughly to get it. Now we have it in our hands we have to set to work to endeavour to keep it.

1415. Do not you think it would be reasonable for those who invest capital at the present time for the purpose of dealing with these palm kernels during the war to ask the Government to prevent them having unfair competition after the war from all these idle mills?—Yes, I think it is quite a reasonable proposition.

1416. You mentioned in your précis that more shipping facilities are required from the shipping companies. You are aware that British shipping lines have over 100 steamers nearly all engaged in this trade?—Yes.

1417. And it is the case that they provide about ten regular lines between England and the Continent and West Africa?—Yes.

1418. Have you had any serious want of tonnage during the last five years except possibly at the height of some crop season?—No, I do not think we have, and I would like to say that I believe the merchants have a great deal to thank the steamship companies for in the past year with regard to the way in which they have tackled the difficult problem of the traffic. By the facilities to which I allude I mean this: that it is essential that the steamship companies should say at once to the merchants, "We will provide the facilities for shipment to this country, and to outside ports that are necessary for the palm kernel trade on a uniform basis." I mean we should be able to go to the steamship companies and say we want palm kernels shipped to Liverpool, London, Bristol, Hull, and Glasgow on the same terms and at one price. It is not impossible that that should be arranged, and then we should have all the crushers in the country on one basis. The same remarks apply to a less degree to facilities to countries outside, such as France.

1419. In other words it is an advantage to the trade if it can have equal rates to neighbouring ports as far as possible?—A very great advantage. The Germans had that advantage when they had similar rates to Hamburg and other ports, and when we had not those facilities, now we ought to have the

facilities here in respect of all ports where the palm kernel business can be worked.

1420. Can you tell the Committee what, in your opinion, is the difference in freight between palm kernels in bulk and in bags which would enable merchants to deal with the trade in bulk. If the merchants were encouraged to erect elevators, either jointly with the Government or independently, what advantage would palm kernels shipped in bulk require per ton to encourage the merchants to take this step?—I am not prepared to say, but I should think 7s. 6d. a ton. However, I have not thought it out.

1421. (*Chairman.*) What extra advantage given to the merchant for shipment in bulk over shipment in bags would encourage him to put up elevator facilities?—That is to say for the purpose of loading the steamer rightaway and providing elevators and everything. The difference between shipping in bags and in bulk I should think would be 7s. 6d. a ton to the benefit of the merchant.

1422. (*Sir Owen Philipps.*) But would it require as much difference as that, seeing that all the merchants would have the advantage, and would save the expense of the bags?—I have not had time to go into it.

1423. You have not looked into it from that point of view?—No, but I should think 7s. 6d. a ton would be the extreme difference, at any rate.

1424. (*Mr. G. A. Moore.*) In speaking of the relative advantages of shipping to Liverpool and to Hamburg, you mentioned that it was almost necessary to ship in bags to Liverpool, owing to the ships taking mixed cargoes?—Yes, general cargoes.

1425. Is it your experience that we have not quite the same satisfactory outturn in Liverpool as in Hamburg, in consequence of that broken storage?—That has been the opinion expressed. I cannot say from personal knowledge that I have noticed it.

1426. With regard to crushing kernels in Africa, this is what I said for the benefit of the Committee on a previous occasion: "The great difficulty in connection with the local mechanical treatment is the impossibility under present conditions of obtaining sufficient quantities at one spot to keep the factory working. Increased transport facilities may correct this in time." Is that a correct statement?—Yes, I hold that view.

1427. You said crushers always made losses in this country before war when crushing palm kernels?—I do not happen to be a crusher.

1428. But you did say that?—I did. The crushers said so; and I think, broadly speaking, it is correct.

1429. Assuming they had losses, or only very small profits, has not it been generally supposed, amongst West African merchants, at all events, that one of the difficulties the African Oil Mills in Liverpool have had has been to dispose of the cake?—That has been so.

1430. They have always had to export it?—Yes.

1431. They could get no price in England for the cake which was in any way equivalent to what they could get for it abroad?—That is so.

1432. Do you remember anything about a contract the African Oil Mills had with a London firm, for some cake which they could not ship owing to the commencement of the war, and then the African Oil Mills had to sell it by auction?—I have no knowledge of that.

1433. You have answered a number of questions with regard to merchants' profits. When a merchant buys a ton of palm kernels to-day in Africa at any particular station, he knows in the first place probably his own factory expenses, but is he able to calculate with any accuracy what the net result of the purchase will be when he has shipped the produce home and sold it?—No. He cannot know in the present conditions, because you have port charges and delays in shipments, and other delays before you can get the cargo discharged—penalty rents on quays and extra freights.

1434. Mr. Knowles asked you some questions about merchants having refused a price for kernels of between 19l. and 20l. a ton. Is it not a fact that within a very short time the price of palm kernels declined from 20l. to 13l. 5s. a ton?—That is so, speaking from memory—in about six weeks.

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1435. During that time the merchants had very few facilities indeed for shipping their palm kernels?—That is so.

1436. Consequently there was a loss of 6*l.* 15*s.* a ton on any palm kernels bought for the 20*l.* a ton market at that time?—Yes.

1437. In suggesting that there should be an arrangement between crushers and merchants, your idea was to provide a stable price at which we should go on buying?—Do you mean the original arrangement?

1438. Your general idea was that we should be able to buy with some confidence at the other end so as to be able to get hold of the bulk of the palm kernel crop from the natives?—Yes.

1439. One of our great difficulties in knowing what to do under present circumstances is that if we were to bring home normal quantities there would very likely be a surplus which would probably be unmarketable. We might have some on our hands that the machinery in this country would not be able to tackle. Is not that the case?—If more palm kernels were brought home than were actually wanted, or than the crusher had actually sold the oil of in advance, the crusher probably would not buy them, and you would have either to store them or take a very big discount.

1440. That is one of the difficulties the West African merchant has to-day in arranging his prices at the other end?—That is so.

1441. That is one of the factors which make it impossible for him to work on the margins that he did before the war?—That is so.

1442. Do you consider that it is at all a true statement that the merchants held up palm kernels at any time in this country?—No. I think on one or two occasions there was an error of judgment when the merchants could have sold at 19*l.* 10*s.*, and had to sell at 18*l.*, but the same applies when the market price was 14*l.* and he could have got 16*l.* a little later.

1443. Is it not a fact that at the beginning of the war we thought palm kernels were going to be very low in price indeed, and we were very much surprised when they went to nearly 20*l.* a ton? That fact, perhaps rather demoralised our judgment?—I think that did us rather more harm than good. I think the general opinion of merchants was that the price of palm kernels would be in the region of 16*l.* or 17*l.* a ton for twelve months after the war.

1444. That subsequent decline in price from 20*l.* to 13*l.* 5*s.* was largely the cause of the combination or arrangement, as far as prices are concerned, on the coast, about which you were asked by Mr. Knowles?—On the question of price the merchants would have to bear that risk.

1445. We are not denying the fact that there was an arrangement made between the merchants on the coast which was very largely forced upon them.—That is so.

1446. There is no secret about the fact, and Mr. Knowles knows it perfectly well, because Messrs. Lever Brothers were a party to it.—One cargo of palm kernels that I know of was shipped from West Africa and was not sold, and they faced an actual loss of 12,000*l.*, but that is the merchants' fault in a measure—it is a question of supply and demand.

1447. As to the cost of bringing palm kernels to this country, one of the factors which I gave the Committee as affecting the actual price paid for produce in Africa, is the standing expenses of the merchants' factories, which vary very considerably according to the number of tons in a year which each station can in normal times buy and ship. The greater the tonnage the lower the cost per ton; that is to say, the more you buy at one factory the lower is the cost per ton of your standing expenses. That of course varies very largely in different districts?—Yes.

1448. From that point of view it is not necessarily economy to spread small stations all over the country because these stations are very expensive and as a matter of fact the natives can do the work cheaper?—That is so; it is coming to that.

1449. I mention that because Sir Frederick Lugard's question was, I think, a suggestion that you should put

a number of small stations at the ends of radiating roads. That system would not tend to economy as far as collection is concerned.

1450. (Sir F. Lugard.) I was referring to native agencies.—Native agencies or depôts—I would not call them stations.

1451. (Mr. G. A. Moore.) I do not want to go too far, but in only a very few districts indeed can you get natives whom you can trust for that sort of thing.—That is the opinion we generally hold.

1452. A question was put to you with regard to barter versus cash. Is it not a fact that in catering for the natives we supply everything that we think they will buy from us, small or large, and we generally make up these small articles at a price which they can deal with just as well as if they had cash?—That is so.

1453. Do you think that the want of actual cash passing makes any difference in the supply of these small articles to the trader?—No; with one or two exceptions, which have been specially brought home to me in Northern Nigeria, I do not think so.

1454. In fact in some districts, seeing that the natives will not take bronze coinage at all, we can deal with even smaller amounts by means of barter?—That is so.

1455. What do you say with regard to the manillas?—As to that I have no knowledge.

1456. (Mr. T. Walkden.) You mentioned you thought the larger merchants ought to have an advantage in rates of freight by the steamship companies. Do you think that would be to the benefit of the Colony?—It might be in that form or in another form. I certainly think the larger merchant, if he provides the facilities for quick transport, should have some advantage, and I believe when that comes about—I think it is inevitable—the position will alter. Instead of the smaller trader being considered as against the interests of the larger trader, I think you will find the smaller trader will be co-operating with the larger trader. That time is quickly coming in Nigeria.

1457. Take Lagos, where there are so many different branches. It is somewhat different to what it was years ago, when practically all the trade was done in Lagos, but now you have these smaller merchants and medium class merchants established who probably have to buy this produce, and they do not rely so much on the produce as on the goods that they sell. Do not you think they would be at a disadvantage if a larger merchant got preference in the rate of freight, or a reduction in the freight?—I believe, under the altered conditions, a small merchant would find it was to his advantage to trade with the large merchant locally, and provide the money that way.

1458. Some of these merchants who do very little in produce, probably export large quantities of goods. They may be large traders in the way of exporting, but not so large in the way of importing?—Yes.

1459. So that would not be to the interest of the Colony. You mentioned about the pools in Lagos; is it within your knowledge that in the last twenty years there have been six different pools made?—Yes, made and broken as quickly.

1460. Do you think it is to the interest of the Colony that they should have these pools there?—I have no personal knowledge of the Lagos pools. I know that there has been much talk and little do during these twenty years, and I do not think they amounted to very much.

1461. You will find that the competition has been keener when there have been no pools. When you have a pool, naturally it tends to keep down the price of palm kernels, and the purchasing power of the native is not quite so great as when there are no pools. Therefore in that way it is against the interest of the Colony that there should be these pools?—It may be so, but I have no knowledge of Lagos pools.

1462. You seem to think it would be to the advantage of the Colony if the merchants combined with the crushers. I think you would find that it would be better to have competition.—I am as strongly opposed to big combinations as anyone, but not to combinations up to a point. All the world

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over, if you take the history of the colonies in other parts, you will find that in opening up a country like Nigeria in a short time the co-operation of the smaller men with the large merchants will come.

1463. I do not agree with that. It was different when they were settled in one district or in one part, but now that the tendency is to extend the railways and open up different branches, you will find it is not so much a question of the importation of goods as the exportation of produce.—I would like to say that I hold very strong views with regard to the small merchants, and I think that Sir Frederick Lugard will bear me out that I hold the very strongest views with regard to the transit system on all the railways as to opening up the country and facilitating the small traders.

1464. The question of the profits of merchants was mentioned by Mr. Moore and by Mr. Knowles, and I think you said it was recognised in Lagos that they were content with a profit of 2s. 6d. a ton at times when they did not combine?—I am not very familiar with it in Lagos. I was never a party to a Lagos combine and know nothing about it.

1465. In Nigeria you have not the same competition. Where the Germans have had this trade, do not you think that after the war the Germans would come in again, and there would be the same competition and keener competition, if they are allowed to trade?—It is difficult to say. At any rate, we should be ready for them now, and we must not fear competition if it is fair competition.

1466. The inspection of produce was mentioned by a witness last week. I am strong upon this question of the inspection of produce, and I think you will find that in Lagos it has worked very well. We used to hear that, previous to the inspection of the produce, palm kernels would have 10 or 11 per cent. of dirt and shell. Do not you find now that the percentage of dirt and shell is becoming very much smaller?—The percentage of shell and dirt in the Nigerian palm kernel is very small, and there is no inspection.

1467. I am speaking of the Lagos palm-kernels, which have Government inspection, and that system has worked very well in Lagos.—The reason that was brought about was because of an absolutely insane competition in Lagos originally.

1468. And not only because of competition, but do not you think when they are bringing in small quantities of stuff by canoes into different markets, it is rather difficult to say what the percentage of dirt and shell is in a small lot?—Certainly it is, but a keen trader will know it fairly well.

1469. You will find that that has been a difficulty with the buyers out there?—I think the soaking trouble has been the worst trouble.

1470. It is difficult, when the produce is brought in these canoes, probably purposely soaked, and with shell and dirt mixed with it, for the buyer on behalf of the English merchant to know exactly what the percentage of dirt and shell will be. The inspector can tell, and, just as you are not allowed to adulterate butter, the inspector is there to protect the merchant, so that he does not have this shell and dirt?—Yes.

1471. (Sir W. G. Watson.) I suppose you will agree with me that the great market in the future in connection with oil will be the margarine factories. The greater proportion of the oil will be taken by those factories?—For margarine and for vegetable lards.

1472. In other words, that is for edible purposes?—Yes.

1473. I think you said you agreed with what Mr. Knowles stated, that those who crushed palm kernels in England prior to the war had not made a profit during a few years previous to the war?—I believe that to be the case.

1474. Do not you believe that is chiefly because of the fact that they supplied their oil to the soapmakers, whereas the German factories supplied their oil chiefly, especially in later years, for refining it for edible purposes?—That is so. I think that is my point. You are taking up the trade from quite a different standpoint, in order to bring the industry into this country for an edible purpose as against soapmaking.

1475. I understand you are connected with crushing mills?—Yes.

1476. And you represent the Niger Company?—Yes.

1477. And you are interested in the firm of de Bruyn?—Yes.

1478. Have German oil millers great advantages over British oil millers from the fact that they can cheaply transport their oil to the German margarine makers and the Dutch margarine makers (especially the Dutch) who supply the British market with margarine, and from the fact that they do not have to put their oil into barrels, or into drums, and pay the cost of the return of those barrels or drums?—Yes, they have that advantage. I cannot have an all-round knowledge, but it does seem to me that if this trade is thoroughly taken up in this country now, when the war is over our friends in Holland, with their German interests, will have all their work cut out to supply Germany, and we can largely hold the trade here.

1479. Do you know that those friends in Holland cannot send the margarine to Germany because of the tariff against them?—I did not know that, but their German interests are large too.

1480. Do you know the reason why those firms in Holland put factories in Germany and in Belgium? Originally they did all their trade from the Dutch factories where the industry was established, as I daresay you know.—Yes.

1481. Do you know the reason they established factories in Germany and in Belgium?—I have only a theory, and I may be quite wrong about it.

1482. I will elaborate my question a little by asking why did not they establish factories in England as they established them in Belgium and in Germany?—Have not they a better outlet for their cake and for the milk there? Has not the milk question something to do with the matter in Germany?

1483. Milk is cheaper in Holland than in Germany, if anything, and therefore they would hardly put a factory in Germany to buy the German milk which is dearer.—By having a factory there they get a high price for their stuff in Germany, which enables them to hold the trade here, I should think.

1484. You do not think the question of tariff has anything to do with it?—I think the tariff has a lot to do with it.

1485. That is the point I wanted to bring out.—The profits they make out of the German trade enable our Dutch friends to put down their material in this country very cheaply. That is the view I hold, but I may be wrong.

1486. Do you agree with me in thinking that the Dutch margarine makers, for their shipping to England, require from 50,000 to 60,000 tons of either copra or palm-kernel oil?—I reckon that to-day it requires about 35,000 tons of palm-kernel oil.

1487. I put copra and palm-kernel oils because they are interchangeable, and I make it to be very much more, speaking as a margarine maker.—I make it 35,000 tons of oil, which is 70,000 tons of palm kernels.

1488. You said you thought our oil mills had done very little, when war broke out, to meet the position. I quite agree with you that the oil mills charge very much too much for their oil. Prior to the outbreak of the war we got, I take it, about 30,000 tons of oil from Germany to our own British factory, and naturally, when war broke out, we were very concerned, so I put out an advertisement appealing to the soapmakers to let me have some of their oil. I went and interviewed one or two of them, and we arranged a meeting, when one of them told me: "I cannot supply you with copra oil because we cannot make soap without copra oil." I met another one, and I told him that I could pay him a certain price, about 10l. a ton more, and he at once let me have it. I actually paid 60l. a ton for crude oil, and then they all came forward very quickly. Now my argument is: Do not you think that on the question of selling cakes in this country, if the people complain there is no market, they should reduce the price so that the cake is very cheap to the farmers, and then the farmers would soon buy it and the market would spring up?—The case was that cakes were unsaleable at 5l. a

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ton, but I think you could sell all you could get of palm-kernel cake at 7*l.* to-day.

1489. (*Mr. C. C. Knowles.*) The price is 6*l.* 15*s.*?—Yes, and it is going up.

(*Mr. C. C. Knowles.*) There is no other cake.

1490. (*Mr. G. A. Moore.*) There is no cotton seed cake.—Still palm-kernel cake is finding its way into the market.

1491. (*Sir W. G. Watson.*) If the oil crushers extend their works in England so that they make more oil than the British consumption—and the British consumption is smaller by about 50,000 or 60,000 tons, as I say, than it should be—then they will have to sell their surplus oil, I suppose, to the Dutch margarine makers in competition with the German oil millers. Do you agree that the German oil miller can get his oil transferred from his factory, which is often only on the other side of the river, to the margarine factory in Holland at a cost, on an average, of 5*s.* a ton, when he does it in bulk in tank wagons or tank barges, whereas it would cost the British oil miller who may extend his factory in England, 30*s.* a ton to transfer the oil from the mill in England to margarine works in Holland? Do you agree that on the average it will cost the British oil miller 30*s.* a ton?—I think 30*s.* is an extreme figure; I should think 1*l.* a ton would be nearer. The German has an advantage, but against that you are leaving out altogether the question of the expanding trade. I may be quite wrong, and may be a fanatic on it almost, but I believe the Eastern market is going to open up very rapidly for edible fats. If it does, we will all have our work cut out for the next few years without considering the German competition, although I admit what you say is correct; if you were forced to send your oil to Holland, you would be at a disadvantage not of 25*s.*, but perhaps 15*s.* or 12*s.* 6*d.*

1492. That difference on 60,000 tons is a disadvantage to the British oil miller to the extent of 40,000*l.* or 50,000*l.*, roughly?—Yes.

1493. You say you think it is 20*s.* a ton. Have you had experience of buying the oil in barrels? If you put the oil in barrels, at a certain price on the Continent, and then have to sell them in this country at a very much lower price, do you know what is the loss per ton on the oil carried, owing to the difference in the buying and selling price of barrels?—I am sorry I have not followed that detail very closely lately. ☺

1494. I think you will find it is nearer 30*s.* than 20*s.*, and if you put the oil in iron drums, which is the modern way, you have the freight on returning the drums, and in many cases the shipowners refuse to take the drums back, because they say they can get better cargo.—Yes.

1495. You recommended that the oil millers in this country should extend their works now. Have you had experience of obtaining machinery in this country at the present time?—Yes, I know the difficulties too well.

1496. You said that in your opinion the mills in this country, with one exception, were not up-to-date. I take it that refers to mills for crushing palm kernels?—I was speaking of palm kernels, yes.

1497. Is that owing to the fact that the mills in this country crush the palm kernels rather than obtain the oil by extraction? Do you think the up-to-date plan is extraction?—The up-to-date plan is extraction, certainly.

1498. Going back to the question of the reason why the Dutch margarine manufacturers put works in Belgium and Germany, and not in England, I think you are connected with the firm of de Bruyn?—Yes.

1499. Just for the information of the Committee, will you say where they established their first works? Was it in Belgium?—Yes, in Belgium.

1500. Did they eventually establish works in Austria and also in Germany?—Yes.

1501. What was the reason they established those works in those two countries, and up to the present have not established works in this country?—The establishment of their works in Germany and Austria was before I had any connection with them, so I cannot

say the reason. With regard to this country, I may say—and I am rather proud of it—that in a very small way, notwithstanding their adversities, they have started works here.

1502. Is that since the war?—Yes, since the war, but it is in a very small way; you will perhaps smile at the size of them.

1503. For the information of the Committee, I should like to say that my firm established works here which they started before the war. They have their own margarine works in this country and thereby save the heavy cost of transporting oil across the sea. In other words, it is the opposite thing to what I was putting: we considered whether it would pay us better to put our margarine works in Holland and transport the margarine instead of the oil, and for patriotic reasons and not commercial reasons, I decided to establish the oil mill in England. Do you agree with me that the value of the cake is only 15 per cent. as compared with roughly 85 per cent. as the value of the oil in connection with these oil seeds? It varies in the case of kernels, but I have copra in my mind. Kernels may give rather different percentages?—Yes, that is about right.

1504. In other words, it is very much more important that the British oil miller should have a good market for his oil than a good market for his cake?—Unquestionably.

1505. I take it you will agree with me it would cost very much less to transport the cake to Germany, if that is the only market for it, than to transport the oil to Germany or to Holland?—You know the rate. Take London cake: you can transport it to Belgium, which is only a small country, but still I hope we shall have their cake business after the war. Germany used to send a great deal of cake into Belgium, but now you can send the cake from London to Belgium for 7*s.* 6*d.* a ton as cheaply as you can get it from Germany to England.

1506. It is very much cheaper to transport cake, so where the market for it is, does not matter, but it is very expensive to transport oil, which is much larger in quantity?—Yes.

(After a short adjournment.)

1507. (*Sir W. G. Watson.*) There is one more question I should like to put, in order to be quite clear about it. I understand you said you thought these Dutch firms established mills in Germany in order to enable them to sell the margarine in England at a lower price. Are you aware that the margarine that is sent to England is sent from Holland, and not from Germany? and therefore I do not see any reason why a Dutch firm should establish a factory in Germany to supply England with margarine at a lower price than the market would otherwise allow.—I had a feeling that they had an opportunity of competing very strongly for the trade here, in view of the strong position they held in the trade in Germany.

1508. In other words, they use the profits made in Germany to sell it cheaply in England?—In order to keep their hold on this trade. That is what I mean.

1509. (*Mr. L. Couper.*) We have not heard much from you on the subject of the ground-nut, but it is well known to most of us that before the war it was a very promising little industry in Northern Nigeria. Can you give the Committee any reason for the falling off in the exports from Nigeria of ground-nuts since the war?—The ground-nut trade was in its infancy just prior to the opening of Kano. The Niger Company, and other merchants, and, I think, the Government, sent up a large quantity of seed and distributed it among the natives, and I think the crop was about 5,000 tons. In the second year we were all surprised when Kano was opened, to find the station literally buried in ground-nuts; they poured them in, and we could not buy them and pay for them in the time.

1510. (*Mr. C. C. Knowles.*) Was that in 1913?—Yes. Unfortunately the merchants competed very strongly, and paid for the ground-nuts 10*l.* on the spot per ton. Government officials, the agricultural department there, and the merchants all agreed that

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the natives could make a large profit at 4*l.* 10*s.* per ton. I had the advice of many Government officials on the subject and therefore we persuaded all the merchants that it would be suicidal to pay more than 4*l.* 10*s.* per ton in 1914. At the outbreak of the war it was doubtful whether we should be able to bring home the ground-nuts at all, even on that basis, but, although there was supposed to be a good crop, the natives would not bring in the ground-nuts because they said they were going to hold them for a better price. They stored them, and fortunately they did. Owing to the ground-nut planting, they did not provide their yams and their guinea corn, and were faced almost with starvation and so far as they could they ate the ground-nuts and held some over till the next season. That accounted for the falling off last year. With regard to the current year, foodstuff in Nigeria is generally scarce, and the guinea corn grown in Northern Nigeria pays better to send down to Southern Nigeria and Lagos, and therefore they may leave ground-nuts to some extent alone this season. I think it is generally understood, from all those interested in Nigeria, that the possibilities of the rapid development of the ground-nut trade are great, and merchants are agreed that they ought now to start on thoroughly commercial lines. You have to bear in mind that at 4*l.* 10*s.* per ton there is—I will not call it a heavy railway freight, but from Kano to Iddo there is a ground-nut freight to-day which would be heavy in normal times and you cannot put ground-nuts down in Liverpool under about 11*l.* 10*s.* to 12*l.* per ton.

1511. (*Sir George Fiddes.*) Is that when you buy them at 4*l.* 10*s.* a ton?—Yes, and 12*l.* 10*s.* is the limit on the English market at present.

1512. (*Mr. L. Couper.*) How would you compare the Nigeria ground nut in quality with the Gambia ground nut?—They are very similar in quality. In the northern part of Nigeria they are better than the Gambia nut. We have not the same experience in the trade because they all come home decorticated, whereas many of the Gambia nuts come home undecorticated.

1513. You are probably aware that the history of the Gambia in the last twelve months has shown that its dependence on France was unnecessary, perhaps owing to the price at which the ground nuts sell, but formerly it was supposed that France was the only country to which the ground nut from the Gambia could be sent. The fact remains that since the war the largest ground nut crop in the history of the Gambia has been collected, and most of it, I believe, is coming to England. I was wondering if you could compare conditions in regard to Nigeria and the Gambia, to see whether you could look for a market in England in future?—I am afraid for ground nuts it is much more difficult to expect a market in this country than for palm kernels or the shea nut. The ground nut industry for France has been a very important one. France, Italy, and the southern parts of Europe use enormous quantities of olive oil, and other oils, which we do not use. In France, as you probably know, when you go to an ordinary restaurant you see a bottle of olive oil, and round the label the words "made from the best African ground nuts." The consumptive demand for it is enormous. With regard to the enterprise of Bibbys of Liverpool—a very estimable house—they had this year the opportunity of getting hold of these ground nuts very cheaply, I believe, and in the best interests they speculated in them and took them, and I should think they must have done exceedingly well. I have not seen Mr. Bibby, but I should say they have a good deal of difficulty in placing all they bought, and probably have many left. I think the lesson we can learn is that we can do a great deal in the ground nut trade, but we cannot expect to take the bulk of the Nigeria ground nut trade to this country, but we ought to hold a part, and a good part of it, in this country.

1514. You have referred to the question of railway freight. The Gambia ground nut has not to face such a charge. Have you ever considered whether the system of charges upon the Nigerian railways could be modified so as largely to assist in the enlargement of the amount of produce sent down? I mean would it

be possible or practicable for the railway to look for its main freight and revenue to goods giving very cheap rates on produce down to the coast? If that were possible, would not that be of great assistance in the matter of the price of that produce delivered in this country?—You mean making the goods pay part of the freight on the ground nuts?

1515. You put it that way.—There is a great deal to say in favour of that. You would meet competition from other parts of the world, and again you would have the advantage, which the merchant must also feel, that the goods would pay more than the produce. I think if you take merchants as a whole, a merchant who goes to the tropics simply to sell his goods for cash and get his remittance home and make a profit, is not a man who is putting down establishment charges for the development of the country in the same way as the produce merchant. Therefore I think it might be quite a good plan to reduce the freights on the produce and increase them on the goods.

1516. Do you know if that is the system in the Congo?—I do not know; I cannot say.

1517. I have heard it is so, but whether that is necessarily a good example is another matter.—It might not apply generally and broadly; but take an article like the ground nut, which would be a very important industry. We know it is a nut coming from all parts of the world, and you have to cut prices very finely in order to compete. It is simply a question of policy. It is almost as much a Government question as a trader's question—to what extent must we assist the development of what can be, and certainly will be, a very big industry in Northern Nigeria?

1518. In the case of the Gambia nut there is an export duty, upon which I think the Gambia Colony largely depends for its revenue. Would such a duty as that appeal to you in the case of Nigeria, either for revenue or other purposes?—An export duty on nuts, no. If the nut has to compete with a low-priced article from all parts of the world, you would not want an export duty upon it because you want to keep the charges down.

1519. If, as has been suggested, such a duty should be returned in the case of goods dealt with in this country, would that appeal to you as a measure which is desirable?—No. My view is that we have altogether altered conditions. Now we must do what we can by thoroughness and efficiency to hold the trade here. If such a course were necessary, that could be taken after the war; it would depend entirely on the conditions then, I think.

1520. Then I understand you do not suggest that any tariff arrangements are called for in regard to West African edible nuts at the present time?—No, not at the present moment.

1521. But you would like to see them held in reserve?—Yes, held in reserve. I should await events.

1522. Would you now invest your own money in a mill for the crushing or extraction process in regard to edible nuts from West Africa?—I certainly would, so long as I was connected with the West African trade, because I believe that the one would be, as I have already said, helping the other.

1523. What would be your greatest fear if you were placing money in such a mill?—The very views which have been expressed this morning—that the competition might be exceedingly keen.

1524. Foreign competition?—Yes, and the development which I believe is taking place may not be to the extent I anticipate, and therefore the mill might not pay. But against that there is, of course, the development of the special trades which are now being created, as apart from margarine. I do not think any keen body of business men who were interested in the oil-seed trade would lose money if they had an up-to-date mill for crushing, extracting, and refining as part of their business.

1525. Do you think that the West African merchants as a body might reasonably combine to establish mills?—I think they ought to do so.

1526. And you personally would not have any fears as to the result, or at least you would consider it a good

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commercial venture?—Yes, associated with the African trade.

1527. You mean a self-contained concern which could control its supplies?—No; I mean as long as the mill is associated with the African trade it has a much better opportunity of being able to make ends meet than if it was working absolutely independently—that is putting the very worst construction upon the future of the trade.

1528. Now one question as to the past. You will recollect how very keen the late Sir Alfred Jones—perhaps the most enterprising and energetic figure in commercial West Africa—was in regard to the erection of mills, and as we know, he established a small mill in Liverpool many years ago. I understand that until quite recently that mill has not paid anything, or practically nothing; it may have paid in some years, but on the whole it has given no return. To what cause would you assign that non-success, if you can put it in a few words?—It is very difficult to say. I had the privilege of many a talk with Sir Alfred Jones on the subject in years gone by, and I remember him telling me that it was the cake trouble—that he could not sell the cake. I think when the mill was first put up there was some profit, but I think the proper and only answer to give to your question is that the conditions have so changed during the last five or six years that we are not going to benefit in any way by looking to the failures or successes of earlier days.

1529. (Sir Hugh Clifford.) I understand you to express the opinion that if really up-to-date plant were established in this country there would be no special reason to fear the competition from the Continent?—Do you mean the competition from the Continent for the trade of this country?

1530. For the crushing business?—Broadly speaking I say not. As I have said the conditions are so altered and the outlets for edible fats of all kinds are increasing to such an extent that I think one can boldly say that if we make the venture we ought not to fear the competition.

1531. You also told us that there was a difference of 3s. 9d. per ton between palm kernels landed in Liverpool and palm kernels landed in Hamburg?—Yes, for master-porterage, town, and dock dues have to be paid in Liverpool which have not to be paid in Hamburg.

1532. And there are certain free transport arrangements in Germany which are not at the disposal of imports into Liverpool?—That is so, and unquestionably it gave a very great impetus to the shipments to Hamburg.

1533. But those two things in combination form so serious a handicap that the most up-to-date and efficient machinery would be puzzled to hold its own unless in some way or other the conditions could be made more equal?—I think that, as the British now hold the palm kernel trade, as far as the facilities for deliveries at ports at the same rate are concerned, I believe the steamship companies will meet the situation.

1534. You think the situation could be met by the shipping companies without any artificial equalisation by tariff or other means?—Yes, I think it can be met, and I believe they will meet it.

1535. Do you think that will also cover the question of the advantage derived from internal transport in Germany being granted free. In Germany the transit to certain centres is free of all cost?—Free of all cost.

1536. That in itself constitutes a very considerable advantage to the importers in Germany as compared with the importers in this country?—Yes, but if the importer in this country has the same facilities that were given to Germany, and if one or two other outside centres in neutral or allied countries are assisted in the same way by the shipping companies, we can hold the palm kernel trade as against that advantage in the past.

1537. You say if the same facilities are granted to importers in this country as are enjoyed by importers in Germany?—Yes.

1538. But is there any reasonable prospect of similar facilities being granted to importers in this country?—I think so. I remember in conversations I had with Sir Owen Philipps he was very strong on the

point that Hull should be put on the same system of freight charges as Liverpool, with which I heartily concurred. In fact on my visit to Hull they made it a very strong point; they said, "You ask us to take up the palm kernel industry. How will you support us to make it pay? Are the steamship companies going to send in a boat now and then?" I said, "You can rely on the steamship companies in this regard." Since then the freights to Liverpool and to Hull have been made the same, so they are on the same basis.

1539. But prior to the outbreak of war freights to Hamburg and to Liverpool were approximately the same?—Yes.

1540. Is there any reason to suppose there will be any difference between them where traffic is reopened after the end of the war?—If the advantage that accrued to Germany on account of the extra tonnage, the trade all going there, applies still after the war, and if Germany in the first instance only takes sufficient for her own needs, the advantage of freights even from the steamship companies' point of view rests with this country.

1541. You think the increase of imports into England will induce the shipping companies to give preferential rates to England?—It certainly will enable the shipping companies to give equal freights to any port in this country, or it should do so.

1542. The point I am trying to get at is this: You apparently have 3s. 9d. disadvantage against you at the present time. Do you tell the Committee that you are satisfied that that is something which the shipping companies will be able to get over?—Not the 3s. 9d. As a matter of fact I think I am right in saying that Hull is a free port but Liverpool is not at the present time. Those things can be adjusted. I prepared a memorandum some months ago, and I think I pointed out that in Hull there is no 3s. 9d. paid, while in Liverpool it is paid.

1543. (Sir Owen Philipps.) If the shipping companies endeavour after the war to adjust that difference between Hamburg and Liverpool by reducing the freight to Liverpool to 3s. 9d. less than to Hamburg, in your opinion would not the German companies at once insist on reducing the Hamburg rates to the same level?—Yes, I am afraid they would.

1544. Therefore on further consideration would you like to amend your answer? It would not be the case that the shipping companies could adjust that difference in freight?—No.

1545. In other words if they did, the German companies would at once meet it by insisting on the same rate?—Quite so. In my view the shipping companies can adjust the rates so as to have an equal rate to all ports, but the other thing they cannot do.

1546. (Sir Hugh Clifford.) So you find the 3s. 9d. against you all the time?—At Hull you have not that difference, but at Liverpool you have.

1547. I take it that, having regard to your further answer, you do not see any way of getting rid of that handicap as regards the imports into Liverpool?—No, I do not at the moment.

1548. You suggested that the best way of cheapening the production on the coast would be for all the merchants to combine. I understood you also to say that you personally strongly disapproved of anything like a monopoly.—In what way do you mean "combine"?

1549. I understood you to say you were going to pool your produce when purchased. If you pool your produce when purchased you have to make some arrangement as to what prices, having regard to locality, are paid by the people who buy that produce from the natives; you cannot afford to pool produce which has been bought at 15s. by one man in competition with another who only offered 14s. 6d.—No, that is true, but if you have a central depot at each of those places where the produce is bought right out, either by a separate company or by an organisation in connection with you, that is what I believe is done in other parts of the world in the seed trade.

1550. I do not quite follow the proposal. Do you propose that one company of the existing merchants

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would be the single purchaser, or that all the merchants now purchasing on the coast should come to an agreement as to the price to be paid in every locality, the produce so secured being subsequently pooled and divided?—No; it is not necessary that it should be pooled in that way. They could sell their produce outright to the company which dealt with the produce locally. There would be no question of what price they paid for it up-river. In a small way it can be done. I have already arranged with one house; as the stuff comes down the river they know their weight and we know our weight, and we put them in together and the cargo is sold, and it does not matter whose palm kernels are delivered as the price is agreed.

1551. Have you not an arrangement as to the price paid by both of you in Nigeria?—No, we have nothing to do with the price they pay for it.

1552. Supposing the other merchant was buying his palm kernels at an extravagant figure, where do you come in when you pool the results without fixing the prices?—If we have 500 tons and he has 500 tons, and we put them into the boat together and sell them for 40*l.*, I should get 20*l.* for my 500 tons, and he would get 20*l.* for his 500 tons.

1553. Quite irrespective of the price paid?—Quite so.

1554. What is your system in Nigeria? Do you advance money to natives to buy for you as is done in the cocoa districts in the Gold Coast, or do the natives bring the produce into your out-stations?—At present they bring the produce into the stations.

1555. You have at present no itinerant agents buying the produce for you?—No; we had, but it has been stopped. Mr. Moore raised a question as to the expenses of stations. If you open a station on the Port Harcourt Railway where there are 10 merchants, and they are each opening a store where the possible supply of palm kernels is 2,000 tons, it means to say that you are going to divide up amongst the merchants 200 tons each of palm kernels, which means a very heavy standing expense. If the war has done anything for West Africa it has made the merchants realise in a measure that the day for that sort of thing is passing, and that it is useless to multiply stations at a place where the trade cannot be large enough to thoroughly support those stations.

1556. That would all work round really into some sort of combine, would it not; that is to say, instead of 10 competing merchants at a given place you would have one man acting for the firms which formerly employed 10 men?—Not necessarily so in view of the development now taking place in Nigeria, especially in Northern Nigeria. I believe after this war many men will not go back to city life, and there will be a great many men going out there and a big development in Northern Nigeria. In my opinion the small trader will be controlled by the larger trader; you may use the word "combination" if you like.

1557. Your idea would be that the smaller merchant should not have direct dealings with Liverpool at all?—That is what it will come to, I think.

1558. He should deal with the larger companies on the coast?—That is the trend of things which I believe will come about.

1559. (Sir George Fiddes.) You mentioned the difference of 3*s.* 9*d.* between Hamburg and Liverpool. We had evidence given to us, I think by Mr. Batty, at our last meeting, showing the difference worked out in detail, and it amounted to 2*s.* 7*d.* Where does your 3*s.* 9*d.* come from?—I have not the figures with me.

1560. I will quote his, and you may be able to say if they are right or wrong. At Hamburg there is a weighing charge of 7½*d.*, and the bill of lading stamp works out at an average of ½*d.* a ton—a total of 8*d.* a ton. In Liverpool: master-porterage charge, 1*s.* 3*d.*, dues on entry, 2*s.*—total, 3*s.* 3*d.* The difference between those two is 2*s.* 7*d.*—He does not give you the charges for supervision. You have your supervision in Liverpool in the same way as in Hamburg.

1561. Supervision of what kind?—For weighing, sampling, and delivery.

(Mr. G. A. Moore.) The item for master-porterage is wrong. On bags of kernels, according to the Mersey

Dock Board list it is 1*s.* 3½*d.* plus 20 per cent. at present.

(Sir George Fiddes.) Those I am quoting are pre-war charges.

(Mr. G. A. Moore.) It has just been arranged at 1*s.* 3½*d.*

(Mr. C. C. Knowles.) 2*s.* 6*d.* has generally been the extra price which the importers have wanted from the crushers for kernels in Liverpool over the price in Hamburg.

1562. (Sir George Fiddes.) That bears out Mr. Batty's view as to 2*s.* 7*d.* Mr. Batty told us that from the nature of the Hamburg charges it was fairly evident sales were made c.i.f., other charges, if any, being for buyers' account. Liverpool has the advantage of selling ex-quay, and no dues, &c., were incurred in Hamburg. If sales were made in Liverpool on the same basis as in Hamburg the difference between the two ports would be 7*d.* only instead of 2*s.* 7*d.* His figure is rather different from yours.—It is different, but I do not think there is much between us.

1563. His is based on some considerable experience?—Yes, and I would not like to question Mr. Batty's statement.

1564. But you adhere to your 3*s.* 9*d.*?—Yes, it is given to me by our people.

1565. You are not prepared to say where the difference comes in?—No, but you must not eliminate in Liverpool the charge for supervision the same as in Hamburg.

1566. (Mr. C. C. Knowles.) You have to employ an agent to look after your cargoes?—Whether at Liverpool or at Hamburg.

1567. Liverpool men have to look after it themselves?—But they have to pay for it.

1568. (Sir George Fiddes.) But indirectly the Hamburg man has to pay that at Hamburg?—The shipping facilities are so different in Liverpool; a lot of goods are turned out on the quay, but in Hamburg they are put straight into the lighter and taken direct to the harbour mills.

1569. There has been very little said about shea nuts so far. That is a matter you probably know more about than anybody else. Have you anything to tell us as to the points of difference between the shea nut and the palm kernel or ground nut, either in the mode in which you deal with them, or as to any special purposes to which the product applies or for which it is used? Does it stand by itself in any particular ways?—I can give the history of the shea nut very shortly. When the shea nut was introduced into this country there was not a crusher who would touch it. The Niger Company tried to do all they could to develop the trade. I was sent to the Continent and I found a crusher in France who crushed some hundreds of tons and failed; then I had to journey pretty well all over Europe with those nuts and found no one to touch them until I met the Minister of Agriculture in Belgium, Mr. de Bruyn, who was very interested in the matter, and said he would introduce me to the late King of the Belgians, who he thought would take it up. As a result of that meeting the industry was taken up in Belgium. I can only say that the nuts are difficult to work, and, at the present time, except for specialities, they do not yield the same return as palm kernels and ground nuts. Mr. Knowles can bear me out on that. Therefore it is not a question of asking the crusher in this country to put his soul into the work at the moment, because in the interests of West Africa and of the Empire he can be doing better work with other things; but the extraordinary fact remains that during the whole of these years no one has attempted to work shea nuts except in a very small way until Germany took them up some three years ago, and Germany would have gone ahead with them if they had had the opportunity. There is no one in this country who can work them very largely, but I have had the assistance of two crushers who have promised to help in a small way, if they can do so, to keep the industry alive. Shea nuts are used for a different purpose to palm kernels, although some of you may be surprised to know that they have been used in Germany very considerably in margarine, and

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are used in margarine to-day in a small way. They are principally used for vegetable lards and bakery fats, but there is a very big future for the industry and large sums of money have been spent on it by one or two friends. Sir Frederick Lugard will hear me out when I say that it creates the greatest difficulty if you start an industry and afterwards close it down. I should be very sorry to have to cable out that the industry must be stopped; we are buying these nuts now at 2*l.* 10*s.* in Northern Nigeria, and I know that no other merchant will touch them if we leave them.

1570. The effect of your evidence is that the shea-nut industry must be regarded as a special industry?—Yes, at present.

1571. I suppose we shall never have a witness before us with a better all-round knowledge of the industry as a whole than yourself, and I want your view on this point. The problem before us is how we are going to divert the German industry to this country after the war. Do you know approximately what the German capital invested in this business is, in total?—I cannot say, but I do know that the capital invested in the industry is large—not the merchants' capital, because their mills work on a very different basis; the mills are built and financed practically entirely by banks or with banker's money, and they have no capital of their own.

1572. Still it has cost a certain amount to put up and equip these mills dealing with this product in Germany?—Yes.

1573. But you have no idea of the total capital?—I am sorry I have not.

1574. Nevertheless you would agree that it is a total of considerable magnitude?—It is.

1575. And the people who are behind it are people who will fight hard to prevent it being scrapped?—They will.

1576. I suppose you will also agree that the crux of the whole question is, that if we are to succeed in transferring this industry to Great Britain there must be a great increase in the number of crushing mills or at any rate in the output of the mills in this country?—Yes.

1577. You told Mr. Couper that if a capitalist friend came to you and asked your advice as to sinking money in new mills you would tell him you thought it a sound speculation?—I said if he was associated with the seed industry—I made a strong point of that, knowing as we do the history of the seed industry for the last few years.

1578. Would not it very much come to this that you could not recommend anybody to embark capital in this trade under present conditions unless he was assured of a sufficient supply of material in the future to keep his mill going at full speed at prices which would pay him to crush the nuts?—I do know at the present moment an expert in this country in milling and crushing who is prepared to put up a large sum of money for a new mill here. He is an expert, and therefore he would know. I would not advise any capitalist, with the knowledge I have of milling in the past, to put up money unless he was associated with experts or with the trade.

1579. But it seems to me to be common sense that no man is going to risk the heavy amount of money required in putting up an up-to-date plant unless he is certain in his own mind that he is going to get the raw material in sufficient quantity after he has equipped his mill?—Quite so.

1580. Then the question arises, what sort of competition is he going to have to face for this raw material after he has put up his mill? You will agree that, supposing we start from now, it is very unlikely that we should have caught our capitalist, converted him to the profits he is going to make, and got the machinery from the manufacturers before the end of the war?—That is so.

1581. Therefore it will not be an established going concern in all human probability by the time the war closes?—No; but I think I am right in saying that there are one or two large plants almost on the eve of completion here now which will make a considerable difference to the West African trade.

1582. At the close of the war it is at any rate possible and even probable that we shall be faced with this position: If British merchants have put up fresh plant, that plant will be almost or quite at the stage at which it is waiting for supplies of the raw material. Then in Hamburg and in Germany you will have a number of mills standing idle which are thirsting to resume business. Will you put yourself into the skin of the German merchant, if you can, and say what would be your course of action in those circumstances. Knowing that there was a movement in Great Britain to divert the supplies of raw material to this country, what would you do to counteract that and to get the trade back into its old groove?—If I was a German merchant I should pay up to secure it.

1583. You would offer a higher price, you mean?—Yes.

1584. In the first place you would have the initial advantage that you could always offer 2*s.* 6*d.* more than the Liverpool merchant—and after all Liverpool is the main place at present—and in addition I think you told us that a crusher cannot be expected to go into the business unless he is making 1*l.* a ton profit?—I said he would be a very happy man if he made 1*l.* a ton profit.

1585. "You" being a German merchant for the time being, would it pay you to make 5*s.*, 2*s.* 6*d.*, or even 1*s.* a ton profit, or perhaps nothing at all for a whole year if thereby you could bring the trade back into its old groove and assure yourself of a constant supply of nuts and practically upset the British opposition? Would not you be prepared to consistently offer a higher price than your British rival for the first year or two, at any rate?—Yes.

1586. Can you imagine any other course of action whereby the German merchant could secure his end?—No; but as a British merchant I should try to overcome that, I have already made a suggestion. It is rather difficult to know how far one may go.

1587. You may go as far as you like.—That very question which you have raised has been raised with me by a crusher in this country. I said to him: "You have the pull now over the poor West African merchant; you have had the profit and the merchant has had the loss. Now you are going to have the pull over the merchant again." He said, "In what way?" and I said, "When the war is over the German will come in and buy, and up will go the price, and you will get the pull again."

1588. You said this to the crusher?—Yes. I said: "Now, if you want to keep the trade in this country we have to adopt some course so to do. Is not there a fair way of doing it? You do not want the price of your seeds to go up materially. You use 50,000 tons of kernels a year. Very well, then I will sell you 50,000 tons of kernels for three years and halve the profits with you; that is going to help you in the trouble with the Germans." He is thinking about it; he says it is a reasonable proposition. That is one way of meeting the German competition. The German will come and pay a very long price. The merchant may or may not benefit; the merchant will probably have sold his kernels to the crusher in advance to a certain extent, and the crusher will get the benefit too; but if the merchant is in partnership with the crusher to the extent of 50,000 tons, he is helping to keep the trade in this country and overcoming a part of one of the difficulties you have named.

1589. Would you say that the British merchant or any merchant trading on the West Coast is so patriotic that you may feel certain that in spite of higher prices offered in Hamburg he will not sell to Hamburg but to Great Britain?—No, he would be a fool if he did. Still at the same time there is that insurance premium for a group of merchants. If you see the position ahead and sell a portion of your imports and are assured of half profits with the crushers you are quite certain of your position without speculating on the German market of the future.

1590. As far as I can see your proposal would transfer the speculation from the merchant to the crusher. He agrees to take firm a given number of

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tons of kernels over a given number of years, and he loses or gains by it, but the merchant has got his price?—No, you fix your price mutually.

1591. The speculation, such as it is, is a speculation with the crusher then?—No; it is mutual; you divide it between you. If kernels to-day are 15*l.* a ton, which is a low price, and you believe it will rise—and I know people who now say that they will store kernels for a rise at the end of the war, and that it will pay them very well to do so, though I do not say I agree with them—you go to the crusher and say: "Kernels to-day are 15*l.* a ton. Very well; we look for a rise in the market in any case, but we will sell you 50,000 tons at 15*l.* a ton as a fixed price, or on a sliding scale, and we will halve the profits with you." Then that man has secured his supply of raw material on which he makes his profit, and you have secured the sale of your goods, and you mutually agree to divide the profit. Therefore you are protecting the industry, at any rate for the early period after the war.

1592. Do you think the merchants generally would come into an arrangement of that kind? You have said that they would be fools if they did not get the highest price, no matter where they sold their kernels. Acting on that view do not you think they might reasonably say: "It is clear there is going to be, at any rate for a time after the war, an artificial increase in the price; we shall be fools not to avail ourselves of it, and we will not tie our hands"?—There is a great deal in that, but you have to bear in mind that the merchant cannot accumulate very large quantities of kernels. He has to lock his kernels up out there or at home here. If you assume that, with a view to taking advantage of the price the merchants would store 125,000 tons or 150,000 tons of kernels for six or nine months to meet the demand, I do not think they would do so.

1593. Why should the merchants store anything at all if they simply refrain from entering into forward contracts with the crushers, but sell the produce as they are selling it now, leaving themselves free when war is over, and when Hamburg is offering an artificial price, to profit by it? I may be wrong, but it seems to me that that is business.—I do not think it is entirely business. If a merchant has a sincere view that a large portion of the trade can be kept in this country, I think even in the West African trade there are plenty of merchants who do not look for the last penny of immediate profit. Your question is whether, if I had an order in my business for kernels from Hamburg I should sell them to Hamburg; but in view of the altered conditions and circumstances with which we are faced to-day, if a combination could be made such as I outlined, I believe the bulk of the African trade would be prepared to do their part to keep the trade in this country.

1594. Do you contemplate that there will be no German buyers in West Africa after the war?—I do not contemplate that there will be none, but it will be some years before they will reach the normal position again.

1595. You contemplate such a reduction that they alone, without the assistance of the British merchant, would not be able to get the supplies of the raw material?—Yes; but you have to bear in mind the altered conditions—a point which I must bring in again.

1596. You have used that phrase several times, but it conveys nothing to me unless you tell me what the alterations are.—It does not of necessity follow that Germany must have palm kernels because they have mills. For instance, if this country takes the palm kernel industry Germany may take up, say, soya beans or other articles.

1597. (*Mr. C. C. Knowles.*) Not soya beans?—Or copra—they may take copra up largely.

1598. (*Sir George Fiddes.*) Which again is either a British or a Dutch product?—Yes. I do not think you can say that because they have the mills they are bound to take up palm kernels at any cost, because when the war is over, no matter what oil seed it is from any part of the world, the price will rapidly advance to meet the German demand.

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1599. Would you say that the British and Colonial Governments between them, if they choose, have the power to control the course of the palm kernel trade of the world as a whole—I mean the supplies from the West Coast are of such importance that if the British and Colonial Governments choose to say it shall take a certain course, they could do it?—Certainly they could.

1600. Then the palm-kernel industry is an industry which you may say Great Britain could control?—Certainly she could control it.

1601. But you are of opinion that a crusher would in present circumstances refuse to embark his money in the venture unless he was satisfied that Government assistance in some shape or other would be given him for a longer or shorter period in order to make certain that sufficient supplies of raw material would reach him in face of the assumed abnormal competition of the Germans for a greater or less period after the war?—The best answer I can give to that is that one large crusher in this country is going to put up a very large and improved plant forthwith.

1602. You think he is not an exception, but what would be the general feeling of crushers?—Opinion is very divided, but he is not isolated.

1603. (*Sir Owen Philipps.*) Is it not the case that that particular gentleman, if he is prepared to risk his money, is willing to do so because he believes he will receive Government support after the war, and only because of that?—He has not told me so.

1604. From what you know of that gentleman do not you think that is so?—No, I do not. His remark to me the last time we met was that he never has feared and never will fear competition.

1605. (*Chairman.*) I want to put to you just one or two questions in order to clear up some points which Sir George Fiddes was putting to you. Do you happen to know the price before the war of margarine in Germany and in Great Britain?—No; I have a note of it, but I could not tell you off-hand.

1606. Approximately was it much higher in the one place than in the other for the same quality?—Higher in Germany.

1607. (*Sir W. G. Watson.*) My opinion is that, speaking generally, it would be rather higher in Germany because there it has to be put in small packets, and it is a proprietary article?—Yes, in Germany our people make it up in little packets.

1608. (*Chairman.*) That is the only difference—the making it up in packets?—I think it would be nearer the basis of 50 per cent. more, but I have not the figures.

1609. The 50 per cent. more could not simply be caused by the method of making it up in packets?—No.

1610. Roughly speaking, it comes to this: after the war, if mills are put up here, there will be largely increased crushing facilities in this country for crushing these palm kernels and other seeds?—Yes.

1611. Therefore, unless there is a greater consumption throughout the world it will mean, as compared with before the war, taking this country and Germany, and the Continent generally, that the crushing facilities will be much greater if we set up crushing mills?—Yes.

1612. In other words unless there is greater consumption of the product to carry it off, there will be more capital invested in crushing mills competing for the same amount of trade, except in so far as there is an expansion of the trade in the east as you anticipate?—Yes, that will be so if the trade is stationary; but taking the last few years and looking at the trade we must look for development.

1613. Therefore, supposing there is an increase in crushing facilities you expect the crushers will all get their return in the marketing of their product, because the demand will be greater throughout the world generally?—Yes, that is a reasonable expectation.

1614. Is that the security which you think the putter-up of crushing mills in this country will rely on?—Largely so, yes.

1615. Supposing the demand did not increase in the world generally, and that for some portion of the

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demand you had the owner of the mills in this country and the owner of the mills in Germany competing, would you then say that the owner of a mill in this country had a good chance when the war is over?—You mean the German miller and the English miller competing?

1616. Yes. Supposing there is not that general increase in consumption which you anticipate, you would then have increased crushing capacity competing for the same amount of demand as existed before. How do you think that the new English miller and crusher, and the German miller would then stand as compared with one another—who would get the bone, so to speak?—The chances are to-day that whilst we have not up-to-date plant or enough plant here to take the trade as a whole, and the export trade too, the whole time that the war lasts the position will be improving, and we ought to be getting a bigger hold on the export trade.

1617. You mean to countries other than Germany?—Yes; and therefore we shall not be absolutely left after the war. The German has to get his trade back. He is not going to take it back wholesale. We respect the German's business ability, but he will be very much handicapped after the war, and you do not suppose he is immediately going to open his factory and take back his trade all at once.

1618. Take the German trade now which is manufacturing partly for the German market and partly for Denmark and for Russia. Taking their existing markets do you think anything we could do during the war would get us a really sound footing in those markets other than the German home market (which we could not expect) and the German foreign market?—We ought to get hold of the German export market.

1619. Denmark?—Not Denmark.

1620. (Mr. C. C. Knowles.) There is practically no exporting of cake from Germany to Denmark?—I have been trying to get the figures.

1621. (Sir W. G. Watson.) Cakes were sent from Denmark to Germany and from Russia to Germany?—Yes.

1622. (Mr. C. C. Knowles.) There was a big export

The witness withdrew.

Captain W. H. GREY, R.E., called and examined.

1630. (Chairman.) I believe you represent both Messrs. Swanzy and Messrs. Miller on the Coast?—Yes.

1631. You have been a considerable time in Nigeria as well?—I was ten years in Nigeria.

1632. When palm kernels, or, if you have experience of them, ground nuts, are bought on the Coast, do you find they are generally bought from the middleman, or direct?—I think generally from a middleman; it depends on the district. In some districts you always purchase them from the purchaser, and in other districts practically always from the middleman.

1633. The middleman being an independent person?—Not always independent, but usually a person who has money advanced for the purpose of going into the interior to purchase the produce.

1634. Take the time just before the war: what would be the ordinary price paid to the native, if you can give an average, which I know is a very difficult thing, for palm kernels?—The ordinary price compared with what?

1635. The ordinary price paid to the native per ton for palm kernels at Lagos?—I could not give the price at Lagos: I have not been to Lagos for years. On the Gold Coast, I think the average price would be somewhere about 4*l.* per ton below the Liverpool market price. That would be on the coast line; in the interior it would be less.

1636. According to the Liverpool market price, would it tend to go up and down?—Yes, it fluctuates day by day sometimes. It is always based on the Liverpool and Hamburg market price of palm oil and palm kernels.

of undecorticated cotton cake from Germany to this country, but the palm kernel cake is all taken by Germany?—Belgium takes a fair quantity.

(Mr. C. C. Knowles.) Very little; a mere nothing.

1623. (Chairman.) Still you think, other things being equal, a crusher here would have a fair chance in competition with Germany for the existing market with the amount of start he would get during the war?—Yes, I think so.

1624. Would you advise a friend to put capital into it on that basis?—My friend must put his capital in with an expert or with the trade. It is different when putting up a new mill and creating your business, and getting the knowledge and the supply of the material. The crushers and merchants here are practically a small body of men, and can arrange it amongst themselves quite well without anyone else.

1625. Therefore, unless there is an expansion in the demand which will give every one an increased chance, the person starting the mill here either ought to have connection with the West African trade, or expert knowledge to warrant him doing it?—I should think so.

1626. So far as the West African trade is concerned the Germans will not have much connection with it immediately after the war?—No.

1627. Therefore, apart from expert knowledge, the man putting up a crushing mill in this country has to face a differential handicap by having connection with the trade as one alternative. He would have to have a bit of advantage over the German by having some connection with the West African trade?—That is so.

1628. Either that, or an advantage in the matter of expert knowledge?—Yes.

1629. In what way do you mean "expert knowledge"—knowledge of the machinery and methods and processes of crushing, or of the margarine business, and the chemistry of it?—I mean if there is an existing mill here to-day of standing, and they are going to double their plant, and want the capital, then the capitalist will say: "Yes, I will put in money." I would not advise the capitalist to put up plant simply with the view of taking trade from Germany.

1637. So far has there been anything in the way of an arrangement between the houses out there as to the price to be paid to the natives?—Yes, at various times, and in various places there have been arrangements for buying.

1638. Then to that extent perhaps the price would not fluctuate?—It still fluctuates. These price arrangements, or most of the arrangements I have had any knowledge of, have been usually on a fixed margin, and that margin remains always the same, so that if the margin is fixed at 5*l.*, the Liverpool price being 12*l.*, the native would get 7*l.*, and if the Liverpool price went to 13*l.* the native would get 8*l.*

1639. They agree to fix a margin based on the Liverpool price?—Yes, practically all the arrangements I have ever known of have been on that basis. There has been a fixed margin, and that margin works out on the basis of so much profit, and any fluctuation in price the native gets the benefit of, or the reverse.

1640. Is that the general rule do you say?—I think as a general principle, that is what has been acted upon.

1641. It has been suggested that it would be very much cheaper if the palm kernels could be shipped in bulk. Would that be feasible on the Coast?—It would be feasible, but in practice there is not very much difference. They have to be bagged when they come to Europe, for handling purposes in Europe.

1642. You find that is so in Europe?—Yes.

1643. For the purpose of shipping in bulk, could you assume that the produce would be sufficiently all of one quality?—In the case of palm kernels, yes, I think so.

1644. You would not find them differ so much in

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quality that you would have to grade them?—No, there is practically no grading of palm kernels.

1645. If carried in bulk, it has been suggested by one witness that they would be more likely to develop fatty acids on the way home, than if they were bagged?—When I was in Lagos we used to ship more often in bulk than in bags.

1646. Did it have any effect on the quality of the produce in transit?—I do not think so. We never had any complaints other than ordinary complaints of sweating; and they sweat in bags just the same. In fact, for weeks and weeks we keep them on the coast in stores in bulk.

1647. I suppose on the coast there is not so large a trade as in Nigeria?—Not in palm kernels, but of course, we deal in some thousands of tons.

1648. From your experience on the Gold Coast, do you think that after the war the business will pass more into the hands of a few of the larger firms? What do you anticipate will be the relations of the large firms with the small traders?—It is rather a difficult question; it depends on the matter of capital. If new capital does not come into West Africa, naturally the larger firms will benefit by any increase of business.

1649. How far do you think the Germans will be able to restart there after the war, if we win?—If the war stops this year, I think the Germans would re-start very much as if they had never stopped. If the war goes on for another year, I should imagine most of the Germans would not be able to start again. I can speak particularly of German companies, because I represent the only English company in Togoland. There most of the German companies are very small companies, and, indeed, a German firm with a capital of 20,000*l.* is a large firm, while an English firm with that capital in West Africa we hardly recognise.

1650. Do you find that so far as Germans buy at all, their shipments are nearly all to Hamburg or to Germany?—Practically all to Germany.

1651. You do not get much evidence of their shipping to England, at any time?—They ship to England, but very much of the bulk of their shipments are to Germany.

1652. So far as the trade is in German hands out there, it means the cargo as a whole is going to Germany?—Yes, and also to a great extent cargo from Europe means for them cargo from Germany in return.

1653. Do they employ many different methods with the natives as compared with the methods of English firms?—No, they are practically the same.

1654. As to the amount of credit given, and so on?—Yes. The system of trading out there is very much the same in the case of all companies, French, German, and English.

1655. (*Mr. L. Couper.*) Have you any knowledge of Hamburg in pre-war days?—I have not any personal knowledge.

1656. You have spoken of Togoland. I believe you were often at Lome?—I have been there often enough, and I have lived in Togoland.

1657. I was wondering how much you knew of each end of the trade?—It depends upon what the information desired is.

1658. Did you ship kernels?—It is much easier to ship kernels to Hamburg than to Liverpool.

1659. More so from Togoland than, say, from the Gold Coast?—I can speak of Nigeria eight years ago, and of the Gold Coast during the last eight years, and it has always been easier to ship any product from West Africa to Hamburg than to Liverpool.

1660. Not particularly in the case of Togoland?—In Togoland particularly, because most of the Woermann line boats stop there, and they have two German main line boats a month, whereas there is only about one English boat calling there. So to all intents and purposes the whole of the trade of Togoland was forced into the German shipping hands. In British West Africa also, so far as shipping facilities homeward are concerned, it has been always much easier to ship to Hamburg than to Liverpool. I have been forced to ship cocon to Hamburg because I could not get an English ship to bring it to Liverpool.

1661. You spoke of the little capital employed by some of the German companies. Do you imagine that they had financial assistance in Germany in the matter of credits?—From whom?

1662. From other parties.—I do not know. I have heard that they are supposed to be financed by the Dresdner Bank and the Deutsche Bank, but I have no proof of it and I do not believe it.

1663. We both know that some of these German companies—and I do not think I am giving any secret away—provide the signature of broking firms as guarantors.—Yes, they could get money from the Dresdner Bank and the Deutsche Bank fairly well, but they had to pay for it.

1664. What would be the result to the native in the Gold Coast Colony if the German was excluded from West Africa for a period of years?—I do not think it would affect the native in any way whether the German were there or not.

1665. Would not it reduce the price he gets for his produce?—Not a bit. There is enough competition amongst the English firms for that.

1666. (*Mr. Walkden.*) You have had a lot of experience in Lagos and in the interior. It has been mentioned by a previous witness that these pools or combines are an advantage. Do you think it is to the benefit of the Colony that there should be these pools or combines?—They are to its benefit to some extent, but, of course, they could easily develop not to the benefit of the Colony.

1667. During your experience of Lagos do you consider the merchants, when there was not a combine, made any profit, if at all, on palm kernels?—The principal English merchants in my time in Lagos were lucky if they paid 5 per cent.; they were limited liability companies.

1668. They relied practically on the speculation whether the market went for or against them?—Quite true.

1669. Competition is very keen, and when they have a combine or pool in business, they do not ask an illegitimate profit. I think you said it is probably 10*s.* a ton margin they work on at present?—I did not say that. Generally the pools, as they are termed, ask and allow for a reasonable profit. I have known cases where unreasonable profits have been taken.

1670. But those pools have very often been broken. If, say, a German house has a steamer of their own which they want to fill up, or if an English house has its own steamer, at such times it has probably paid some of the merchants to break that pool, and that, I presume, has been one of the reasons why these pools have been so very often broken?—I have found a pool is usually broken when there is too large a margin of profit. The inducement to break a pool, if there is a large margin of profit, is such that the weaker men break it in order to make an unfair share of the profit; they do it secretly, and after a time it is found out.

1671. It has been suggested by a previous witness that after the war the merchants might be patriotic enough to bring their palm kernels to Liverpool in preference to sending them to Hamburg, even if the German ruling price was higher.—That would not be patriotism according to my reading of patriotism. It would simply mean that one would be throwing capital away. You must buy and sell in the best markets.

1672. Do you know that in Hamburg the facilities they have for loading and taking goods from a steamer to their crushing mills are infinitely better than they are, say, in Liverpool?—I had figures placed before me this morning on the subject. The difference between Liverpool and Hamburg, in dock charges, landing charges, and so on, comes to about 2*s.* 7*d.* per ton in favour of Hamburg.

1673. (*Sir George Fiddes.*) We had those figures given us by Mr. Batty.—Yes.

1674. (*Mr. T. Walkden.*) The subject has been mentioned of credit being given, and advances made by merchants to middlemen for buying produce for cash.—Yes.

1675. I think we know that the Germans have at times given a lot of credit?—Yes.

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1676. Have they done that more than the English firms?—I do not think so. I think some of the larger English firms have been the leaders in the giving of credit.

1677. I may refer to Messrs. G. L. Gaiser, an old-established firm in Lagos. Naturally they had a certain amount of trade and were well known, so it was not altogether a matter of giving more credit, but a matter of having a certain standing?—When I went to Lagos first, Messrs. Gaiser did about 40 per cent. of the whole palm-oil and palm-kernel trade of the Colony, but they certainly do not do anything like that amount to-day.

1678. The inspection of produce is a subject which has been mentioned by one or two witnesses. Do you think it has been a good thing in Lagos to have this inspection of produce, such as palm-kernels?—It has been introduced since my time, and I only know of it by hearsay. All the merchants I have spoken to have said it has been a good thing.

1679. On an analysis, the amount of dirt and shell has come out better?—So I am told. Personally, I am against it, and think that the less grandmotherly-legislation of that kind we have the better.

1680. In Lagos, in your experience, the produce comes in not only from the railway but from the Eastern markets, and smaller markets, in very small lots in canoes, probably in bulk in canoes, and sometimes it is wet, and they wet it purposely, and it has shell and dirt mixed with it. When bringing it into your yard, would it be possible for you, by looking at those palm-kernels, to say what percentage of shell and dirt was in them?—When I was buying palm-kernels personally in Lagos, I could tell within one or two per cent. on any sample shown to me.

1681. You could tell by a bulk sample?—Yes. I could take a bulk sample from a bag and tell very closely the percentage, and any man that deals in the business should be able to do the same.

1682. But do not you think having these inspectors facilitates matters? The natives then know that the produce is to be inspected, and naturally are more careful about it, and it comes in cleaner.—I think it is a matter for the merchants themselves to arrange. We have on the Gold Coast, in the markets, palm-kernel inspectors who have no Government authority. I do not think it is a matter for the Government. If you allow inspection of palm-kernels, you must allow the Government to interfere in other matters of business.

1683. Now, with regard to elevators in Lagos. It has been asked of several witnesses whether it would be well to have elevators in Lagos, at Burutu, or other places, in the same way as they have grain elevators, so that the palm-kernels could be accumulated there and shipped in bulk in steamers or main liners. Do you think that feasible?—No, I do not think so; the quantity handled is not sufficient, and with the methods of buying, and so on, I do not think it is feasible.

1684. Because of the produce coming from many different places. Would you suggest the erecting of an elevator at the most convenient place?—I do not think there is any place in West Africa where an elevator would be most useful.

1685. On the island at Lagos would be the only place, I presume, and that is congested and there is no room, I suppose, to build one?—You mean if it is decided that an elevator should be put up?

1686. Yes?—The best way would be to have a local committee to decide upon its position.

1687. Do you think that such an elevator should be built by the merchants, or by the Government?—I think, so long as the merchants are to benefit by it, they ought to put up the money for it and build it.

1688. (Mr. G. A. Moore.) Do you think that the palm-kernel trade will go back to Germany as soon as the war is over?—Under present circumstances, yes.

1689. When you say "under present circumstances," what do you mean?—Taking the facilities we have at present for handling palm-kernels in England, and taking it that the German shipping will restart in the same way as it was before the war, I do

not see anything to stop the palm-kernel trade from going back to Germany.

1690. Does the matter of the outlet for the oil and cake enter into the problem at all?—The question of the outlet for the cake certainly does. We have little or no market for palm-kernel cake in England, and we have not the mills in England.

1691. There is a fair demand for palm-nut cake at present, but it is at a very low price as compared with other cakes. Is it not our experience, as far as we African merchants know anything about it, that palm-kernel cake in Germany has always commanded a much higher price than it would command in England?—I understand that is the case.

1692. It is higher by as much as 30s. or 2l. a ton?—Yes.

1693. When you said Messrs. Gaiser had 40 per cent. of the trade of the Colony did you mean the Colony of Lagos?—Yes, the old Colony of Lagos. They were not in what is called Southern Nigeria in those days, but simply in Lagos Colony.

1694. In Togoland a few years ago you were practically confined to the German boats for shipping goods of any kind?—Yes.

1695. Some years ago when the maize crop first started we had some difficulty in arranging with the late Sir Alfred Jones that maize should be brought to Liverpool. Do you remember that?—Yes.

1696. That was really the beginning of the English shipping service?—No, we had a service of a kind before that, but we never had had much of an English service from Togoland.

1697. Would you consider it a sound commercial proposition for any English merchant trading in West Africa to sell to an English crusher a large quantity of palm kernels at a fixed price over a series of years?—It would be a speculation. For a man who would do that it would be very much better to go on the Stock Exchange and speculate in stocks and shares; there would be no difference.

1698. So if there was very keen competition from Germany immediately after the war the man who sold palm kernels at a fixed price would probably find himself 4l. or 5l. a ton out, and he would not be able to buy them very easily?—He would have to buy them in the open market. Nobody can tell a month ahead what the price of palm kernels or palm oil will be.

1699. It is not an operation which you would care to go into yourself?—It would be the operation of a madman.

1700. There would not be much object in putting up an elevator in West Africa unless we get corresponding methods of dealing with the palm kernels at this end. The idea of having an elevator would be that we could give the steamers very rapid despatch, assuming the Lagos bar, for instance, was deepened so that the ocean boats could go in and out regularly and comfortably?—Yes.

1701. The object of an elevator would be to put two or three thousand tons of palm kernels straight away into the steamers?—Yes.

1702. But that would be very little advantage to the merchant unless there was an equivalent arrangement at this end in England or in Hamburg for getting the palm kernels out of the steamer?—That is so. That is a matter for the steamship companies I should think. They ought to be able to handle cargo in England and in Hamburg pretty quickly.

1703. The idea is put forward merely with the object of cheapening the palm kernels in this country?—Yes. The cost of handling the palm kernels in Lagos in my time—the actual shipping, taking them from store and putting them on board the branch boat, because in those days the main line boats did not come in—was 2s. a ton. With an elevator after you allow for depreciation and the cost of erection I doubt if you would get the cost of handling done for less, considering the quantities to be handled. If you had to handle hundreds of thousands of tons it might be possible to do it for less.

1704. The advantage of giving a steamer, worth say 100l. a day, very quick despatch would be some-

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thing?—It would be something to the steamer, but not to the shipper.

1705. But we would expect to get it back in freight?—Judging from my West African experience I am afraid I should not expect it.

1706. (*Sir Owen Philipps.*) You are talking about the steamer facilities in the case of Togoland?—I was referring particularly to West Africa.

1707. You mentioned Togoland. Were not most of the merchants in Togoland German merchants?—I think there were 20 of us there, one being English.

1708. Do not the German merchants prefer to do most of their trade with Germany?—Practically all of it.

1709. That being so would there be much support for an English shipping line calling there?—Very little support.

1710. Therefore it was very misleading when you threw out the suggestion that the English shipping lines were not properly treating Togoland?—I did not intend it to apply to Togoland, but I do not think the English shipping lines do treat the other parts of the coast well. In Togoland there is a reason why the English shipping lines should not.

1711. The English lines have 100 steamers more or less engaged there?—Yes.

1712. Your firm was actually agent for the German lines on the coast?—In Togoland, but not for the German lines on the coast.

1713. But you were agent on the Gold Coast?—On the Gold Coast in two ports.

1714. The two principal ports?—In three or four ports we were agents.

1715. You were agents for the German lines?—Yes. Perhaps I may be allowed to say that I do not think the suggestion in your last question is a fair one. I ought to explain what I meant by saying that it has been easier to ship to Hamburg than to Liverpool. To Hamburg there were two lines running, an English line and a German line, and the result was there was a great deal of competition to get cargo. The English line put on boats in opposition to the German line, whereas to England there was only one English line. One ought to take things as they were, that was the suggestion I meant.

1716. But we have the fact that you were personally canvassing for the German line?—Yes, but the English line also gave very good facilities for cargo going to Hamburg—much better facilities than for cargo to England. That is what I want to impress upon the Committee.

1717. Is it not the case that all the finest steamers are trading to the English ports?—That may be so, but I do not think that makes any difference to my belief, which is that it has been easier all the time I have been on the Gold Coast and in West Africa to ship by an English steamer to Hamburg than by an English steamer to Liverpool, leaving out of the question the Woermann Line altogether.

1718. What sort of cargoes?—The last eight years I am thinking particularly of cocoa, but before that it was palm kernels just the same. Of the last eight years I can speak definitely; it is all vividly in my mind, because I often had to ship to Hamburg when I wanted to ship to Liverpool, as I had not storage room on the coast to keep the stuff.

1719. But the number of steamers employed on the service to Liverpool is very much larger than the number of steamers employed on the service to Hamburg?—That may be.

1720. Is not it the case that the largest and newest steamers are all employed on the service to Liverpool?—Yes, but that does not do away with the fact that there has been more cargo space offering for Hamburg than for Liverpool, when taking into account the amount of cargo offering for each port. Do you follow what I mean?

1721. Yes, I follow your statement.—That is the point I wanted to emphasise. I attribute it to the fact that there is competition going to Hamburg and no competition going to England.

1722. (*Sir F. Lugard.*) Your knowledge is more

concerned with the Coast than with this end?—Yes, practically all with the Coast.

1723. Can you suggest to the Committee any particular point in which you think the British trade could be improved at the expense of the German trade?—I think we want a cargo line running to the east coast of England. If we were to secure the Hamburg palm-kernel crushing trade we have to find a market for the products. So far as I can see the best place to find a market from in England is Hull.

1724. I am taking the local point of view out there. Apart from the actual shipping and other facilities such as wharfage and harbour facilities, have you any points you would wish to put before us?—No; I think the harbour facilities are just the same for the Continental trade as for the English trade.

1725. But apart from that particular point of the difference between Germany and England which you have mentioned, are there any other points in general which you think would facilitate the trade with this country?—There are many points by which the trade could be increased, such as more facilities for transport, more railways, and harbour accommodation to make shipping easy. But that would mean the expenditure of millions.

1726. I did not mean it in quite so general a way, but I meant in regard to existing tariffs whether there was any particular point you had in mind?—No, I have not.

1727. As regards the German and the British methods it has been stated that the Germans did better because they offered a larger variety of fancy cheap goods and also used native agents to disseminate them in small and new markets, and they took more trouble to captivate their purchasers?—I think the best English firms out there are better off for means and methods, they certainly are for capital, than the German firms.

1728. On the question of cash versus barter; in your experience do many of the firms go in for barter trade?—I was with the first company in Lagos, the Lagos Stores, when it did away with the barter trade. They were the pioneers in doing away with it in the whole of West Africa. Since then, which is only 19 years ago, it has spread, and there is practically very little barter trade now; it is all becoming cash trade.

1729. You are speaking of what countries?—Of the Gold Coast. It is a cash trade in Lagos Colony proper. It is practically all cash too in Southern Nigeria. I am told there is still a considerable amount of barter, but I should say now that in the bulk of British West Africa and the whole of what was German West Africa it is a cash trade and not barter.

1730. I did not want to ask you so much about how much barter trade and how much cash trade there is, but as a matter of fact there is a great deal of barter trade in the Northern Provinces of Nigeria and also with gin, and so forth, in Southern Nigeria?—Yes.

1731. I rather want your opinion as to whether cash trade is not greatly preferable to barter trade and a better system, which has been adopted more by the Germans than by ourselves?—I think cash trade is the best for the people and best for the merchants. I think those firms who adopted the cash trade were the firms who went ahead.

1732. As regards the question of combinations, it has been advocated that combinations, perhaps not very large combinations in the form of a monopoly, but reasonable combination, give an extra chance to the small trader. Is that your view?—It stands to reason that if the large firms insist on making a reasonable profit the smaller firms have a better chance of making a reasonable profit than they would have if the large firms were fighting each other.

1733. What would you consider to be the fair margin of profit—what percentage of the cash price?—It is impossible to say that, but I should think in West Africa one should be able to get 15 per cent dividend on one's capital invested. If one can do that I think that is fair. The risks are great. The West

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African risks are not like risks in England or in India, and 15 per cent. on one's capital I do not think is excessive. There are very few companies indeed that have earned 15 per cent. I was with a company which for seven years only earned 6½ per cent., while other companies at the same time were not earning anything at all.

1734. The formation of combines with a margin of profit tends to cut down the price to the natives, does it not?—Yes.

1735. And that decreases the production?—I do not think so. Of course it is possible to go from one extreme to another. Asking for an unreasonable profit would undoubtedly decrease production.

1736. As regards the mode of purchase of produce, would you advocate the elimination of the native middleman?—No; I would not advocate that. I think the tendency is to do away with the middleman as much as possible; but there are times when the middleman is extremely useful, and when the business could not be done without a middleman.

1737. Our last witness spoke of the disadvantage of having a multiplication of merchants at one station; say, 10 or 12 at one particular station competing for a definite amount of produce. Have you any views about that or suggestions for getting rid of it?—I think the more competition there is the better for a country.

1738. The combine system would be against competition?—Not necessarily.

1739. I do not quite follow why not.—A number of firms may combine to do away with competition—that is their own concern; but I do not think it alters the statement that competition is good for a country.

1740. I agree as to that, but it seems to conflict with your view that combines are generally necessary?—I do not think they are necessary, but I do not think they are an evil. I think they, like everything else, could be made an evil, just the same as unlimited competition could be made an evil, because it is a bad thing for a country if there is so much competition that the merchants go broke.

1741. (Mr. C. C. Knowles.) I do not know if it is a proper question to put to you, but if you do not think it is please do not answer it. Have you heard of any rebate being given by the German shipping lines on the freight to the merchants?—I knew some years in South Nigeria Messrs. Gaiser and Messrs. Witte and Busch did receive rebates from the Woermann Line, but they received those rebates in exchange for giving up certain steamers which they owned, and I understand those rebates were discontinued some ten years ago.

1742. You made a great point of the necessity of better shipping facilities to the East Coast of England, and you mentioned the port of Hull because, I assume, you think it would be a better market for the palm kernels. Why do you come to that conclusion?—Not because it is a better market for the palm kernels.

1743. Perhaps because it is better for the oil and the cake?—There are greater facilities at Hull. I should imagine Hull would be a better market for marketing products for the Continent than Liverpool is.

1744. That would be the cake and the oil?—Yes.

1745. Does not it appeal to you that the best centre for the oil would be the nearest port to where the oil is consumed?—I was thinking more particularly of the cake.

1746. The cakes are about 6*l.* a ton, or to-day's price is 6*l.* 15*s.*, while oil is about 38*l.* a ton?—Yes; and that rather bears out the impression I have formed, because the oil can stand a larger percentage of freight. A charge of 1*l.* a ton on oil is not nearly so important as a charge of 1*l.* a ton on cake.

1747. Where do you consider the market is for the cake?—At present mainly on the Continent, in Germany. There is a certain market for it in Norway, but mainly the market is in Germany.

1748. Do you think the freight is cheaper from Hull to Germany than from Liverpool or from London?—It should be cheaper from Hull certainly.

1749. And that is why you think Hull is a better place?—It is a nearer centre to the Continent.

1750. But if we can create a demand for the cake in this country there is no reason for sending the palm kernels to Hull?—Certainly not.

1751. I think you have had a lot to do with shipping palm oil?—Yes.

1752. If palm oil could be manufactured so as to contain a considerably lower percentage of free fatty acids, and if it could come in better condition here it would command a very much higher price?—Yes.

1753. To-day the price of palm oil is about 27*l.* a ton with a free fatty acid of anything up to 22 or 23 per cent.; but if that palm oil came with only about 8 or 10 per cent. of free fatty acid, and in really good condition with the impurities taken out of it, it might easily command 35*l.* a ton: that is to say it might easily command 25 per cent. more than it does to-day. When the oil is received in very small quantities on the coast would it be difficult for the merchant to put it through a filter press and take out the impurities?—No, it would be quite a simple thing, but that would not have any effect upon the question of the free fatty acids.

1754. You do not think so?—I have had an interest in machinery in Togoland which was set up two years ago to deal with palm fruit direct from the tree and put it through the mill within two or three days, because if it was allowed to ferment, which it very quickly did, no after preparation had any effect on the fatty acids. The effect of the acid is set up in the first few days after the fruit is gathered from the trees.

1755. Supposing you shipped that oil and left the impurities in it, did not you find that the fatty acids went on increasing all the time—daily almost?—Yes, but the main production of fatty acids is in the first week after taking the fruit from the tree and putting it through the mill.

1756. What percentage of fatty acid did you find in the oil?—I have not the figures before me, and I would not like to make a definite statement, as I do not remember.

1757. You do not remember whether it was 8 per cent. or 10 per cent. or any other percentage?—No.

1758. You say you do not think it would be very difficult to take the impurities out?—I do not think it would. At the same time the impurities in the best oil are very small indeed.

1759. What are they—2 per cent.?—Yes, under 2 per cent.

1760. There is a lot of fibrous matter in it, and our experience is that if you filter it you would probably take out about 4 per cent. Although the oil might only contain 2 per cent. of impurities, still you would take out, with a filter press, about 4 per cent.?—If the buyers in Europe stated they wanted the oil turned out in that way filtered, in a very short time everyone would filter their oil.

1761. The African merchant has never, to my knowledge—you can tell us if he has—tried to improve the quality of his palm oil at all.—I know a district, more particularly the Volta district on the Gold Coast, where every drop of oil the merchant received from the middleman and the producer he had to boil himself.

1762. It was necessary to do that?—Yes, in order to get the impurities out.

1763. Because the impurities were very large?—Yes.

1764. We are advised that if those impurities were taken out on the coast, the free fatty acids would go down very considerably, and would not go on increasing, and the free fatty acids would be practically the same when the oil got here as when it started. I look upon that as a very important point, because if a higher price can be made for the oil, the natives can be paid a higher price for it, which would help the Colony very much.—Yes. I am certain the merchants would do anything necessary in that way, once it was put to them by the buyers. They look upon it solely as a matter of money, and if they could get a better price for a better article, and it was possible for them to make a better article, they would do so.

1765. There would be no doubt about that, you

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think?—If they were satisfied of the necessity for it, I think they would carry out what was necessary.

1766. (*Mr. G. A. Moore.*) Do you know what Mr. Knowles means by a filter press, and what power it takes to work it?—The only filter press I know of is a filter press they have attached to this experimental plant in Togoland. In that press we had to force the oil through gauze.

1767. Do you know what horse-power it required to work it?—No. I could not tell you what horse-power the actual filter press required.

(*Mr. C. C. Knowles.*) It is a very simple process; there is no difficulty about it.

1768. (*Sir Hugh Clifford.*) When you were in Togoland did the Government grant to the merchants there any facilities or privileges to which there is nothing found to correspond in our colonies?—Only the question of paying duties. They were allowed to pay the duties, I think, three months after the entry of the goods in the Colony, which practically meant that they could sell the goods before they paid the duty.

1769. The Government did not give any preferential tariff of any sort?—Not for one firm as against another.

1770. Nor for one nationality against another?—None whatever.

1771. Did not they have some arrangement whereby they used to carry goods free over the railway?—On one railway from Anecho, a place which used to be called Little Popo, they used to carry goods free a distance of 40 miles to the new port.

1772. That is only a question of having one instead of two ports of entry?—They made that arrangement when they closed Little Popo port. The reason they did it was because the German merchants of Little Popo had to compete with the French merchants in Grand Popo.

1773. It was not a differential rate as between nationalities?—No.

1774. You told us that the purchasing price on the coast of palm kernels is regulated by the price that prevails daily in England at Liverpool, and in Germany at Hamburg?—Practically so. Cables are sent out giving the prices.

1775. Does that mean the native has any knowledge of what prices are ruling in England?—I do not think so.

1776. It simply means that among yourselves there is a certain amount of competition, and you offer prices which you base upon those calculations?—That is all. The natives themselves have no means of knowing.

1777. Then the native can practically hawk his goods about until he can find someone to buy them?—Yes.

1778. Most of the purchases of produce made on the coast to-day are not made direct from the cultivator, are they?—Of the purchase of cocoa I should think 50 per cent. is made from the cultivator, but of palm kernels very little is purchased direct from the cultivator or producer.

1779. Palm kernels are almost all bought by your buyers?—Yes.

1780. Those buyers work for you on commission?—Some work on commission, and some work on their own account, bringing the produce to the factories, and selling it to the best buyer.

1781. But as a rule the produce is not brought into your factory by the people who have been working on it?—No.

1782. Is it brought by hired labour?—No, it is usually brought in by middlemen who pay their own labour.

1783. Then the people they use are not Gold Coast natives, as a rule?—The cocoa carriers are nearly all people from the interior, and not Gold-Coast natives.

1784. (*Mr. C. C. Knowles.*) Did Messrs. Jurgens or Messrs. Van den Berghs have a plant for extracting oil?—No. There were two plants, one belonging to the Deutsche Togoland Gesellschaft, a German colonial company under the patronage of the Imperial authorities, but with no Imperial money in it, and another company consisting of six firms, including the one in which I am interested. Those two had experimental plants in Togoland for the extraction of palm oil.

1785. Is the second firm a British company?—No, it is a German company. They were both German companies.

1786. (*Chairman.*) Was that the Agu Plantation Company?—No, that was a third company. It was an offshoot of the Deutsche Togoland Gesellschaft, but run separately from the Deutsche Togoland Gesellschaft with their own oil-press arrangements.

1787. When the palm oil, as distinct from palm-kernel oil, is made locally from fresh fruit, did you find its quality superior to the ordinary oil sold on the coast?—No. The oil produced by the natives in Togoland is very good quality, and the oil produced by our machinery was very little better than that produced by the natives. The reason for that was that we could not get the fruit fresh enough; we had to bring it down from up country, and in the delay by bringing it down, it fermented.

1788. Supposing you could get fruit quite fresh by means of a plantation system, or something of that kind, and could have enough to feed your machinery—I am not talking of keeping the machinery running the whole year—do you think you would then get a much superior product, given fresh fruit and pressing it in that way?—A mill that could get the fruit direct from the trees, and put it through the mill at the correct moment, could get an absolutely pure product.

1789. With a very low percentage of fatty acids?—Yes. That is theoretically, but whether it would turn out to be so practically I do not know.

1790. What I have been asking is the proportion of fatty acids you would get in that way; but how much greater percentage of the oil from the pericarp do you think you would get with your machinery, as compared with that produced by the natives?—Our manager tells me that he got about 12 per cent. more of oil than the natives get.

1791. From the same type of fruit?—As an experiment, we once put through some refuse from the natives. They put the fruit in a sort of pit, and there was a lot of fibre left after the natives had wrung out the oil. We put some of this refuse fibre through the mill as an experiment, and we got very little oil indeed from it.

1792. When you say 12 per cent. more, you mean you added one-eighth to the native product, not that you added 12 per cent. to the whole weight of the pericarp?—Yes.

1793. (*Sir Hugh Clifford.*) The shipping of palm kernels to Hamburg had very little to do with the existence of German firms on the coast?—I think very little to do with it.

1794. By whom were the bulk of the palm kernels shipped to Hamburg?—I think by English firms, but that is a matter of figures which I would not like to commit myself to definitely.

1795. But so far as you know, the existence of the German firms had not very much to do with it?—No.

1796. It was simply the case that Hamburg was a better market?—Exactly.

The witness withdrew.

Adjourned to Wednesday next at 11 o'clock.

FIFTH DAY.

Wednesday, 15th September 1915.

Colonial Office, Whitehall.

MEMBERS PRESENT:

Mr. A. D. STEEL MAYTLAND, M.P., in the Chair.

Sir HUGH CLIFFORD, K.C.M.G.
 Mr. L. COUPER.
 Sir G. FIDDES, K.C.M.G.
 Mr. C. C. KNOWLES.
 Sir F. LUGARD, G.C.M.G., C.B., D.S.O.
 Mr. T. H. MIDDLETON, C.B.

Mr. G. A. MOORE.
 Sir OWEN PHILLIPS, K.C.M.G.
 Mr. T. WALKDEN.
 Sir WILLIAM G. WATSON, Bart.
 Mr. T. WILES, M.P.

Mr. J. E. W. FLOOD (*Secretary*).

Mr. A. A. COWAN called and examined.

1797. (*Chairman*.) You are a member of the firm of Miller Brothers of Liverpool?—Yes.

1798. Your experience is, I suppose, chiefly of Nigeria. You have a general experience of the whole trade, but I suppose of Nigeria especially?—Of Nigeria in particular. I have been connected with West Africa for a little over 28 years, and the greater part of that time has been spent in actual residence in Nigeria. During the past 15 years I have also acted as manager, or one of the managers, of the company in this country, making periodical visits to Nigeria.

1799. I want to ask you questions particularly about Nigeria and that end of the question. I am going principally to ask you about some of the other aspects with which you are also familiar, including questions on most of the notes which you submitted. First of all as regards the export trade from Northern Nigeria, and its connection with the import trade into Nigeria, I suppose that you would agree that in so far as German firms exported from Nigeria, the tendency was for the imports back into Nigeria to come also from Germany—*pro tanto*. The tendency was for the import trade into Nigeria to follow the export trade?—Up to a point, yes. Naturally, the British houses, although they might be under the necessity of bringing the bigger part of their imports to Hamburg to be taken into Germany, preferred, where possible, that their outward cargoes should go from this country. At the same time there was a service from there, and the German markets were always available.

1800. Supposing that the crushing trade could be permanently located in England, would there also be a tendency, do you think, for a larger proportion of British exports as a consequence?—Undoubtedly.

1801. Without question?—Yes.

1802. I am merely driving at this: I believe that actually, as apart from smaller questions, the interests of the exporters to Nigeria really hang together with the interests of the crushers and importers from Nigeria to this country?—Yes.

1803. I want to ask you one or two very simple questions as to the advantages that the Germans may have had over the English in various branches of the trade. In regard to the actual method of trading with the natives, were there any methods employed by the Germans that you know of which gave them an advantage over us out there; for example, prompter cash payments, or being more obliging, or anything of the kind?—I know of no other inducements. In some instances they were a little lavish perhaps in the giving of credit.

1804. That is to people who bought goods from them?—No.

1805. Or advances on kernels?—Advances to natives might possibly be made at times. There are instances where they have perhaps done more in that way.

1806. Are you referring to Gaiser's particularly or generally?—I could refer to Gaiser's. One of the directors of Messrs. Gaiser visited Africa eighteen

months ago, I happened to be present at the time, and he actually called the chiefs of a certain place together, and said it was the wish of their firm to strengthen the connection with this particular district, and gave the natives the impression that it would be conferring a favour on Messrs. Gaiser if they took credit from them. Not very many British houses, knowing Africa as they do, would care to take such risks, or work on those lines. I mention that because I know of it as I was on the spot in the district.

1807. Speaking generally should you say that in any way their methods were more likely to give them an advantage than ours? Was there any such difference in methods?—No; I should take it the other way round. All the conditions being equal, we have nothing whatever to fear from the Germans.

1808. Out there?—Their method of treating natives is different from ours, and there we have a decided advantage.

1809. Next, with regard to the question of shipping to Europe from Nigeria, do you think that a larger proportion of kernels goes in bulk to Hamburg than to Liverpool?—I take it that you are speaking of the conditions ruling before the war.

1810. Yes, I am speaking of the conditions ruling before the war?—Yes, I should say so.

1811. A greater proportion was sent in bulk to Hamburg than to Liverpool. The aggregate shipments were much greater?—Yes. Liverpool has not the facilities for handling bulk that Hamburg has.

1812. I am coming to that. Is there an advantage in the direction of cheapness in shipping in bulk, and what is it, if so?—It is difficult to say the advantages offhand, but there are decided advantages.

1813. It was put at, say, 6s. 6d. a ton; roughly speaking, 6d. a bag of 1½ cwt.?—That is high. I would say there is a minimum saving in bulk of about 3s. a ton.

1814. Would it affect the quality at all deleteriously to ship in bulk instead of in bags?—The experience we have does not incline us to think that.

1815. When it comes to putting it on the steamer, say at Lagos or Burutu, what are the actual charges involved after it has been bought from the natives. How much do they come to?—It is very difficult to estimate that. In Lagos they worked with a branch boat service very largely. In the other districts practically it amounts to nothing. Each buying station is equipped with boats for its ordinary trade, and they put it on board in the ordinary way of business. There is expense certainly, but it has never been clearly defined. It does not amount to much.

1816. Who pays it?—The merchant pays it.

1817. What I am trying to get at—and we have had conflicting evidence about it—is the possibility of constructing an elevator which should only handle the goods in bulk and not in bags. You do not believe in the possibility of an elevator?—I do not know of any part of West Africa where an elevator would be practicable under existing conditions.

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[Continued.]

1818. What would make it impracticable to your mind?—The smallness of the quantities to begin with, and the difficulty of arranging for a common centre where you would get sufficient quantities.

1819. Have you ever thought in your own mind what quantity would be required to make an elevator a paying proposition?—In Hamburg, for instance, they have never considered the bringing of an elevator into the question unless they had something like 300 tons minimum to work on, and rapid despatch was required at the same time. But even then I think they looked at the charge connected with the use of elevators as rather heavy—2s. a ton I believe it is, or was.

1820. But if need be, supposing we asked you to do so, could you work out the sort of conditions that would be necessary before an elevator began to pay, as distinct from the ordinary methods of loading?—In West Africa?

1821. Yes. It is a combination of two things, is it not—a combination of the amount of kernels handled and of the question of the rapidity of dispatch?—Yes, getting the kernels to one common centre.

1822. Exactly.—Under existing conditions we should require to travel a long way before circumstances would admit of it, I think. It is far from being feasible at present, in my opinion.

1823. With regard to landing charges at this end as distinct from freights between the West Coast and here, a good deal of the evidence has shown that the landing charges at Liverpool are a good deal heavier than they are at Hamburg. Is that so?—That is so.

1824. That is established as a fact, can you see any reason why they should be heavier at Liverpool; or, in other words, do you think it would be feasible to make any representations to try to get them brought to anything like the same figure?—If the trade is to be kept in this country I think it is all-important that it should bring itself into line at Liverpool not only with regard to charges, but also in providing facilities equal to those at Hamburg.

1825. I am coming to that in a second. As regards landing charges, if it is reasonable for Liverpool to charge so much, how is it that Hamburg can do it for so much less?—I am not quite competent to answer.

1826. You have been importing into Liverpool and into Hamburg, and it is an important question. It is not enough simply to say that they are more at Liverpool and less at Hamburg, and that they ought to be made the same at Liverpool without discovering how far it is practicable, is it?—Perhaps not. I would not like to take the responsibility of saying where and how Liverpool charges should be reduced; but I have no doubt in my own mind that they could be reduced.

1827. If we were to ask you with others to think it over perhaps you could then take the responsibility. If they are to be reduced to any rate some one has to make suggestions. Perhaps we might ask you to think it over and, if need be, we could communicate with you. It is too much to ask off hand, perhaps.—We have an employee who has spent something over 20 years in Hamburg representing us there, taking charge of our cargoes, and handling them. He has been in Liverpool since the war broke out, and has taken up the same duties there. He is in London at the moment looking after the discharge of cargoes in London. From there he goes to Hull. After a little time it might be easy to arrange for his coming here if you wish. He would speak on each of the different centres.

1828. First hand?—Yes. He has actual knowledge of these things, and the different charges and everything more or less at his fingers' ends. He would be available if the Committee wish.

1829. Next as to the question of shipping freights, freights may be high or low. I am speaking of before the war or after the war. In so far as they are the same to Germany as to here, how far have you reason to believe there were private facilities, not in the ordinary published rates, in the nature of rebates given by German shipping lines to German interests, by the Woermann Line, or others. Do you know of any private facilities which amounted to favouritism

in freights?—Do you mean can I advance proof of anything of the kind?

1830. Have you any proof of anything of the kind?—Frankly, I have no proof.

1831. Have you any opinion as distinct from proof?—I have opinions, and very strong suspicions, that the German interests had preferences.

1832. In addition to the ordinary agreed conditions as between the German and British lines?—Undoubtedly.

1833. Coming to the trade in Europe (to get the differences between Germany and England throughout this business) are you aware that for oil, after being crushed and refined, sold f.o.b. Hamburg, the prices ruled on an average during the years before the War at 2l. or 3l. less than in Liverpool. Is that true?—Not so much. I have never heard of any great discrepancy. You mean kernel oil?

1834. Yes.—I have never heard of any great discrepancy as between the prices for kernel oil produced in Britain and that produced on the Continent.

1835. Should you say that they would be the same?—No. It has not been brought before my notice perhaps, but I always understood that there was a difference in the price of kernel cake.

1836. But not of the oil. I am comparing the ordinary prices of oil f.o.b. Hamburg and of British crushed and distilled oil in Liverpool.—Figures could be got, no doubt, which would put you right at once.

1837. You do not know of it?—I cannot speak definitely, but I have often heard the fact advanced that the difference between the kernel cake in Britain and in Germany placed the crusher in this country at a disadvantage.

1838. Principally in the advantage given by the cake?—Yes.

1839. Not an advantage given by methods of manufacture or otherwise, but merely owing to the market for the cake?—In addition, although the crusher never admitted it, I think that he also suffered certain disabilities through his machinery, possibly, not being so much up-to-date.

1840. From the point of view of manufacture, as distinct from market for cake we have had one or two suggestions; first of all that there are advantages due to the carriage in Germany by water-ways, better machinery, and longer and more experience in applied chemistry; also that the f.o.b. price Hamburg for export was less than the internal price charged in Germany. Have you any experience that you could give us of any of those four points?—I should say that each of them weigh and meant a good deal.

1841. There is a certain amount to each. You have no knowledge; you only give an opinion?—Take importing palm-kernels into Hamburg in bulk. There are no quay charges on what is water-borne. The kernels are put over the ship's side into barges and taken away direct.

1842. What have you to say with regard to machinery?—I cannot speak as an expert about machinery, but I should certainly say that the Germans were ahead of us there, generally speaking.

1843. So far as your knowledge goes, is there, or could there be, what I might call more or less of a constant proportion possibly between the price of kernels and the price of oil, varying a little perhaps as cake found a market?—It has varied a little at all times. There has been a difference since kernel oil became usable for edible purposes. That has made a difference.

1844. I have not made myself clear perhaps. Just before the war it was quite clear that kernel oil was to be used for edible purposes. It has been suggested that if oil was worth 36l. a ton, roughly speaking, you could say there was a charge of 1l. a ton for crushing, and that therefore, allowing for a normal rate of profit based on the selling price of the oil, you would have more or less a fair selling price for kernels?—I was speaking of palm oil.

1845. I was thinking of kernel oil throughout, not palm oil merely.—It is my mistake. I have always understood that you could work on a basis something like that. It has been commonly said that if palm

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[Continued.]

kernels are selling at 18*l.* a ton kernel oil is worth, say, 36*l.* a ton.

1846. That is very rough—doubling it?—Anything over that has been looked upon as profit to the crusher after covering his expenses.

1847. Supposing I took the price of the oil at 2*l.* to every 1*l.* in the price of kernels, 36*l.* to 18*l.* or 28*l.* to 14*l.*, as the case might be, would the crusher's profit have to come on top of that?—I do not quite follow you.

(*Chairman.*) I am sure Mr. Knowles realises what I mean.

(*Mr. C. C. Knowles.*) Yes.

1848. (*Chairman.*) Supposing that any sort of agreement were possible at all as to a proportion between the price of kernels and the price of oil, and the crusher could say: "If I get 40*l.* for my oil I will give 20*l.* for my kernels, and if I get 36*l.* for my oil I will give 18*l.* for my kernels, and so on," would the 40*l.* or the 36*l.* really include a normal and fair profit to the crusher, or should that come in addition?—I think that his profit reasonably ought to come in addition to that.

1849. Have there been in your experience any pools out there with regard to the price payable to the native? There was one at Lagos?—In connection with the price to be paid to the native?

1850. Yes?—There have been understandings.

1851. I will call them understandings.—At different times. Sometimes they served a purpose and sometimes they did not.

1852. Did they last?—They have at times.

1853. What was the effect on the price to the natives? Did they tend to depress it, should you say?—No, but I do not quite follow you in using the term "pool."

1854. Let me say an "understanding." Did it tend to depress the price?—There has never been any question of anything of that kind. That is to say, there have been understandings, but they have never in any way tended to what you might call affect the volume of trade or restrict the output in any way. That I am quite satisfied of.

1855. Now with regard to shea nuts, have you had much to do with them?—Nothing at all.

1856. Ground nuts?—Very little.

1857. As regards the local consumption of cake (perhaps Sir Frederick Lugard will want to ask you about this), do you anticipate any likelihood of local consumption, or the possibility of creating it?—I see the possibility. In the past there has been no outlet, but in the future there are certain possibilities.

1858. In some evidence which was given to us, I think a fortnight ago, it was said that one great disadvantage in trying to bring the whole fruit, including the pericarp, to a mill for the palm oil as distinct from palm kernel oil to be expressed, was that you were bringing a lot of waste stuff in the shape of the fibre part of the pericarp. Have you ever considered whether cake can be manufactured from the fibre of the pericarp as well as from the fibre of the kernel?—That I cannot speak upon.

1859. (*Mr. C. C. Knowles.*) I suppose you know the marketing cost of the kernel—that is, taking the Lagos price and the cost of bringing it to Liverpool, including labour at the coast, bags, freight, insurance, loss in weight, &c.?—I have had some little experience of that.

1860. With regard to Sierra Leone, what would it cost, roughly, to-day?—I do not know.

1861. Would it cost round about 4*l.*?—I cannot speak of Sierra Leone.

1862. Lagos?—It is difficult to say off-hand. I could give it within a shilling or two if I had an opportunity to consult figures.

1863. Within a shilling or two would do.—I would not care to say that I could do it off-hand.

1864. I thought that that was generally in a West African's mind from day to day. He knows if kernels cost him 11*l.* in Lagos what he has to add to cover all the charges, and that anything above that is profit?—Under normal conditions, yes; but at present conditions are rather abnormal.

1865. I do not mean calculating anything for loss through the war or loss on the sale of the goods, I am merely speaking of the marketing price of the kernel?—There are losses through the produce being held up. If you buy produce in Lagos you may not get it shipped for four months, and you are not sure what market you can sell at. You do not know what the shrinkage will be or the general deterioration of the kernels, and your marketing cost remains an unknown quantity until the transaction is closed, naturally.

1866. I have got out costs from our firm's books—Sierra Leone, 4*l.* a ton, Lagos, 4*l.* 15*s.* a ton, and Opobo, 4*l.* 5*s.* a ton. Our clerks inform me that that covers everything.—I cannot speak of Sierra Leone at all. The others are approximately correct, I should say.

1867. Can you tell me if the West African importer has made more profit on importing kernels since the war commenced than he had done for many, many years previous to the war?—I should not say so.

1868. You do not think that the West African firms, since the war, will be able to show in their balance sheets a much larger profit than they have done for years before the war?—I do not think so.

1869. I have given you the costs, and you say that you think they are approximately correct. Do you see any way of cheapening the costs? There are many competing oils and fats with kernels and palm oil, and the more you can cheapen the cost the better it is for the Colonies and for us all.—Undoubtedly. We are constantly endeavouring to reduce working costs wherever we can.

1870. Do you see any way of cheapening them?—In the immediate future?

1871. Yes, or at all.—Under existing conditions,

no.

1872. Mr. Steel-Maitland asked you questions about elevators. You do not think that they are feasible?—Not at present.

1873. You spoke about it being necessary to have quantities at different centres. Lagos is a centre that very large quantities are shipped from?—Yes.

1874. Would not the quantity there be sufficient to support an elevator?—Yes, but then how would you get the quantities together to one centre?

1875. If one elevator was built and controlled by the Government, or by a company, of which all the merchants became members, and all the fine kernels were put into that one elevator graded in much the same way as wheat is in America, would that meet the case?—There is the difficulty of grading to begin with, and the cost of bringing kernels to a common centre. Do you suggest that they should be purchased at the common centre?

1876. Not necessarily, but something like 40,000 or 50,000 tons are shipped from Lagos a year?—Yes.

1877. Could not the 50,000 tons of kernel be handled more economically by having a central elevator?—No. I still see difficulties, as I told the Chairman. Although there is a big quantity shipped from Lagos, they are passing through the hands of 20 or 30 different interests.

1878. (*Chairman.*) Might I intervene? My question was based on this: They have to be brought to Lagos anyway, and therefore there need not be much greater expense to bring them to the elevator than to some other warehouse, so far as the mere bringing is concerned.—There may be ten, fifteen, or twenty different interests buying kernels in Lagos. They trade with their customers in different ways and at different centres, and the difficult thing is to admit of all these people retaining their connection and buying at a common centre—

1879. Not buying at a common centre; it has to be brought to a common centre at some time or another, and it might be brought to an elevator in a common centre. That is what I mean.—Take an Elder Dempster branch steamer loading for a main line boat. To get her cargo, she might call at ten or twelve wharves and pick up parcels at the different wharves and put them aboard the main steamer.

1880. At Lagos?—Yes.

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[Continued.]

1881. Is it not much more economical in the matter of saving time to deal with it in bulk at one central elevator?—It is, perhaps, difficult to make it clear, but I still see difficulties. The kernels could be brought to a common centre and treated at an elevator, but the cost of bringing them there would be just as much, I am afraid, as the saving effected, and possibly more.

1882. You think so still, in any case?—Yes.

1883. Do you see much difficulty in the question of quality as apart from the cost of bringing?—I see difficulties, but these difficulties, I think, have been overcome in other markets.

1884. You would have to grade them and have warrants?—Yes.

1885. (Mr. C. C. Knowles.) There would be very little necessity to grade, I think. I buy many kernels from Lagos, and the allowances are very few and far between on any kernels. They all come as fine kernels.—There is not so much difficulty at Lagos as at some of the other ports. That is, perhaps, very much due to the system we now have of Government inspection. Prior to that you would find that allowances on Lagos kernels varied from 5 to 15 per cent. a very serious thing.

1886. Certainly. There could be Government inspection when they went into the elevator just the same.—Yes. I am speaking of the conditions ruling up to a few years ago, prior to the present system of inspection having been perfected as it has been.

1887. You think that Government inspection has been a good thing?—Undoubtedly.

1888. You have been about 28 years in the West African trade. During that period, do you know of anything of importance that has been done to improve the quality of the palm oil shipped, and to improve the quality of the kernels, or to keep them in good fresh order on the coast?—Practically nothing, other than the system of inspection which I speak of.

1889. There is no inspection of the palm oil?—Yes, there is inspection. We have the same system there.

1890. What do they inspect for—impurities?—For general impurities.

1891. With regard to Lagos, what percentage do they allow to be shipped?—It is difficult to say off-hand. I think it is roughly up to 2 per cent.

1892. Anything up to 2?—Lagos oil, as you know, is always well within that. There has never been very much difficulty in Lagos as regards quality.

1893. Would it be difficult to filter the palm oil on the coast? My idea is eventually to get palm oil over here in such a condition as to free fatty acids, that we might bleach and refine it, and use it for margarine making. If we could take out the impurities on the coast it would help that very much indeed.—I fail to see what filtering would do in the reducing of fatty acids.

1894. Filtering would take out the impurities. There is no question that the longer you keep palm oil in the casks and the longer you keep the impurities in the palm oil the more the free fatty acids accumulate. Would there be any difficulty in filtering the oil there?—There would certainly be difficulty at the beginning, not such as could not be overcome perhaps.

1895. Not very important difficulties. They could be overcome, and overcome cheaply, could they not?—Yes.

1896. The oil comes into your stores in very small quantities?—No, it depends on the district.

1897. It comes in puncheons?—Yes; in some districts you may collect a matter of 50, 60, or 100 puncheons in a morning.

1898. That is quite a quantity.—In other places you may get it in calabashes, and not one complete puncheon. You have to fill the puncheons yourselves.

1899. When it gets to the coast it practically all comes in puncheons?—On the coast line?

1900. Yes.—Yes. I am not committing myself as to any value that may result from filtering. Filtering could be carried out, but whether it would serve the purpose you suggest, or not, I cannot say.

1901. So far as you can tell us, the natives have never been taught to produce oil and kernels more economically or to improve the oil?—I think the position has been represented to the natives repeatedly, but not perhaps sufficiently to have any real effect. We are continually teaching the natives what it means to allow the standard quality of the oil to deteriorate in any way, and the different Government Departments at times have brought the thing up. One of the Forestry officials, for instance, went all over Nigeria not very long ago and tried to get the natives to see what it means to take a little more care in the preparation of their oil, and particularly in the treating of hard oil when they could get so much more by making it all soft. I have to admit that very little has been done systematically, and the result is not much.

1902. When the Chairman asked you questions about elevators, you said that there were no facilities in Liverpool for handling in bulk.—I am not aware of having said that. I did not intend to say that, but that the facilities for handling in bulk are very poor as compared with the facilities we have had in the past at Hamburg.

1903. I want to point out that the facilities for handling bulk and cereals at Liverpool are very good. I am trying to clear your mind. There is no reason in my opinion why arrangements should not be made for the Mersey Docks and Harbour Board to handle kernels in bulk just like grain.—Perhaps not, but so far they have not done so.

1904. They have not been applied to.—I cannot say, but I should think that the steamship companies have raised the question before now, considering the delays that have occurred.

1905. You have not heard of it being raised?—No, I have not.

1906. (Sir F. Lugard.) In a minute which I laid before the Committee I said that I understood that those engaged in this industry in the United Kingdom feared to erect machinery here, as the industry might revert to Germany after the war, because the Germans could offer better terms because of their existing machinery, and other reasons; and that the merchants who were willing to embark on this industry asked a State guarantee that the industry should continue to be protected after the war. Is that your view?—That is my view.

1907. In what way do you think protection should be offered—that there should be an export duty on the coast?—That, I think, is the simplest way of getting over the difficulty.

1908. An export duty on kernels exported to ports other than the United Kingdom?—Yes.

1909. That would involve a similar duty in England for re-exports?—Yes, to make it effective.

1910. And guarantees as to transshipment at the Canary Islands or elsewhere?—Yes.

1911. At our last meeting a witness expressed the view that nothing of the sort was necessary, because he thought the demand for oil nuts of all kinds, in view of their being used for edible purposes, would be so enormous that all the mills in Germany, plus all the mills to be erected here, would be amply employed. Do you hold that opinion?—No, I should not agree with that. Ultimately an export duty may not be necessary, but for the present and the immediate future there is no hope, I think, of keeping the trade in this country without it.

1912. The view was expressed that the Germans might take soya beans or something else if we had machinery here for dealing with palm kernels?—I cannot speak to that; they might.

1913. There will be an enormous demand after the war undoubtedly, in consequence of the nuts being used for edible purposes, will there not?—Yes, we anticipate quite a good demand.

1914. Do you think that the existing supply is in any way likely to meet that demand?—I do not anticipate any difficulty there.

1915. To put it in another way,—if there is a probability of such an enormously increased demand, ought not steps to be taken to increase the existing output. Is there no prospect at present of the output

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being increased enormously?—No, no immediate prospect.

1916. I have led up to that because I want to ask you some questions about the ways in which we might increase the output. You, for instance, favour a system of collecting depôts—that the Government, say, should establish a system of motor transport, radiating from certain railway centres, and that the merchants should establish collecting depôts at the termini of those motor routes, say 25 miles. Would the merchants be likely to take up the project of establishing collecting centres under native agents?—I do not think that the merchants would fail you there.

1917. You think that it would pay them to do it?—Generally speaking, yes. Of course if they were asked to go to a place where, for years to come, the expenses would be out of all proportion to the gain, they might possibly hesitate, but generally speaking they would be only too glad to do anything in that way.

1918. I put the question to a previous witness who gave me to understand that he did not think it would be a payable proposition—that if white men were there they would be too expensive, and natives would be too unreliable. You do not think that?—No. We should certainly, as a firm, if we were engaged in anything like that, naturally arrange for more or less regular supervision by Europeans. We have out-stations where we work in a similar way to-day.

1919. I am talking of a somewhat larger and more organised system than already exists.—We would be quite ready to develop that.

1920. That would tend to eliminate the native middle man?—Undoubtedly. He is eliminating himself in a way.

1921. You think it would be an advantage to the trade that he should be eliminated?—He has served an exceedingly useful purpose.

1922. In the past.—I do not know that sentiment should interfere with our ignoring him.

1923. You would be glad to see it?—I do not think it would be a great loss to the country, speaking frankly, but he has served an exceedingly good purpose, and there have been exceedingly good men.

1924. Your firm has some large rubber plantations in Nigeria?—Yes.

1925. Is it feasible to make plantations of improved classes of palm? Mr. Farquhar states that there are certain palms which yield 50 per cent. more oil than others.—Yes.

1926. Is it possible, do you think, to undertake plantations of that sort, with the assistance of the Government in selecting the palm?—Yes, quite possible, but, if I may say so, I think the conditions would require to be less onerous than they are to-day with regard to the taking up of agricultural areas.

1927. Should the term of lease be longer, or the conditions with regard to land under cultivation be different?—Not so much that. It would require an outlay extending over about ten years before there would be any immediate return, and land conditions in Nigeria are a little bit difficult.

1928. In what way are they difficult? Is rent too high or the term too short?—The rents for a proposition like that are a little high.

1929. What sort of rent should it be?—For anything like that the rent should not be more than nominal. It means a large outlay, and it goes on for a long period. There are not very many who could undertake it, but it would be undertaken, and undertaken willingly, I think, if we had any inducement at all. As a company we have been quite willing to go into anything of the kind for the last 8 or 10 years.

1930. A former witness suggested to the Committee that some kind of combined action on the part of merchants would tend to promote the trade, and I gathered that the point was that the presence of perhaps a dozen different purchasing agents at a single centre was waste of energy and money, and that if a single purchasing agent could purchase for all firms it would be a great advantage. Is such a thing, do you think, conceivably possible?—In theory it sounds all

right, but I am afraid that it may not work out in practice.

1931. He would have to purchase at the fluctuating rate of the Home market, so that the native had the benefit of the fluctuation.—And I take it it would eliminate all competition.

1932. That would be the idea.—I would not like to commit myself to anything like that.

1933. The witness I am referring to said that such a scheme would greatly increase the output and would greatly benefit the colony. Do you see any way in which it would increase the output or benefit the colony?—Frankly I do not. I admit that there has been a great deal of wasted energy in the past through, perhaps, eight or nine interests fighting for a living not sufficient for one, at some little centre on the Lagos line of railway, but that would right itself in some way.

1934. Only by some species of combination?—By some going under possibly.

1935. (Chairman.) The ultimate effect being the same?—Not necessarily. It would mean that possibly three solid interests would remain.

1936. With no arrangement between them?—With no arrangement between them. Speaking frankly from Sir Frederick Lugard's point of view, I think there would be a certain amount of risk attaching to one interest getting the power of having what is practically a buying monopoly in a particular district.

1937. (Sir F. Lugard.) The witness I speak of repudiated the idea of a monopoly. He said that he was against a large combine, but favoured smaller combines which, he thought, would compel the small merchant to sell to the larger one.—Something between the two extremes would meet the case better, I think.

1938. What do you think, generally speaking, would be the least price paid to the native which would maintain the existing output or even increase it?—It would be very difficult to say. I could give you an idea if I had a little time as to what the limit at places removed from the coast should be. During the past few months, for instance, we have had advices from different centres above Lagos, saying that they have got to the limit. The kernel market fell from a little over 20*l.* to 13*l.* 10*s.*, and naturally prices had to be reduced at Ibadah and elsewhere. Necessary reductions were made there to meet the fall in the market, and when that occurred the native ceased selling entirely.

1939. To turn to another point, our Chairman asked you a number of questions about dealing with the imports at this end. Now one or two questions about the other end. Have you any suggestions to make as regards either shipping facilities, railway facilities, or wharf or harbour facilities?—In Nigeria?

1940. Yes. Are there any outstanding causes of complaint?—Well it would be difficult to say. We have had many difficulties to contend with during the past fifteen months, but conditions are abnormal, and we cannot hope for anything else.

1941. Take normal conditions. With regard to shipping do you anticipate any increased difficulty owing to the withdrawal of the German lines?—Unless we get increased facilities in some other direction there certainly will be difficulty.

1942. As regards the tonnage offered or as regards freight rates?—There is certainly danger if freights are made prohibitive. Naturally it will seriously affect trade, and if there is not sufficient tonnage offered that is a very serious drawback.

1943. You have fears as regards quantity of tonnage and freight? You have fears on both points?—You will be able to get information as to what the intentions are of, say, Messrs. Elder, Dempster and Company, as soon as circumstances admit; but without a very large increase in tonnage, West Africa is not going to be catered for after the war is over. I think that goes without saying.

1944. With regard to harbour and wharf accommodation you said just now that one reason against an elevator was that the ship would have to pick up a number of small parcels at different wharves. Would

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it be better to enact in some way or another that all private wharves shall be eliminated, and have one Government wharf on which to concentrate?—No. You would simply be adding to the charges prior to bringing the kernels to the elevator, if that were done. It would be impossible for a merchant to buy all his produce at the Government wharf or in the vicinity of an elevator. If you had to purchase the produce first, and have it conveyed to the elevator, the cost of doing that would more than take away any gain there might be in working your elevators afterwards.

1945. If you had better shipping or wharf facilities or whatever it may be, would not the Germans equally benefit with the British?—Undoubtedly.

1946. It would raise the price to the natives, or the profit to the merchant, but would not increase the output?—No, it would not increase the output.

1947. I will turn to a different point. The local consumption of oil has been put, by one witness, at about 50 per cent. of the output. I think the opinion generally was that it did not exceed 6 per cent. Would it be, in your view, possible to decrease the local consumption in order to increase the exports?—You refer to palm oil, I take it?

1948. Palm oil used for food and also used for making soap. You are aware that there has been a considerable increase in the local manufacture of soap?—Yes.

1949. Especially at Ibadan.—They have been getting it mostly from kernels. Since the price for kernels was reduced behind Lagos, round about Ibadan, the natives have made their own soap from the kernels.

1950. And offering very good soap that competes with imported soap?—Yes. There may be sentiment in it but they say that it sells quite freely, and there is a demand for it.

1951. Do you think that by importing foodstuffs from the north, for instance, we should decrease the local consumption, and release a larger quantity of kernels for export?—It is more a question of price. Take palm oil for instance.—If the price rules low in this country, and the price is correspondingly low at the other end, the native will use the palm oil for burning purposes and cease to purchase kerosene.

1952. That was the object of my question.—If he is getting what he thinks is a good price for his palm oil, he will sell all he can produce, apart from what he may take for food, and purchase kerosene oil.

1953. We had it in evidence that the collection of the palm kernel, and also of the shea nut, is very incomplete, and that a great deal is wasted uncollected. Can you suggest any inducement which could be offered to make a more thorough collection of palm produce?—Population has almost more to do with that than anything else, I think. We may give increased facilities at different centres, such as you suggest, motors and so on, but anything that is left just now is very largely due, perhaps, to the native not being there. What is left, I think, as a matter of fact, has been exaggerated. The amount of the produce lying rotting in the ground is not very large in Nigeria to-day, and if we had a bigger population there would be less.

1954. Do you think that a great increase of cash trade instead of barter trade would promote it?—No, not by itself.

1955. The idea being that the native, obtaining cash for his produce, purchases whatever variety of articles he likes, instead of having a particular article forced on him in barter?—If that is done it is detrimental to the trade; but, in the ordinary way, the native gets what cash he requires, and it is difficult to force cash on him if he is not used to it, and does not want it.

1956. Generally speaking, he desires cash?—It does not follow. On the coastline he does sometimes, but not always. We, as a company, give all the cash that is asked for, and all the goods asked for.

1957. It has been suggested that the Germans succeeded very largely by holding very heavy stocks of large varieties of articles, and if the native obtained cash for his produce he could buy any of the articles which tempted his fancy. You do not hold that view?

—No, it is not my experience. In some places there is nothing but a cash trade, but in other districts it is part cash and part barter. In other districts, again, it is almost entirely barter; but I should say that it would be a want of progress on the part of any interest to insist on the native working on barter if he wished for cash.

1958. I am sorry to say that that is the case in certain areas in the Northern Provinces.—We have no experience of that, and as a company would not dream of seeking to influence the native one way or the other. If he wants cash, he will have it. Since the war began, there has been at times a short supply of cash. Just after the war was declared, for instance, cash was not available, and naturally the native had to depend on barter then, but under ordinary circumstances the native gets what cash he wants in the districts I have any experience of.

1959. Do you think there is any large loss by tapping the trees for palm wine?—In certain districts the loss is very considerable, undoubtedly.

1960. Is it increasing?—Lately it has been increasing.

1961. And it is likely to increase as the price of "trade spirits" goes up?—I am afraid so.

1962. Are there any feasible steps for checking that, do you think, other than simply making legal penalties?—I am afraid that I know of none.

1963. It has been suggested that it would be advisable to transfer the supply of imported liquor to England, having regard to outward freights on the steamers. Is that an advisable course, do you think?—If it is feasible, it is certainly very advisable.

1964. You doubt if it is feasible?—I question very much if it is feasible.

1965. Do you think that if the liquor traffic was considerably decreased, the native would replace the liquor by imported goods of any kind—cotton or hardware, or anything else? Perhaps I do not make myself clear. Would trade receive a serious set back, because the native would not collect produce for the purchase of other goods than liquor?—Yes, trade would certainly suffer.

1966. Do you think it would recover in a reasonable time?—Only very gradually. I may remind you that I sat on the Liquor Committee which took a good deal of evidence on the subject seven or eight years ago, and that was one of the points that engaged a good deal of attention. It was, perhaps, outside the terms of reference in a way, but a good deal of evidence was led under that head and there can be no doubt whatever that the volume of trade would suffer very seriously indeed if the duty were made entirely prohibitive or if the spirit trade were stopped altogether.

1967. Now, another point. A very great deal of labour is expended in cracking the nuts, estimated at 100,000 men or women a year. You have experimented with various forms of machines for cracking?—

1968. You have now a centrifugal machine costing 10*l.* or 12*l.*?—Yes.

1969. Has that been a success?—Yes—not as great a success as we would have liked it to be.

1970. Do you know that the Government this year is importing 500*l.* worth of pestle and mortar crackers at half-a-crown apiece? Would those be useful?—It is difficult to say. The native is conservative. That is the difficulty we have found in getting him to take up our machine.

1971. My point is how we can reduce labour in other directions in order to concentrate it on collection. Can you see any way of reducing the labour expended on cracking and transport and so on?—No, unless it came to producing oil and cracking on a bigger scale altogether, and on a more scientific scale. I question very much indeed if they will take up anything else whole-heartedly. By his own method, he works very rapidly. I have not seen the pestle and mortar.

1972. Have you any experience of local manufacture, of local crushing or local extraction?—No actual experience—no experience as a matter of fact.

1973. We have had evidence that the cake will keep

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for six months at least, and labour being cheap out there, and probably scarce and expensive after the war, do you think that the erection of local mills in Nigeria would be likely to be a good thing?—I do not see why it should not.

1974. You said just now that you thought you saw some opportunity of disposing of the cake locally.—Yes, that might be done for the feeding of cattle.

1975. Would it also be possible to sell either palm kernel cake or ground nut cake to the natives?—I see a possible outlet there also but it would take time. In the Calabar district, as you know, the native makes certain cakes himself to-day from similar fruits, and if we could hit on something palatable there is no reason why we should not in the end devote the kernel cake to similar uses, and get a local outlet for it in Nigeria.

1976. You spoke just now very strongly in favour of Government inspection of produce.—Yes.

1977. The two last witnesses we have examined were against it. One said that the produce on the Niger, where there is no Government inspection, had held its own, and never been found fault with, and both considered that it was the duty of the merchant rather than of the Government to undertake the inspection. One witness, when asked why it was inspected at Lagos, said it was only due to the insane competition existing. Why do you wish the Government to undertake the inspection rather than have the merchants undertaking it themselves?—Well, there are no standards in Lagos, for instance, or in any part of Nigeria.

1978. That is a separate question. Would you advocate standardisation by the Government?—If we had standardisation, then the Government might suspend or abolish the system of inspection.

1979. Is Government inspection in the native markets advisable or Government standardisation of exports? Which do you advocate?—Government inspection in native markets without efficient supervision involves certain risks. We know there have been abuses, but we have had no abuses in that way that could not be overcome with a little additional expense in supervision.

1980. It is exceedingly difficult to overcome the temptation of bribery and corruption, as you know.—Yes.

1981. That is a risk which the Government is unwilling to take.—In Lagos, and along the coast-line this argument was used very strongly at the time the different merchants approached the Government to arrange for some method of inspection, and though there have been little difficulties it has worked extremely well. In some of the native markets where a native produce inspector has been on his own, so to speak, away from all supervision, abuses have arisen, and owing to that inspectors were withdrawn from certain interior stations; but if they had been subject to regular supervision I am sure we should never have heard of the difficulties that arose.

1982. Is it not a somewhat arbitrary thing that a native should be punished, fined or otherwise, for offering whatever he likes for sale?—Yes, if he did not know what it meant, but if he is quite well aware of it I do not see that it is. We have known, for instance, of natives who have deliberately sunk their canoes in a stream with a view to soaking the produce and making an increased profit, getting more than they would otherwise have got.

1982a. The merchant can surely deal as effectively with that as any Government inspector, if he gives a bad price or no price?—If someone who does not know is willing to give the full price and makes a loss, although the man may go under, as long as he is willing to do it, the fact remains that trade cannot be on anything like stable conditions.

1983. (*Sir Owen Philipps*.) Are there idle mills at present in Germany sufficient to deal with the whole palm kernel crop, or practically sufficient, in your opinion?—I can merely give an opinion.

1984. They have in the past dealt with a very large majority of the crop?—Yes.

1985. There are a large number idle?—I would not like to say idle. Only yesterday I saw that one of the

mills that we have known a little of showed, for 1914, a very substantial increase of dividend.

1986. Would not that probably be from the store of palm kernels and other suitable seeds which they had at the beginning of the war?—It may be. It may be some of our own kernels that enabled them to do it. We have kernels there that we have not yet been paid for. We do not know what use has been made of them.

1987. If new mills are erected in England, in your opinion will they have to meet with exceptional competition from these German mills afterwards?—Undoubtedly; there is no question of that.

1988. And do you consider that the Germans would probably run their mills at a loss to endeavour to get back the trade?—I should say that they would.

1989. And it is for that reason that you are of opinion that people who invest money here in erecting new mills to get the trade to this country may reasonably ask the Government for support?—Yes, that is my main reason; there are others, of course. But I think it is only reasonable that if any man is going to sink 200,000*l.* in erecting mills, he should have at least some assurance that the machinery will not require to be scrapped shortly after the war is over.

1990. Because of the old German machinery that has been erected for this particular trade being brought into competition against him?—That is so.

1991. Sir Frederick Lugard asked some questions about shipping, and you said that if the German steamers were withdrawn it would naturally require further tonnage to carry the trade after the war.—Yes.

1992. You are aware that a certain number of German steamers are at present in the hands of the Admiralty?—Yes.

1993. Only one of them has yet been sold, I believe?—I know of one that was sold.

1994. Are you aware that the Admiralty has been approached to employ these steamers or to sell them for the West African trade?—I understand that representations have been made to the Admiralty upon that.

1995. I notice in your précis that you mention that in your opinion the primage system cannot but be detrimental to trade. Is it not the case that you have always been an opponent of the rebate system?—Yes, I think I can say that.

1996. Your firm is one of the most important firms in West Africa—one of the very large firms there?—Yes, we have fair interests there.

1997. Is it not the case that if there were no rebate system, you, as very large shippers, might in the height of the season get your cargo off cheaper than smaller shippers. I am not asking whether it is desirable that you should or should not, but is not that the position?—Yes, very likely.

1998. In West Africa there is a very large number of ports?—Yes, a very large number of ports.

1999. Nearly 100?—I could not say, but I know that there are very many ports.

2000. In your opinion, is it an advantage to the trade that all these ports should be regularly served?—Yes, I think it is important that they should.

2001. And have they been up to the time of the war, regularly served by the regular lines?—Yes.

2002. You as a big merchant would agree therefore that there are advantages to the merchants in regular lines of steamers running?—Yes. Certainly it would mean a drawback if there were not a regular service.

2003. What you mean is, that you would like to have it both ways?—No. My difficulty is in seeing the connection between a regular service and primage.

2004. It is the case that in every regular trade throughout the world, with practically two exceptions, primage does exist?—Yes, I believe it exists elsewhere. I do not suggest that it is any more right because it exists elsewhere, though.

2005. With reference to local mills, you told Sir Frederick just now, that you thought that the erection of local mills should be considered.—Yes.

2006. I forget the exact words that you used. Is it not the fact that local mills have been erected, and

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are not working. Does not that carry weight with you, and show that they are not a business proposition?—Oh, no; not at all. I should like to know more as to why they are not working. It does not follow that because they are not working, they are not a business proposition. May I ask if you are referring to recent crushing operations at Lagos and Opobo?

2007. Yes.—Mr. Knowles no doubt can put us right there, but we understood that it was because there were machinery difficulties, and not because of the principle of crushing locally being in any way at fault.

2008. The same firm that erected the mills have had successful mills in this country. Is not that so?—Yes, I understand so.

2009. Do you think that the local report of machinery difficulties is likely to be wrong?—It might be bluff. It might be that they paid too much for the produce to begin with. I do not know. I should require to know more before giving any opinion.

2010. (Mr. T. Wiles.) If there were a common centre and a combination of merchants, for purchasing nuts from the natives, as has been suggested, with perhaps an elevator, do you think that in the course of a fair number of years, they would put up the price to the native, or put down the price to the native?—I am not quite clear. Would you please repeat the question?

2011. Yes. If, as is suggested, a common centre or combination of merchants were made at a port for a district, with perhaps an elevator, and the small men who run about, as I understand, were eliminated, do you think that such a combination, whether blessed by Government or otherwise, would put up or put down the price paid to the native?—Well, strictly speaking, I do not think it would put it down. It depends a great deal on the principles actuating the combination. I should say that there is risk, at any rate.

2012. But if they were large merchants who were naturally connected with the combination, their object would be, I take it, to buy the things as cheaply as possible?—Naturally they would like to work with a margin.

2013. If this combination were successful, they would be able to name their price, and the native would have to sell at that price if he had nuts?—I might say frankly that I cannot foresee conditions in Africa which would make anything in the form of a combination like that possible.

2014. You think that unless the Government took it up we need not consider such a possibility as a combination of merchants with an elevator at the port?—It has occurred to me since I was asked questions with regard to that: Where the Niger Company gather their imports from the Niger it might be feasible to work with an elevator. They bring all their produce from interior stations to Burutu and ship it from there in very large quantities. From what I have said with regard to elevators, I would like to exclude Burutu.

2015. What liquor is chiefly imported in the districts you know?—Principally gin.

2016. And where is that shipped from usually? I am talking of pre-war time, of course.—The bulk from Holland, but a very fair proportion from Germany.

2017. If the import of liquor into these districts were prohibited, do you think it would stop the volume of trade?—Undoubtedly, very largely.

2018. Is the native a great drinker?—No, not individually. It is a luxury, and if it were taken away from him, and he wanted it, he would destroy his palm-tree for the sake of getting it, to begin with, and he would not turn over the same amount of produce. There would not be the same incentive.

2019. What do you mean by drinking individually?—There is a large quantity of liquor imported into the country, but the amount consumed per head is not great.

2020. You think that if liquor were prohibited the native would not be able to collect so many kernels?—

It is not a question of not being able, I am sure he would not.

2021. Why would he not?—There would not be the incentive. He looks upon drink as a luxury, and if he wants it he has to get produce in order to be able to buy liquor.

2022. Have you had any experience of liquor being withheld in any way, the result being that what you suggest has actually happened?—Yes, we have had that experience. If I might refer you again to the evidence led before the Liquor Committee that sat in West Africa, we had pretty conclusive proof that that did happen; and we also had a great deal of evidence from those competent to give an opinion that, were the liquor trade stopped altogether (I am not speaking on sentimental grounds now) there can be no question but that the volume of trade would suffer very seriously. I could give instances of the native, quite apart from the question of the liquor trade, sitting down and refusing to do anything more, once he has met his requirements for the year resulting perhaps from his having got a bigger price for his produce. Let me make myself clear.

(Chairman.) I think you are quite clear.

2023. (Mr. T. Wiles.) Yes. I do not want to pursue the point. (To the witness.) Are kernels usually shipped in bags or in bulk?—As a company we ship more largely in bulk.

2024. Can you ship by what we call liner steamers in bulk?—Yes, provided quantities are considerable.

2025. Is the freight the same for kernels shipped in bulk and shipped in bags?—Freight is the same.

2026. In shipping to Hamburg you usually ship in bulk?—Yes.

2027. Is it the custom with the trade there generally to ship in bulk?—I would not like to say that it is. Most of the big interests do ship in bulk. If you can only send in 25- or 50-ton lots, you cannot expect the steamship company to provide space for bulk for all shippers; but if it is a question of two or three hundred tons or a little under that, there is no difficulty.

2028. Do I take it that they are usually shipped in two or three hundred ton parcels?—No. Our shipments work from 50 to 300 or 400 tons.

2029. What is the biggest shipment made in a liner as a rule?—Do you mean from one port?

2030. I mean the quantity which one firm ships in one steamer.—We have frequently had 1,500 tons on board one bottom, but that may be put on board at four different ports, perhaps.

2031. Is there usually a good supply of freight?—Fair.

2032. All this is under normal conditions?—Yes. Sometimes we have had little difficulties, say in the season, where the river draught is not very great, and there is difficulty in taking more than a certain tonnage in one bottom.

2033. Is it more difficult to get freight to Liverpool, Hull, or London than it is to German ports?—Well, there was no demand for freight to Hull before the war. There was no necessity.

2034. When the war is over and everything is, we hope, normal again, would it be as easy, do you think, to obtain freight to Liverpool, London, or Hull as to Germany? I will put it in this way: If there had been a demand in Liverpool, London, or Hull before the war, would it have been as easy to get freight to those places as to Hamburg?—I have no reason to think that the steamship companies would have placed difficulties in the way, but it is difficult to say to-day what could have been obtainable. That is where primage comes in, if I may say so. If you are working on the rebate system there is not the same freedom in shipping to outside ports, because you are dependent on the steamship company entirely.

2035. What do you mean by "rebate system"?—Suppose you are tied to ship by a particular line of steamers, or failing that forfeit your primage.

2036. Is it usual for firms to tie themselves up to one particular line of steamers?—I do not know that it is so, but sometimes they have had to accept the position, and have not been able to help themselves.

2037. May we take it that there is no competition

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and that freights are the same by all lines from these ports?—As far as West Africa is concerned, I think with regard to the primage system we were under the same conditions with the Woermann Company from Hamburg, and the Elder Dempster Company from Liverpool.

2038. The German and the British lines worked together?—Yes.

2039. One was not cheaper than the other?—No.

2040. Therefore we may take it that there was no competition?—No.

2041. Are tramp steamers ever loaded along the coast?—They have been in the past, but in loading the tramp steamer, you forfeit the primage on what you have shipped by the regular lines. It is a question of considering gains and losses.

2042. You do not think it possible to bring the tramp steamer into competition with liners as a rule?—It is extremely difficult, unless you are in a position to carry the whole of your cargoes yourselves, making yourselves entirely independent of the steamship company.

2043. We have been told that the dock charges for dealing with kernels are lower in Hamburg than in Liverpool. Can you give us any idea of the difference?—As I said to the Chairman—

2044. If you have answered the question, never mind. I was not present. — We have a man who has spent many years in Hamburg and has had experience in Liverpool since the war started, and he can, if need be, submit a statement showing the difference, or give his evidence direct to the Committee. That would be much more to the point than anything I can say here.

2045. Are the mills in Hamburg situated on the river or water-ways as a rule?—The bulk of them, I think, have water facilities.

2046. Can kernels be put overside into lighters and go direct to the mills?—That is the usual practice. All the bulk parcels are handled practically in that way.

2047. They are not compelled to go over the quay in Hamburg?—No.

2048. In Liverpool they are compelled to go over the quay?—That is the position to-day.

2049. Generally, we may take it then, that the dock charges in British ports are very much against the manufacturer here as compared with the German manufacturer?—Generally speaking, it comes to this—that the charges in Liverpool to-day are greater than those at Hamburg. It comes back to that.

2050. You do not mean the extra $7\frac{1}{2}$ per cent. because of the war?—No. I speak of the ordinary working charges.

2051. If the charges in the docks in England or Great Britain were similar to the charges in Hamburg, do you think the British manufacturer would have a much better opportunity of competing?—Yes, undoubtedly. I may be wrong in saying that you are compelled to put all your kernels on the quay in Liverpool.

(Mr. C. C. Knowles.) You are wrong.

2052. (Sir Owen Philipps.) Yes, you are wrong, but according to my experience as a trader practically everything has to go on the quay.—Practically everything has to go on the quay.

(Sir Owen Philipps.) In London it is the opposite: nothing goes on the quay.

2053. (Mr. G. A. Moore, to the witness.) I showed you a memorandum which I had drawn up for the benefit of the Committee. Might I just ask whether you endorse that?—Is it a fair statement of the facts as they appear to the African merchant?—I should have no hesitation in endorsing it, although I might say I hope that the scope of the Committee will be in no way limited. I took a note of the phrase you used. You speak of "anything of a fiscal nature being political and controversial." I might express the hope that nothing of that kind will interfere with your investigations.

2054. Have you any reason to think that the trade in portions of Nigeria is in any way hampered by the system of barter which obtains there?—No, I should say not.

2055. Is it not a fact that the use of cash is gradually extending, and that ultimately we look practically to trade being carried on entirely on a cash basis even there?—Yes; it is almost more than gradual. The change is coming about pretty rapidly.

2056. You agree with me probably that any endeavour to hasten the change by legislation would be inadvisable?—Certainly, if it is hastened unduly. In the past, as you perhaps know, we had an instance of a Native rising which was more or less brought about by insisting on changes in that way.

2057. With regard to measures of value, the Native is almost as conservative as English countrymen?—No doubt.

2058. I do not know whether you have had much experience of English countrymen. I have. In the memorandum I showed you I gave a list of factors which vary the prices to the Natives. Under present circumstances there are several others of which you were speaking just now. Can you tell us what those are?—Well, shortly, there are one or two heads. I will refer to the violent market fluctuations in this country. There is the difficulty again in selling to arrive with any certainty at carrying out the contract. There is uncertainty again as to when you might be able to effect shipment. There is an extra and an unknown loss in weight caused by such detention, and there is deterioration of course in the quality of the kernels due to the same cause. There are other things, but these, I think, are all factors; and during the past 12 months we have found each of them meaning a good deal. They cannot be left out of account.

2059. Are you aware that Mr. Booth, the Chairman of the Congestion of Ports (Port of Liverpool) Committee, suggested to the Chairman of the West African section of the Chamber of Commerce, that Elder, Dempster, and Company should be requested to reduce sailings from West Africa in order to reduce the arrivals in Liverpool.—I understand that.

2060. What is the present stock of produce now lying awaiting shipment in Opobo? Can you give us an idea?—I could not give the figures for to-day, but I know what they were very recently.

2061. It is a very large amount any way?—Anything from 12,000 to 15,000 tons. I am speaking of the different interests and their stocks of produce in Opobo.

2062. What is the largest amount that can be shipped from that river in one bottom?—Lately, the most we have been able to count on, after bunker coal and so on, is 1,200 to 1,500 tons.

2063. With the present supply of tonnage what time will be necessary, do you think, before we get that river clear?

(Chairman.) I think, if I may say so, we are wandering a little away from the Terms of Reference.

2064. (Mr. G. A. Moore.) It is rather important. Various questions have been asked with regard to the profit, and that sort of thing, that African merchants are making, and I want to bring out the fact in the evidence that there are factors which at present, at all events, are making it absolutely impossible for the African merchant to estimate what his profit is going to be. (To the witness.) You, I think, are favourably disposed to an exhaustive experiment being made to ascertain the feasibility of treating the palm fruit from the very beginning?—Yes, I think it highly important that such an experiment should be made.

2065. You probably agree with my statement that one of the great difficulties in making such an experiment is the getting of a sufficient quantity at one place. It is a mercantile proposition. Do you see any way of getting over that difficulty?—Would you mind putting that question again?

2066. For instance, you know that I have had nut-cracking machines on the coast, and you have seen them for some time, and you know that I can only keep them supplied for a very short time, and in Opobo, for instance, I have not been able to keep them supplied at all. The great difficulty has been that we cannot get the raw produce in sufficient quantities. Can you see any way of getting over that difficulty, to keep the plant running all the year round?—I see

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certain risks attached to any large sum being expended on plant which, at least for a fairly long term, would be unproductive.

2067. Have you made any calculation as to the minimum out-turn that would be required in order to have any chance of its becoming a payable proposition?—I cannot speak of that, but I understand that a witness is coming before the Committee who will be able to give you some information on that.

2068. Your firm is interested in a small experimental plant put up with a view of seeing whether such a plant could be worked in Africa. Would you be prepared to give the Colonial Office the benefit of those experiments?—I have already said in my précis that we should be perfectly prepared and willing to give the Government the full results.

2069. Now, it has been suggested by some questions that have been asked that West Africa would be a better point for distributing the cake than Liverpool, but is it not a fact that with steamers radiating from Liverpool to all parts of the world, there can be no finer distributing centre than that port?—That is as apart from any local outlet?

2070. I mean this: If you are shipping palm kernel cake from West Africa you have to ship it in whole cargoes, except to Liverpool or Hamburg?—Yes, undoubtedly.

2071. And it would be difficult to do that. If you got it in Liverpool or made it there you would be able to ship it in small parcels to any part of the world?—Yes. We could not distribute from Nigeria all over the world under anything like existing conditions.

2072. Questions have been asked with regard to arrangements between merchants with regard to prices and so forth; is it not a fact from your experience that whenever merchants have made profits, a very large proportion of those profits have almost invariably been reinvested in the business in order to develop the trade?—I think there is no doubt as to that.

2073. Merchants are fully alive to the fact that a reduction in price beyond a certain point would do them much more harm than good in the long run?—Well, I should say that they would be foolish if they were not alive to it.

2074. With regard to the difference between Hamburg and Liverpool, is it not the fact that the cost of discharging the produce is thrown on the merchant in Liverpool, whereas in Hamburg it is practically a free port, and there are no charges at all paid by the importer on bulk kernels arriving there?—There are no charges on bulk kernels.

2075. So that the port must be supported otherwise. They must draw a revenue from somewhere?—Yes, but I cannot go quite fully into that. I know that we have no charges to meet.

2076. If we could ask your representative, amongst other things, he might, or might not, be able to tell us about that?—I understand that the gist of Mr. Moore's question is this: How can Hamburg afford to do without charges?

2077. (Chairman.) How far it is supported by some other public revenue?—I question very much whether our representative can answer that.

2078. (Mr. G. A. Moore.) You were asked several questions about releasing the labour from nut-cracking. The amount of labour employed is very great, but probably you have seen the jealousy exhibited by the women who do the cracking in competing with us in buying uncracked nuts?—I have seen something of that.

2079. You have seen them standing on the bank and trying to get the canoes to come to them rather than sell to me?—Yes.

2080. So they are not very anxious to be relieved of the labour of cracking the nuts themselves. They do not know what else to do, in fact, in order to earn their living.—As I said in answer to Sir Frederick, they are very conservative, and it is difficult to get them to change. It has been part of their business, and I suppose the women take a kind of trade union view of things. They are conservative, and do not like innovations, even if it can be proved to them that

you will give them something that will release a very great deal of manual labour.

2081. You were asked a good many questions about elevators. If an elevator were found to be feasible in either Lagos or Opobo, and measures were taken for the kernels to be collected in that elevator for shipment, would not the principal advantage accrue to the shipowner rather than to the shipper, in getting quick discharge. The cost to the local merchant would be practically the same, or even greater than under present circumstances, would it not?—In the answers I have already given I have tried to make clear that that is the view I take.

2082. So if we are to get any advantage by putting up an elevator, there would have to be a reduction in freight?—I take it that the steamship companies would consider that at once.

2083. There is one point arising out of another question put by Sir Frederick Lugard. He spoke of forcing cash or forcing goods on the native. Is it not, speaking generally, a fact that no merchant can force anything on the native owing to the competition between the merchants, and we must let them have what they want in every way?—I only speak of conditions prevailing in the Southern Provinces of Nigeria, and there I can scarcely imagine anyone being so foolish as to attempt to do that.

2084. Really it is not practical politics at all?—I should say not; most certainly not.

2085. If we could manage to ship the spirits from England which we at present get from the Continent would it not put another difficulty in Hamburg's way in getting the kernels, owing to there being an absence of outward freight?—Certainly.

2086. (Mr. T. Walkden.) During your many years on the coast you have had a large experience of shipment both by the Woermann line and the Elder Dempster line. Did you find the Woermann line more obliging and giving better facilities or keeping their promises better than the Elder Dempster Company's line?—Well, leaving the question of keeping promises out of account altogether, the facilities granted by the Woermann line, I think, were more than we have had from Liverpool lines in the past.

2087. Were the captains of those steamers more obliging to the merchants on the coast? Did you find that, generally speaking?—Yes, but there may have been reasons for it.

2088. But we want to know why they have got the produce and I may say that that was the general experience that I had on the coast—that the German captains were more obliging. Now, the matter of profits on these kernels since the war has been mentioned, and perhaps I might be allowed to mention it again. As you know you paid some big prices at the commencement of the war.—Yes.

2089. And they naturally fell.—Yes.

2090. So therefore you do not think there have been the big profits made that have been suggested?—I should say certainly not.

2091. We want to make a market for kernels here. Do you feel quite sure that if we had facilities for dealing with cargoes at Liverpool we could do it. Hitherto, Hamburg has been the market for kernels?—It has been the principal market.

2092. The price has ruled as from Hamburg?—Yes.

2093. The quotations there ruled Liverpool prices?—Yes, very largely.

2094. We want to get a market here, and we want to secure, after the war, that the kernels shall continue to come here. Now it has been suggested and brought forward by witnesses that there is a difference in the prices ruling in Liverpool and those ruling in Hamburg. Do you think we should be able to retain the market here with the mills being unworked in Hamburg?—After the war?

2095. Yes.—Under existing conditions?

2096. Under existing conditions.—No, I do not think so.

2097. Therefore, I think, you said the simplest way out of the difficulty would be to put an export duty on kernels. We must have protection in some way.

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We want machinery and mills to be erected here, and, therefore, according to the evidence so far, we must be protected in the market. Can you think of any other way? May I suggest that if an export duty were imposed on a raw product it would naturally fall on the community of the Colonies?—I take it that if an export duty were imposed in Nigeria, the Colony would retain it.

2098. But do not you think that the Germans, to keep their mills going, would probably get kernels or a substitute from some other market?—I think that we should be quite justified in taking the risk of that.

2099. Might I suggest another way? Would it not be better to protect those establishments which are erected here, and put a moderate duty on the palm-kernel oil after crushing coming from foreign countries?—That is another question. From my point of view there is no reason why it should not also be considered.

2100. I want to know which is the better way. We feel that they must be protected in some way, and I think that if you put an export duty on any raw product the native local community must suffer.—I do not see in what way the local native could possibly suffer. If there is an export duty, that export duty is based on the difference between, say, Liverpool and the Hamburg market, and the native or the local Government is going to get the duty. The native cannot suffer.

2101. If it was possible for the Cameroons to become the possessions of Germany again, is it not possible that they might farther cultivate the product, as a lot of kernels come from there?—I have no doubt they would.

2102. And it might have an effect on Nigeria or our other Colonies?—No; I see no great difficulty there.

2103. The pools or understandings that you have had in Lagos have never lasted very long, have they?—I have never known any understanding to last any great length of time.

2104. But still when they have been in vogue they have never had any exceptionally big margin of profit?—I should say not. Take Lagos, where we have had certain arrangements at different times. The margin of profit in many instances has not averaged 2s. 6d. a ton; I think that Mr. Knowles knows that.

2105. With regard to the area of palm belt, is it possible to go on and increase the acreage of it, or is it practically fully developed? You know pretty well through travelling round different parts?—In some instances the palm belt has been somewhat thinned out in Nigeria through tapping the trees for palm wine.

2106. I was coming to that.—At the moment I should not think that there was any immediate call for planting the palm tree, as there are plenty there, but at the same time I think that looking to the future I should certainly encourage planting, as Sir Frederick Lugard suggested.

2107. Yes, but do you think it is likely that a merchant will plant or take a lease of land with only probably about 20 or 30 years' lease?—That is one of the difficulties connected with any merchant embarking on an agricultural proposition.

2108. You think that with longer leases and more security of tenure there would be more planting?—I do not doubt that at all.

2109. With regard to the inspection of produce: that has acted very well in Lagos?—All over Nigeria, as far as I know, it has given excellent results.

2110. Previous to having it at Lagos they had it in Dahomey, where it worked very well.—I have heard so.

2111. Do you find that kernels from Sierra Leone give an analysis of about 10 per cent. or even up to 15 per cent. of shell?—I have no experience.

2112. If the merchants were unanimous in wishing to have inspection you would say they ought to have it. You would advocate it?—If the conditions were at all like what they were in Nigeria prior to inspection I can

understand the merchants being justified in seeking to bring about some such system in Sierra Leone.

2113. Certainly. Sir Frederick asked about trees being tapped for palm wine, and he mentioned the importation of liquor. You feel sure that if they stopped the importation of liquor the tapping of palm wine would be increased?—Yes. We had direct evidence of that at Ibadan. Some years ago, when for some reason or other there was a practical boycott of imported spirits, the Resident at Ibadan actually took a note of the different men going out and in at the different city gates with palm wine from the surrounding trees. The immediate result was the death of a great many palm trees in the district. We had the same experience in Abeokuta. It is not a question of theory. We know it to be the case.

2114. Exactly. In Lokoja and Northern Nigeria liquors have been prohibited. I have seen more drunkenness there than in any other part. What is your experience?—Referring again to the Liquor Committee we went all over the Southern Provinces of Nigeria and paid a visit to Jebba in the Northern Provinces. The only drunken man we saw all the time we were in the country was at Jebba. I think that was led in evidence.

2115. Therefore you think that if it is prohibited they will make a concoction of palm wine in Northern Nigeria from their guinea corn?—Peto is what they use more largely in the northern provinces.

2116. With regard to outside stations, you said that where there are several buyers there are not sufficient kernels coming into a place to give a living for more than one firm.—We have had many instances of that.

2117. If there were only one he would naturally have a monopoly?—If trade centres into the hands of one there is always a risk.

2118. In these outside places it is not altogether the buying of produce, but also the buying of produce and selling the goods?—Yes.

2119. The latter is the more important?—I do not say more important but certainly important.

2120. (Sir William G. Watson.) With regard to Liverpool, I would like to know whether the existing mills there are alongside the river so that they can take the produce up in large barges direct from the ship, or has it to be landed and then carted to the mills?—To the Liverpool oil mills it has to be carted. Messrs. Lever, I understand, can lighten their requirements without difficulty.

2121. Whereas in Hamburg or the vicinity they are almost, without exception, alongside the river?—Yes.

2122. Therefore the expense of landing is less?—Yes.

2123. You consider it important, you say in your *précis*, that we should not drift in this matter. Such being the case, would you think it very unwise of the Board of Trade, owing to instructions they have got from the Government that money is not to be spent, to forbid a landing stage being put opposite a large mill that has been erected, although it has been passed by the Port of London Authority. Everything the Port of London Authority sanction has to go to the Board of Trade, and the decision of the Board of Trade is that the expenditure shall not be allowed, although, I think, the river landing stage will cost 30,000*l.* and only 500*l.* worth has to be finished. Do you think the prohibition wise?—I think it very short-sighted indeed.

2124. With regard to mills in Africa, I understand there are some mills in Africa that are not working at present?—They are not working at present.

2125. Do you not think it probable that the reason why they are closed or not working is that they do not pay, or did not pay, judging from what you know of the firm owning them?—The reason given locally for the closing down was that they found they had installed some wrong machinery and were going to replace it. Other reasons have been advanced since then. I am not altogether in the know; I can only speculate and repeat what I have heard.

2126. When the mills were being worked, was the oil consumed locally or exported?—It was exported.

2127. Do you agree with me in thinking that the expense of transporting oil across the sea, especially

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from a tropical climate, is very great owing to the cost of barrels, or if you put it in drums, owing to the difficulty of returning the drums?—The cost there, I think, should be more than met by the saving in another direction.

2128. But you agree that it is expensive to transport oil across the sea, as it is in some conditions of temperature semi-liquid, and in others hard?—There is a certain expense involved, but I do not quite understand what is involved in your question.

2129. Do you not think that German mills have a great advantage from the fact that great markets for oil are in their immediate vicinity, and those markets are generally connected with a river, and therefore they can transfer their oil as they manufacture it straight to the margarine factory where it is used, without going to the expense of barrels or drums?—Undoubtedly that is a distinct advantage.

2130. Is it not regrettable that more than half the margarine consumed in this country is made in Holland, the German oil merchant consequently having a great advantage?—Yes, I think it is very regrettable.

2131. I suppose you agree in thinking that a British oil mill that has to pay 30s. a ton to get oil to the margarine maker who uses it, is at a disadvantage compared with the German, who can get the oil to the margarine maker at an average cost of 5s. a ton?—Undoubtedly. Anything like that means disadvantage.

2132. Now with regard to kernels in Liverpool, are they crushed or are they extracted at the mills there?—I could not say to-day, but in the past there has been a prejudice against extracting.

2133. You will be surprised to hear that extracted oil has been considered better for edible purposes?—We have followed the subject for some time past without being experts. We understand that the prejudice is being overcome.

2134. I am sorry to bring up the question of price again, but I think that Mr. Knowles rather thought that you who import the nuts get rather too large a profit. You said that you thought that the price of oil should be double the price of kernels?—I do not pose as an authority there.

2135. As a sort of basis?—I have always understood that if kernels were bought for the crusher at 18l. anything over 36l. would yield him some return.

2136. If I told you that the firm with which I am connected bought 1,000 tons of crude kernel oil in February and March at 46l. to 47l. you would not think the crushers lost on the transaction?—I think that the crushers must have done exceedingly well.

2137. (Sir William G. Watson.) There is, if anything, an over-abundance of kernels because the German mills are closed and therefore the cheaper those can be brought to the consumer the better, in whatever form, and the sooner that surplus will be worked off?—Yes.

2138. Now with regard to German buyers of kernels you said that they were rather inclined to give more credit than English buyers. Do you not think that that is because German buyers are often supported by

the German banks who are inclined to take greater risks than British banks?—I think there is even more than that in it as far as Nigeria is concerned, but I cannot put forward positive proof.

2139. (Sir Hugh Clifford.) With regard to the export of kernels: by far the larger amount went to Hamburg?—Yes.

2140. Do you attribute that in any appreciable degree at all to the existence of German as well as British firms on the Coast? To put it more clearly, do you consider that the presence of German firms on the coast in any appreciable degree determined the destination of cargoes of kernels?—Not latterly, but going back many years it might possibly have had that effect. Take the large firm already referred to—Gaisers. At one time they were actually interested in a crushing mill. They also had steamships. Their crushing mill was at Hamburg, and they imported there direct.

2141. The adoption of the Hamburg destination may have been due to the presence of German firms on the coast?—I would not like to say that it is the result of that, but I would not like to say that it had nothing to do with it.

2142. At any rate, at the beginning their existence had influence in determining the destination of cargoes?—Yes.

2143. For five years preceding the war, and until immediately before the beginning of the war, much the largest proportion to Hamburg was shipped by British firms?—I should say so.

2144. And the existence of Germans on the coast, therefore, I take it, had very little to do with the large shipments to Hamburg?—Not as things stood before the war.

2145. So that for the five years immediately preceding the war the whole question, in fact, was rather where there was the largest demand?—It amounted to that.

2146. You are quite convinced, I think, that without artificial assistance, when normal conditions are resumed, the kernels will flow naturally to Hamburg in preference to any part of Great Britain?—I should be very much afraid so.

2147. Not only are you afraid but are you convinced that that will be the case?—Yes, I may say I am convinced that that will be the case.

2148. The only thing that will make any difference will be some artificial preference securing shipment to a British port?—Yes. If we are to retain the trade in this country, I feel strongly that something of the kind must be done; I do not say continued indefinitely.

2149. It would have to be continued so long as there was competition in the field?—Yes.

2150. (Chairman.) To wind up, following that, you think that some sort of preference is necessary—taxation of one kind or another, really—to enable the British industry to get under way?—Yes.

2151. It need not necessarily be permanent, but it is to get the industry under way, and as a going concern with the goodwill and the traditions and the experience?—That is exactly the view I hold.

The witness withdrew.

Adjourned for a short time.

Mr. J. W. HOPE called and examined.

2152. (Chairman.) You represent the Primrose Soap Works and you are also a member of the Oil Seed Crushers' Association?—Yes.

2153. And of the Oil and Tallow Trades' Association too?—Yes, and of the United Kingdom Soapmakers' Association.

2154. Do you crush as well as refine?—Yes.

2155. You refine as well as make soap?—Yes.

2156. So far as the prices were concerned before the War were they approximately the same at Hamburg and in Liverpool, so far as a market existed in the latter place?—Yes—for kernels you mean?

2157. Yes?—Practically the same.

2158. The same over a period of years?—Yes, over about five years. May I refer to my note?

2159. Certainly.—The average price worked out at

19l. some odd shillings; 19l. 14s. 2d. was the average price for both Hamburg and Liverpool from July 1909 to June 1914.

2160. That, however, would not include the landing charges at the two places, that is as sold there?—These are the prices, I take it, ex steamer.

2161. As regards prices of oil f.o.b. Hamburg and Liverpool have you bought oil from both Hamburg and Liverpool?—Yes. We have bought f.o.b. Hamburg and also Liverpool.

2162. What is your experience over a series of years? Has there been a difference in price between the two?—The average price in Liverpool during the same periods was 39l. 3s. 5d. The average price in Hamburg was 36l. 19s. 1d. Of course as regards Liverpool there may be some little difference in the terms,

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in one case 2½ per cent discount; in the other case f.o.b. without discount.

2163. That would be as sold by a broker?—Yes, as sold by brokers or crushers.

2164. Sold direct by a crusher?—In Liverpool.

2165. If the crusher sold direct the buyer might get it for rather less, but that is the ordinary market price?—These are the market prices.

2166. What should you say accounted for the difference?—In the value of the two oils?

2167. Yes?—I think that probably the facilities granted to the crushers in Germany in one form or another enabled them to crush to greater advantage than the crushers in this country. And then again the machinery in general use in Germany was certainly of a superior nature to what was generally in use here. They got better results. The quantity of oil exported from Germany only amounts to less than a third of their make. The total quantity of kernels imported into Hamburg during the years 1910 to 1913 averaged 271,000 tons per annum, and the quantity of palm kernel oil exported from Germany during the same years averaged 38,000 tons. The total production taken at 46 tons of oil to 100 tons of kernels works out at 124,660 tons; so Germany must have consumed about 86,600 tons of oil. Really she was selling her surplus to this country.

2168. Was the export price lower than the price in the home market as far as you could make out?—Yes, I should say so. Liverpool is peculiarly situated. Liverpool is not so well situated for importing oil from Germany as London is.

2169. The price f.o.b. Hamburg was lower?—That was certainly lower than the Liverpool price.

2170. Not the Liverpool price; but were the Germans selling oil for export at a lower price than they were getting in their home markets for it?—Undoubtedly, I think so. They were selling the surplus.

2171. Now have you personal knowledge on the question of machinery, as you are a member of the Oil and Seed Crushers Association? How far do you think machinery with the crushing in this country is coming up to the German standard, or can it be easily brought up to that standard?—I do not think there is any doubt that it can be brought up to it. There is one very important condition with regard to the bringing up of it generally. Crushers generally will not put in the necessary improved machinery unless they have some sort of guarantee as to the continuity of the supply of kernels after the war. There may be exceptions.

2172. Otherwise you think there will be no question as to machinery in this country being brought up to date?—I do not think so at all. You have an example of machinery in Liverpool. It has been running for years. I refer to the mill put up by Sir Alfred Jones. The African Oil Mill it is called. That was erected entirely with British machinery and they got results from crushing which I think are quite as good as can be got anywhere. There are always improvements coming out in regard to oil mill machinery. Especially for that class of crushing the firms in this country can make the machinery quite as well.

2173. Has the African Oil Mill got machinery anything near as effective as modern machinery?—Approximately so. I have been through the mill and seen it working.

2174. Have the Germans any other particular advantage over us in the matter of crushing?—Undoubtedly they have had the advantage of better shipping facilities. It is difficult to estimate what the allowances are. They are variously estimated, but there is no doubt that the German line of steamers has been in receipt of some kind of bounty or something of the sort from the German Government which enabled them to give a preference to millers in Germany.

2175. So far as you are a user of oil over here for soap purposes, if crushing was properly established here, I suppose the freight on the oil would give an advantage over the German competitor?—If we got the kernels landed here under similar conditions to

those obtaining in Germany the boot undoubtedly would be on the other leg; we could supply Germany with oil.

2176. At any rate we should have an advantage in supplying ourselves?—Undoubtedly.

2177. I believe you think that there ought to be facilities given for crushing throughout the country in other ports than, say, in Liverpool only or in London only?—Certainly. I think it of the greatest importance that the trade should be absolutely open, not only for crushers but also for shipping interests to take the place of the Woermann Line, that took so many of the kernels to Germany. I quite recognise that the existing Elder Dempster Line are the pioneers of the trade, but there is plenty of room. They, most undoubtedly, are entitled to consideration, but I do not suppose that they would mind if we had tramp steamers, as we have in other trades—cotton-seed, linseed, and so on—and open markets for the steamers to take direct cargoes to mills round our coast. The country crusher is put to the disadvantage of having to pay extra freight for bringing the stuff round from Liverpool or London to his particular port.—That is a great difficulty.

2178. Will you give me an instance of what you mean by "country crusher"?—Men in Dundee and Burntisland, Aberdeen, and similar places all round, and Glasgow on the west, and places like that, and King's Lynn. There are many mills. I think I sent you a list of crushers; I do not know whether you saw it.

2179. Yes.—If these men were able to buy cargoes of kernels in the same way as they can buy cargoes of cotton-seed or linseed, direct to their own port, they would save very considerably. The extra freight would probably be a shilling or a couple of shillings. That is the usual thing. Then again they would save all the cost of bagging. At the present time a great many of these kernels come in bags, but there is no necessity for that if you have a cargo.

2180. You mean by an ordinary tramp boat?—By an ordinary tramp boat of 1,500 to 2,000 tons capacity.

2181. You have not considered how far it is possible to load steamers on the coast to get a full cargo? Very much depends on that.—If there are 300,000 tons of kernels to be got, surely some means of loading can be found. The advantages accruing to the Government of the West African possessions (and that is the point of view from which I am looking at it) of having crushers in the agricultural neighbourhoods who can distribute the cake among the farmers and educate them up to the use of it, will be very great indeed. It is a very serious consideration, I think. We all know that a big manufacturer may establish big mills, and crush a large quantity, and turn out the cake, but you cannot educate farmers through advertisement; you have to get at them through the local men who have been dealing with them practically all their lives, and their fathers before them, buying their grain, selling them cake, and so on, and very often giving them credit. They have far more influence with regard to such men than the ordinary town manufacturer could have, and I think that a very important consideration.

2182. If you had local crushers, are you confident that they could put down sufficient plant to crush up to modern standards?—I do not think that there is any doubt of it, always with the one proviso, that the trade is a continuing one. At the present time if you were to put an export duty on kernels on the West Coast of, say, 2l. a ton, thereby making it for a certain number of years, if you like, impossible for the Germans to compete (or if they did compete they would be paying a pretty substantial sum to the coffers of this country) such a plan would be no hardship to merchants or shippers, because there is an ample margin of profit on kernels. I might go back to a time before the war when kernels were in the region of 18l. a ton. If you take the kernels at that value, and the oil at, say, to-day's value, and take the cake, which will have to be sold at a lower price in this country than it is in Germany for some considerable time, but at what one

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might say would be a reasonable price, 6*l.* per ton, you have a very good profit for the crusher, and the shipper would get about 18*l.* a ton for his kernels. What I mean to say is this; with kernels at 18*l.* with the crushing expenses on, oil at 38*l.* and the cake at 6*l.*, there would be a thoroughly satisfactory profit to the crusher. Now the average price prior to the war was 19*l.* 14*s.* 2*d.*, I think. At the present time, as I daresay you are aware, kernels are very cheap, and I should say that the merchants, if they had a guarantee that they would be getting at any rate fair value for the kernels, would not object to 2*l.* a ton duty. They could not be cornered if the trade was open. When I say cornered I mean that they could not be caught with big quantities of stuff at any one place. If the trade was absolutely open both as regards freights and as regards where the stuff had to go, it would right itself, and there would be no hardship to anybody. They could well afford to pay the duty for any that went away except to this country.

2183. With regard to local crushers, you would get the local connection with the farmer, and save the freights on the cake?—Yes.

2184. You would have to pay freight on the oil which you have not at the present time?—Unless your crushing mill is situated within your own works as ours is you have to pay freight of some kind or another.

2185. You recommend that there should be a preferential export duty?—Yes, I think that that is the only way to overcome the difficulty that is standing in the way of crushers putting in machinery at the earliest possible moment.

2186. To get over, so to speak, the force of tradition and the force of established things?—Yes. Things have altered very materially within the last two or three years. Hitherto the Continent has been largely the oil consuming part of the world for edible purposes; but now that we have margarine factories established in this country, and others following on, and the trade in margarine is so extensive and growing, no doubt a very large proportion of the oil which would be produced would be used for home consumption in the shape of margarine.

2187. You think that an export duty is needed to get over the initial advantages which the Germans had got before the war?—Yes; that is what would have to be done to prevent the trade going back to Germany, I think; and unless the duty is of a substantial nature they would get round it.

2188. Once we were on an equality we might not need it, but we should need it at the start?—I think so—decidedly.

2189. Is there any permanent disadvantage under which British people would labour as contrasted with Germany? I can only think of internal waterways.—After the trade was once established here I think we could hold it, but it will take a few years, at any rate, in order to get it established.

2190. (*Sir Hugh Clifford.*) To what do you attribute the original preponderance of the Germans in this particular trade?—I think it is largely because of the fact that on the Continent, and especially in Germany, edible oils were a greater consideration than they were in this country. We crushed (going back a good many years now) primarily for the cake, and not for the oils. The oils were looked upon, since I have been in the trade, as a by-product. We crushed mainly to make beef and mutton. In Germany it was the other way about. Of course, now they use very large quantities of feeding stuffs, but they have not done so to anything like the extent that, for a number of years, we had done in this country.

2191. I suppose that the position has completely reversed as regards crushing in England? You regard the cake as a by-product?—Yes, to a large extent.

2192. And the oil as primary?—Any oils that are edible or that can be made edible.

2193. That is the reason for the original preponderance of Germany?—Not altogether. I think that the German crushers must have been subsidised in one form or another by the Government in order to enable them to do what they did do.

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2194. A question of that sort is not susceptible of proof?—No; it is only assumption; that is all.

2195. What leads you to that assumption; would you tell the Committee?—Well, we hear always or have heard that German owners of vessels were giving a rebate in some form or other, and I think the price that you see obtaining in Germany for the oil bears that out, especially the price at which they sell it to come to this country, as against what we can do. I do not say that we crushers in this country have been up to date in our methods with regard to coco-nut crushing or palm kernel crushing until now. One or two firms have recently gone into it in a proper way, and I think that many more are ready to go into it. On the continent they are more oil-consuming people for edible purposes than we are, and have been so for many years.

2196. The bulk shipped to Hamburg was shipped by British merchants?—That is quite possible.

2197. To whom do you suggest that the rebate may have been paid—to the importer into Germany?—I think that it is forwarded through the crusher.

2198. Would the actual purchaser of a cargo from a British merchant receive something in the nature of a rebate? That has been suggested.—The German crusher can afford to sell at 2*l.* a ton less than the English crusher. You must infer from that.

2199. Would that be accounted for by cheaper harbour or dock dues or canal dues?—To a small extent.

2200. Or to the locality in which the mills are situated?—I think that our crushing mills in Liverpool and Hull are as well situated as any mills in Germany.

2201. You told the Committee that there must have been some secret advantage which rested with the Germans as opposed to the British.—Yes, undoubtedly.

2202. That, I take it, will exist after the war just as before?—That is the danger.

2203. If that is so, anything in the nature of protection afforded to the British merchant would not, I take it, be sufficient if it was merely maintained long enough to give him a start, but would have to be continued permanently, or else he would again find himself exposed to unfair competition?—I would not put it in that way. In a matter of this kind it would not be a question of months but it must be a period of years.

2204. Yes.—I should say that the reasonable way to deal with it would be to try it for a period of years and see what the result is.

2205. Anything from 30*s.* to 40*s.* a ton would be a workable export duty?—I think so.

2206. You are more in favour of an export duty in West Africa than an import duty in this country?—I think if you tried the latter very great difficulties would be put forward, whereas in the other case possibly it might be done without treading on anybody's toes severely.

2207. You mean that we could do it without asking the House of Commons to ratify it?—I do not know.

2208. We could.—I hope you would.

2209. The idea is to avoid a public question on this side of the water.—It is a Colonial question, is it not? If the Colonies or the African possessions applied for something of this nature, it would be more favourably received than if we were attempting to push through a tariff which many people would like to see against stuff coming here. I do not think that a tariff put on these special goods would do any good. If you put a tariff on the oil, for instance, Germany will consume the whole of her own oil, and you will not get it. She has only to consume another 38,000 tons per annum to take the whole lot as it is at present.

2210. Therefore you think an export duty, quite apart from the question of controversy, would be the more effective as well as the more convenient way?—Yes, I think so.

2211. Have you consulted at all with gentlemen connected with the trade in West Africa as to what their view would be?—I have not consulted with them individually. I know that in all probability at the first blurt they would think there was an attempt to take

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money out of their pockets, but I propose showing them that, instead of taking money out of their pockets, it will put something into their pockets.

2212. How would you do that?—If you get British mills established here and open to everybody willing to pay the market value, if oil goes up 10*l.* a ton you will find that the kernels will go up with it.

2213. But will not that operate exactly the same whether the mills that do the crushing are situated in Germany or are situated in Great Britain?—I take it that your first object is to shut out Germany. If I were an exporter I would like to be able to send to all parts of the world, but as I understand, the functions of the Committee are to find a way of confining the manufacture of these kernels to England.

2214. (*Chairman.*) Of establishing it in England.—Yes. Therefore we must protect ourselves against Germany, who has all the up-to-date machinery possibly lying idle there.

2215. (*Mr. L. Couper.*) How many years' experience have you had in the matter of kernels?—I have not had a large experience of kernels.

2216. You are a purchaser of kernels now both for soap making and edible purposes?—No. I have never purchased nor crushed kernels. I have crushed almost every other thing, but not kernels. But we buy kernel oil for soap making.

2217. Presumably your purchases for that purpose are based on the price as compared with other suitable oils?—Yes.

2218. Entirely?—Yes.

2219. Therefore it is impossible to have regard solely to kernels in making arrangements of a protective character?—Well, I do not know. You see the situation has altered very materially within recent years. Up to a few years ago the soap maker was the principal buyer of both coco-nut oil and kernel oil. Now the margarine manufacturer is the buyer, and that takes it away up above the old prices altogether. You may count upon it that the market for all these oils will from now onwards maintain itself at the edible value and not the soap maker's value.

2220. The suggestion you make in your memorandum about establishing an export duty from West Africa would have as its object the limitation to the United Kingdom of all kernels produced in West Africa. I mean that the only destination would be the United Kingdom?—That is what we would like.

2221. That would be the object?—That is what I should like very much, but in the case of our allies it might be judicious to consider them at the same time. Both France and Holland crush kernels.

2222. Would the people interested in other seeds and nuts not come along for similar treatment with equal reason?—We are dealing with West Africa at present, the produce of which has been unfortunately largely in the hands of the Germans. We want to take that produce away from the Germans, and I do not think there is anything of a similar nature applying to any part of the country at the present time.

2223. But the export duty which you suggest would not deprive Germany of nuts for their mills. It would merely deprive them of kernels?—It is the kernels, of course.

2224. That one class of nuts?—What do you mean by nuts?

2225. Take seeds, such as cotton seed and copra.—Very likely not, but if you can take an industry which is essentially an industry of our own Colonies, and keep it for our own use, that is a step in the right direction.

2226. An import duty on oil would directly concern the mills in Germany, whereas an export duty from West Africa would not.—Well, of course, it opens up a very big question.

2227. (*Mr. T. Middleton.*) You made a point of the importance of establishing local crushing mills.—They are established now.

2228. Round the coast of the country?—Yes.

2229. Your point was that that would enable the crusher to get into direct touch with the farmer?—No. My point is that the crusher is in direct touch with the farmer now.

2230. And the crusher who is now in direct touch would be able to introduce this new feeding stuff (palm kernel cake) to greater advantage than a crusher in another district?—Certainly.

2231. That is your point?—Yes, because of the local connection.

2232. But are there not agents apart from local crushers in all these districts?—Yes, plenty of them, but there are many crushers who have not agents.

2233. Would the agent of a crusher, say, in Liverpool, not have the same opportunity of getting at the farmer in, say, Aberdeen, as the local crusher?—I do not think so. It depends altogether on the individual; but if you have a mill established in an agricultural district, naturally the farmers round like to keep that mill going, and they will give it the preference.

2234. Do you think that there would be no difficulty in disposing of the main product, the oil, from the local crushing?—None at all. We have all the oil that comes from linseed crushing, cotton-seed crushing, and so on, from all the mills I referred to just now. It all comes to the different centres for manufacture.

2235. The farmer is not so much concerned in keeping up local industry as getting cake at the cheapest price?—Certainly.

2236. Would the local crushing mill be able to deliver cake at a lower price than a mill at a distance?—Yes; I think that follows without any doubt. If you get raw material taken there at 2*s.* a ton more freight, you save all the freight on the cake from the distant mill.

2237. Can you estimate what the extra expenses would amount to between Liverpool and Aberdeen, the two points which you mentioned? What advantage would the Aberdeen crusher have in selling cake to farmers in his neighbourhood as compared with the agent of the Liverpool firm?—Might I answer that question in the Scotch way by asking you another? Why is it that these mills exist there at the present time?

2238. But I want your answer.—It is evident that they must be able to do the trade or they would not have the mills.

2239. You cannot indicate the extent of the advantage?—It is difficult to do that. It is very largely a matter of freight.

2240. Is it a matter of 5*s.* a ton?—At the present time you cannot estimate what freights are in this country either by rail or by sea. They are altering all the time. There is no doubt that there is a substantial saving, but I put more value on the fact that the man is a local man, manufacturing the stuff there. You mentioned Aberdeen. There are two companies up there who have practically educated the farmers of Aberdeenshire into using the most effective fertilisers, and the best feeding stuffs, and so on, and if they gave their support to palm-kernel cake, it would go a long way towards getting people to use it. That is my point.

2241. Your point struck me in rather another way. It seemed to me that your point was that we should make the most of our sea trade to counterbalance the advantage which the Germans have in their internal waterways.—That is not my point. That is not what I was after.

2242. Do you base your conclusion entirely on the local influence of the crusher?—Not entirely. I say that the local crusher's influence is of very great value, but the fact of his mills being central in an agricultural district is possibly of greater value after the farmer is educated to use the cake.

2243. (*Chairman.*) You will have a chance of correcting what you have been saying. Really what you have been saying is tantamount to this, that the 2*s.* difference gives the local crusher an advantage, and that is really an equivalent to what the German gets by the waterways.—If that is what you mean, certainly. I did not quite follow you.

(*Chairman.*) Forgive my correcting what I think was a misunderstanding.

2244. (*Sir William G. Watson.*) Have you visited and been over the mills on the Continent?—Not in Germany.

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2245. Considering that they are in nearly all cases very large mills dealing with 3,000 or 4,000 tons a week, can they not work cheaper than the country mills that you speak of at the small ports of Great Britain?—A mill that crushes 400 to 500 tons a week will crush quite as cheaply as a mill doing 2,000 tons a week with the one proviso as regards establishment expenses. It is all a question of that. I will undertake to produce cake in our mill, which is about a 500-ton mill, as cheaply as any larger maker.

2246. You said you thought that there was a rebate to the crushers in Germany. I can assure the Committee that there is not.—I say that it gets to the crusher somehow.

2247. I have reason to know that it does not.—There is some advantage.

2248. It is missed in some way that I do not know of. Now you say that the crushing mill adjoins your soap factory?—Yes.

2249. Is not that a very great advantage in saving the cost of barrels and drums and freight?—Yes.

2250. If you had to buy barrels and pay the expense of bringing the oil to the soap factory, would you like that situation?—No; but you are assuming that I use this oil for soap making.

2251. I am assuming that.—Do you know how much is used at the present time for making soap?

2252. There is the same expense in moving one oil as another. I understand that the oil you crushed you used for soap making?—I do not use it for soap making; I sell most of my oil.

2253. Do you sell it in London?—Yes; I can get a better price by selling it; I cannot afford to pay the same price for soap making.

2254. Now do you not think that the oil mills in Germany have a great advantage owing to the fact that they have so many margarine factories situated near, to which they can remove the oil at a very low cost for carriage? They get a great advantage over British mills in that way.—You are putting up a big factory yourselves at present, I understood, and others may be doing the same thing; so we are looking forward to the same happy conditions here as existed in Germany.

2255. Three-fourths of the margarine consumed in this country, excluding what is made by my firm, is made in Holland. They can get oil at a fourth the cost in freight?—But you will have the same thing here if you establish crushing mills and margarine factories. Why go to Holland for margarine?

2256. It has been always made in Holland.—Yes. Palm kernels have always been crushed in Germany, and we want to crush them here, and make a market.

2257. But in order to get the market we must bring the margarine makers to this country.—But they are here. I am looking at one of the most important now.

2258. (Chairman.) We want a genuine answer. To get a market for palm kernel oil generally we want to have the margarine that is consumed here made in this country, instead of merely a quarter?—Certainly; I admit that at once.

2259. (Sir William G. Watson.) Do you know the margarine factories in Holland?—No.

2260. They have crushing mills adjoining the margarine factory, or on the other side of the river where it can easily go across, and that is what we want here.—Exactly.

2261. (Mr. T. Walkden.) You mentioned shipment of bulk kernels by tramp steamers?—Yes.

2262. Are you aware that merchants were practically compelled to ship by the Elder Dempster Line or by the Woermann Line previous to the war, owing to the arrangement about rebates?—I understand that there was something of the sort.

2263. How would you overcome that?—Do you mean how would I overcome the question of dealing with the Elder Dempster and the Woermann Line?

2264. Yes.—The Woermann line is *non est*.

2265. Yes;—now—I would allow the Elder Dempster Line very considerable consideration, because they were pioneers of the business.

2266. There are hundreds of merchants, and they could not afford to forgo the rebate by shipping by an outside line of steamers or tramp steamers.—You mean do they pay a nominal freight and get a rebate?

2267. Ten per cent.—Yes. Supposing that the Elder Dempster rate is 15s. a ton (I do not know what it is), and a tramp steamer will take the goods at 17s. a ton to Aberdeen or Dundee, say, there is no harm done to Elder Dempster's boats, as long as they retain their present business. It comes to the same thing.

2268. But you forgo the 10 per cent. on all the cargo shipped outwards and homewards.—Who forgoes?

2269. The merchant on the West Coast. Take the outward freight.—That does not apply to cotton seed from Alexandria, for instance. I think that Sir Owen Philipps would find a way of getting round what you put.

2270. Now, do you think that an export duty would be advantageous?—I think so. If you establish a steady market instead of fluctuations from 30l. to 19l. in a few months.

2271. Do you think that there will be less competition?—I think there will be more competition if you once establish the trade here.

2272. You think that we shall be able to take all the kernels that have gone to Germany in the past?—Yes.

2273. And dispose of the oil crushed from the kernels?—Yes. Why not sell to Germany as they have been selling to us?

2274. There are kernels that come from the French colonies, from Dahomey, and also from the German colonies. The Germans may try to get hold of that trade from the French colonies.—Do you not think that the French will probably protect themselves in the same way as we will?

2275. You were speaking of the United Kingdom?—Certainly. If the French colonies at the present time send kernels through British possessions to this country, there is no reason why those kernels should not be dealt with in the same way.

2276. Could not an arrangement be made with regard to the French colonies by Germany?—It is not very large, is it?

2277. A very large trade is done between Dahomey, Porto Novo, and Lagos, and the same can be said of French Guinea and Portuguese Guinea. Do you think that the export duty will not interfere with the native? Do you think that taxing the raw material of any country is beneficial to that country?—Under present circumstances I do not see that it can be anything but beneficial. I do not suppose that the native would bring in any more stuff if he got an extra price. In Samoa the Americans thought they would double the quantity of copra by giving double the price to the native when they took the Samoan Islands over, but they only got half the quantity of copra.

2278. Would it not be possible for the mills in Hamburg to get edible nuts or seeds from other parts, say, of West Africa or South America, or other parts of the tropics?—We have been able to compete with Germany successfully in these other things because we have been paying attention to them.

2279. (Mr. G. A. Moore.) One point on the figures of export of palm kernel oil from Germany in 1910, 1911, and 1912. In 1910 the export was 24,900 tons; in 1911, 37,900; and in 1912, 32,900. Did you notice that?—Yes.

2280. And that, notwithstanding the fact that during those years the importation into Germany of palm kernels was increasing?—Yes.

2281. There is a very large diminution in the proportion of oil (much larger than the figures show) shipped abroad, and not to this country. I suppose that some part went to America?—I have not overlooked what you put. It is accounted for by the fact that within the last two or three years—certainly not more (I think that Sir George Watson will bear me out)—they have taken to use kernel oil in margarine.

2282. Very likely.—They began to use it a long time after they used coco-nut oil. They could not

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treat it sufficiently before. Two or three years ago they began to treat palm kernel oil for margarine purposes.

2283. That points to the fact that in a very short time Germany would have no palm kernel oil to export, if she were allowed to continue to export?—Yes.

2284. Have you any idea as to the quantity of kernel oil that Germany exports over land?

(*Chairman.*) To Austria, for instance.

(*Witness.*) No, I cannot tell you that.

2285. These figures by themselves do not tell us anything.—I speak of Germany as including Austria; and a portion of the 86,600 tons would very likely be attributable to Austria.

2286. (*Mr. G. A. Moore.*) As a soap-maker do you require for certain kinds of soap, copra or kernel oil?—We look on copra and palm kernel at the present time, and have for a considerable number of years, as a luxury.

2287. You have to use it if you wish to get certain properties?—You can absolutely do without it for soap making. It is a question of what the composition of your soap is. It improves some soaps to have copra or palm kernel oil in them, but I do not think you will find that any soap-maker at the present time can afford to put into his soaps what he used to put in in the shape of copra or kernel oil. We want them to be down in the region of 30l.; in other words, round about the tallow price, before we can use them in soap making.

2288. You are aware that the West African trade is done almost entirely with firms whose principals reside in this country?—Yes.

2289. They do the trade both ways, that is to say, the export and the import trade?—Yes.

2290. Those firms ship by Messrs. Elder Dempster's steamers under an arrangement by which the steamship company return a primage of 10 per cent. to them, provided they ship by nobody else. You have heard that?—Yes, I have heard that.

2291. The Elder Dempster steamers are, of course, all fitted and provided for the service as liners, and they would not be suitable steamers for sending small cargoes to ports such as you refer to?—No.

2292. Consequently, if we were to carry out your idea and ship small cargoes, 1,500 tons, by suitable steamers outside those in the possession of Elder Dempster, we should forfeit 10 per cent. on all our shipments over a period of something like twelve months.—That is the contract.

2293. It is not exactly a contract. They give us that if we have not shipped by any other steamers. Now you understand that unless that arrangement was cancelled or broken down in some way, it would be quite impossible, even though the larger merchant might be willing to do so, to carry out your idea of shipping small cargoes.—But you have never done business through the German line, have you?

2294. Yes.—Has the British shipper had the same advantage?

2295. Exactly.—My suggestion would be to divert all that went to Germany by the German line to British boats, as I will call them for the time being. It would be possible, surely, to make some arrangement by which to satisfy not only Elder Dempsters, but the shippers as well.

2296. Supposing that the African Association, one of the largest West African firms, were asked to ship 1,500 or 2,000 tons of palm kernels to Aberdeen, and they were willing to do so, and went into the market to find a steamer, it would probably cost them 12,000l. in primages by having broken the arrangement with Elder Dempsters.—That is the arrangement at present. I do not know how long these arrangements last, but you cannot jump into the business that I suggest in a few months. You will probably have a delay of six months, or a year or eighteen months before you can get the crushers to move and put up mills; and therefore you have that time in which to get rid of that condition, if you wish to.

2297. I only want to make it quite clear to the Committee that what you suggest cannot be carried

out under present circumstances.—No, not at the moment; I quite follow that.

2298. Now another point; the machinery that these mills have at present is not, I take it, suitable for crushing palm kernels?—As a matter of fact some of the mills with the ordinary Anglo-American presses are crushing at the present time. Most of the mills in the country are fitted with the same presses. There is no doubt that it is only a question of a little alteration. If you wish to get your oil down to about 5 per cent. you must use heavy circular presses. It is not a very big matter to add a few presses or to change the presses, as they have all the rest of the machinery, in order to do the best crushing.

2299. Is it not a fact that in order to crush palm kernels by machinery, which has been used up to the present for linseed, the cost is at least double that which would be incurred by using machinery specially adapted?—Not double. With the machinery at present you have to press twice. It means extra handling, but it is not double or anything like it. It would not be a third more.

2300. (*Chairman.*) Is that to get it down to a 5 or 6 per cent. basis?—You would then probably have it round about 6 per cent.

2301. (*Mr. G. A. Moore.*) Is it not a fact that the best machinery can crush palm kernels at 11. a ton or less?—Under normal conditions in ordinary times, I think the best machinery would crush at 15s. a ton, and with the present machinery I think you could do it for 25s. a ton.

2302. Linseed machinery would do it for 25s. a ton?—Yes, I think so.

2303. Now, Mr. Middleton asked you about the large mills being able to work more cheaply, and being able, by means of the railway facilities, to distribute cake as well as, if not better than, the smaller mills at out-ports. Is it not a fact that railway facilities are somewhat limited and difficult?—Where the mills are?

2304. Take large centres.—It depends very much on where you mean, what do you refer to?

2305. Take Liverpool for instance. Would you not find it rather difficult to distribute regularly a large amount of cake all over Scotland from Liverpool?—I think that is the wrong place to crush it in for Scotland, certainly.

2306. You would put the mill in Scotland?—Yes I would send it to Aberdeen or Dundee or Glasgow, or any of those places.

2307. (*Sir Frederick Lugard.*) In advocating an export duty from the West African Colonies you thought that would be the line of least resistance, as I understood?—Yes, I think so.

2308. Would it not be necessary to have a similar duty in England for re-exports?—I referred entirely to crushing in the United Kingdom. Whatever went free from the West Coast of Africa would have to be crushed in England.

2309. If you follow it further, and say it must be actually crushed in England, that would be a difficult thing to do, would it not?—If not, you would simply prevent it from being exported.

2310. To stop it you would have to prohibit the export or impose a duty?—I do not think it would be necessary to have a duty. These kernels would be shipped over here free of duty subject to their being crushed in England. That is all it means; at least that is how it strikes me.

2311. How could you verify that they were crushed here?—They would not be allowed to be exported from England. The Customs would look after that.

(*Chairman.*) Would not the simplest way be a guarantee given by the exporter from Africa, that guarantee being held to have been fulfilled and discharged on production of documents on sale to the crusher in England?

(*Sir Frederick Lugard.*) Yes, that would do it.

(*Chairman.*) That suggests itself to Sir Hugh Clifford and to me.

(*Witness.*) That would do it certainly.

2312. (*Mr. G. C. Knowles.*) You have given us your view as to how to get the crushing of kernels in

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Mr. J. W. HOPE.

[Continued.]

this country, but you have not told us how you propose to get rid of the oil. Now what quantity of oil is used in soap making a year?—I cannot tell you that, Mr. Knowles. You know that much better than I do.

(Mr. C. C. Knowles.) In this country there is about 2,000 tons of margarine made a week. That is rather an outside figure. In that margarine there is certainly not more than 40 per cent. of kernel or copra oil.

(Sir William G. Watson.) It is nearer 60 per cent.

(Mr. C. C. Knowles.) In yours, yes.

(Sir William G. Watson.) Ours is 75 per cent.

(Mr. C. C. Knowles.) Say 60; that is 1,200 tons a week, that is about 60,000 tons a year.

(Witness.) Rather more.

2313. Roughly. Soap making I take at about 20,000 tons. That is 80,000.—At present prices?

2314. Yes.—I doubt it very much.

2315. That is a rough calculation. Now, it is one thing to bring the kernels here and crush them, and another to get rid of the oil. How do you propose to get rid of the remainder of the oil?—If you can tell me the consumption of margarine, I will tell you how to.

2316. We want to bring the margarine trade here?—You have Van den Bergh making 1,350 tons a week and Jurgens about the same quantity.

2317. Not coming to this country?—No, I am talking of the quantity that is being made, not the quantity coming here. With regard to the quantity manufactured here, it is at present about 2,000 tons a week. That is about right. If we can supply these gentlemen with oil from this country instead of their getting it from Germany it will pay us to do so. Surely it is a paying proposition.

2318. I know that you are a practical crusher, and a trader in oil, and know the commercial side as well as the technical side; and you know perfectly well that it is no use crushing kernels here if we cannot dispose of the product?—No.

2319. I do not see much difficulty in disposing of the cake, and you do not?—I think that the oil would be more readily disposed of than the cake. What does it mean? You must supply France and Holland with what they are using now.

2320. There are competitors such as copra, do not forget.—Quite so, but that will all level itself if you

The witness withdrew.

Adjourned to Wednesday next at 11 o'clock.

SIXTH DAY.

Wednesday, 22nd September 1915.

Colonial Office, Downing Street.

MEMBERS PRESENT:

Mr. A. D. STEEL-MAITLAND, M.P., Under-Secretary of State for the Colonies (*Chairman*).

Sir WILLIAM G. WATSON, Bart.

Sir F. LUGARD, G.C.M.G., C.B., D.S.O.

Sir HUGH CLIFFORD, K.C.M.G.

Sir OWEN PHILIPPS, K.C.M.G.

Mr. L. COUPER.

Professor WYNDHAM R. DUNSTAN, C.M.G.

Mr. C. C. KNOWLES.

Mr. T. H. MIDDLETON, C.B.

Mr. G. A. MOORE.

Mr. T. WALKDEN.

Mr. T. WILES, M.P.

Mr. T. WORTHINGTON.

Mr. J. E. W. FLOOD (*Secretary*).

Mr. C. C. KNOWLES (a member of the Committee) called and examined.

2330. (*Chairman*.) You are a member of the firm of Lever Brothers?—I am.

2331. Do you do any business as West African merchants; or are you simply crushers in this country,

have an open market, and the kernels will rise and fall with the value of the oil and cake.

2321. You do not think it necessary absolutely to get the whole consumption trade here in the United Kingdom to get rid of the oil?—It would be better, but it is not necessary.

2322. You think that we should be able to export it, and there would be a demand from Holland?—Certainly, and from Germany. Germany has always for years and years, and now the boot will be on the other leg, and we can supply them.

2323. (*Sir William G. Watson*.) Will there not be a duty put on in Germany?—That may be so, but then they will not be able to compete with you in margarine. That will be against themselves.

2324. (*Mr. C. C. Knowles*.) In the past the price of kernel oil sold in Germany and Austria has always been very much higher than the price of oil sold for export?—I believe it has.

2325. It has not been a question of 10s. but 1l. or 2l. In other words it was dumped?—Quite so.

2326. You said that with cake at so much and oil at to-day's price, there was a good profit to the crusher?—Yes.

2327. What do you make to-day's price?—Up to yesterday it was 38l.; to-day I notice it has dropped a bit.

2328. To-day's price is really about 36l. or net 34l. If you calculate oil at 34l. and kernels at 18l., and cake at 6l.?—But why do you take 18l.?

2329. I was only correcting the figures?—If you take to-day's price for kernels, and take your oil at 34l., there is a very handsome profit. These figures were prepared two or three days ago, giving the existing market conditions.

(*Chairman*.) What is the import of margarine into this country from Holland, for instance?

(*Mr. C. C. Knowles*.) About 1,500 tons a week on the average.

(*Chairman*.) Would you count the oil content of that, kernel oil and copra, at 50 per cent.?

(*Sir William G. Watson*.) Between 50 and 60.

(*Chairman*.) On the whole that would account for something like 80,000 tons of kernels a year, and there would be a proportionately smaller amount for copra.

(*Witness*.) I understand that the German production of margarine is in the region of 400,000 tons a year, and the Dutch production is about 160,000 tons a year.

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[Continued.]

course, import from the Congo, and also deal largely on the market through brokers and importers, buying palm kernels and palm oils.

2332. Then you really import your own produce, and also buy a good deal of produce as any other crusher might who had no separate merchant's business of his own?—Yes.

2333. So far as the freight is concerned as between this country and Germany, how far do you think you would have an advantage if there were tramp steamers as well as a regular line?—I do not know.

2334. Let me put it in this way. So far as an ordinary merchant is concerned, I am quite sure he dislikes the system of rebates, but in so far as a system of rebates applies both to shipments to Hamburg and to this country, it does not really come in in comparison. Would this country be more benefited than Germany by having tramp steamers in addition to the other lines?—No, not in ordinary times, I should say, because I suppose the ships which the British could charter, the Germans could also charter.

2335. There is practically only one way into Germany, which is *via* Hamburg, and possibly Bremen?—Yes.

2336. Therefore, there is not a great variety of ports through which the entry of the produce can go to Germany?—No.

2337. But in England there is a variety of ports?—Yes.

2338. So far as this country is concerned it might be not only Liverpool and London, but also Bristol, Hull, and possibly Aberdeen?—Quite so.

2339. Would not that make a difference?—I should say it would make very little difference. You could charter a steamer to most of the British ports at about the same rate; I do not think there would be very much difference.

2340. By a regular line of steamers could you get a service to Hull or Bristol?—No, we have not hitherto got a service to Hull or Bristol. It is only since the war that we have had regular line boats going to Hull, and I do not think one has been to Bristol at all.

2341. If you wanted the alternative of shipping to one of those other ports as well as to Liverpool, could you do it by a regular line of steamers?—No, not unless a special arrangement was made and the shipping companies agreed, as they have done in some instances since the war, to pay the freight from Liverpool to Hull.

2342. How does the arrangement work out of shipping free from Hamburg to Bremen in Germany? Do they tranship the produce from Hamburg to Bremen?—Yes; it is the same rate to Bremen as to Hamburg, I believe.

2343. That is what I mean; they get the same rate for produce to Bremen as to Hamburg?—Yes.

2344. Do they tranship at Hamburg?—Yes, as a rule.

2345. They simply throw the extra facilities in?—Yes, the Woermann Line pay the extra charges.

2346. Supposing, on the other hand, you had your regular line coming to either Liverpool or to London, would it be a feasible thing for Messrs. Elder Dempster, if you wanted cargo transhipped and sent round either to Bristol, Hull, or Aberdeen, to throw in that facility? If you were a shipper, do you think it could be done?—It could be done, but, of course, Messrs. Elder Dempster would prefer not to do it, because it means so much money out of their pocket. They would much prefer, if they can get sufficient trade to Liverpool (as they have hitherto), not to pay extra to send cargo to Hull or to Bristol or to other places.

2347. What I am driving at is this: as between this country and Germany employing tramp steamers, might it be a greater advantage to this country because it gives merchants a freer choice of ports?—Yes, if you were crushing the produce in those other ports, certainly.

2348. Then it would really depend upon whether crushing in those other ports can be done on a business basis?—I do not consider that it can, after the war.

2349. But it just depends on that.—Because they are too far from the consuming centres of the oil.

2350. So far as the West African Coast is concerned, do you think it would be a feasible proposition for tramp steamers to call there? Could they get cargoes enough?—As to the coast it could certainly be arranged. We have often chartered steamers for cargoes to Durban, where we have a crushing mill, and there has been no difficulty at all, but we have had to charter those steamers from Messrs. Elder Dempster owing to the rebate arrangement.

2351. As to the landing charges, can you tell us what your experience is? We have had general statements as to the landing charges being a greater cost at Liverpool than at Hamburg. About how much would you put that difference in cost?—I should say at about 2s. 6d. a ton.

2352. How would you compare the facilities at Liverpool with the facilities at Hamburg; what is your own experience as to putting cargo direct into lighters or having to put it on to the quay?—The Mersey Docks and Harbour Board have three elevators on lighters which they utilise for taking bulk wheat or maize out of ships and putting it into the lighters. When we have had full cargoes from John Holt & Co., and one or two cargoes in chartered boats we have utilised those elevators of the Mersey Docks and Harbour Board, and of course we have got very quick discharge. So far as the West African merchants are concerned, I believe they have been allowed so much off the Mersey Docks and Harbour Board rate—about 8d. or 9d.—but we could never get the West African merchants to agree to allow us that. There has been no difficulty at all in discharging with the elevator on a lighter.

2353. How much do you think ought to be saved by that method?—I think 1s. a ton ought to be saved by it.

2354. How do you make up the 1s.?—If you put the palm kernels on the quay you must bag them. Instead of bagging the kernels and putting them on the quay and weighing them on the quay and then emptying the bags into the barge again, if you are able to weigh the kernels as you are elevating them and loading the craft—because the elevator has a weighing machine—I consider 1s. a ton is quite a small allowance for it; but that is just my opinion.

2355. That leaves 1s. 6d. in favour of Hamburg even then?—Yes.

2356. How is that made up?—It consists of master-porterage and Mersey Docks and Harbour Board charges for inward dues. I have not those figures before me, but I could get them for you.

2357. As regards the actual market business in Liverpool and Hamburg, how far would you say that the existence of a regular market gives Hamburg an advantage over Liverpool, and, if so, can you put a figure upon it?—In my opinion it gives Hamburg an advantage of fully 5s. to 10s. a ton. The free market in Hamburg attracts speculators, dealers, and importers from everywhere. Palm kernels are dealt with on the Hamburg market much the same as Consols are dealt with on the Stock Exchange. You can buy or sell 100, 200, or 300 tons of palm kernels at any hour of the day when the Bourse is open in Hamburg; whereas in Liverpool if you want to buy palm kernels you cannot get hold of a speculator because there are no speculators in palm kernels, as the Liverpool market is not free enough, and you cannot get hold of a dealer, but you have to go to an importer. The importers talk amongst themselves; they say, "Levers are in the market for kernels and want a large or a small lot of kernels; we will see if it suits us to bring kernels to Liverpool"—and if it does suit them they make me a price. If I have an inquiry for oil, as a crusher I cannot quote for the oil before I know the price which I have to pay for my kernels, unless I speculate. Now, in Hamburg they can go on to the market and say, "What is the price of palm kernels," and then calculate up the cost of making the oil, and thus they can quote. They can get the price from dealers because there are so many people dealing in palm kernels. Perhaps a firm will cable for offers for oil

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and ask for a reply in twenty-four hours; the crusher can get the price of kernels and cable his offer, and then if the offer is accepted the deal is closed, and he knows what profit he is going to make; but no English crusher can do that because there is no free market here.

2358. You say you put the difference at 5s. a ton?—From my experience the English crusher is certainly at a disadvantage of at least 5s. to 10s. a ton.

2359. I can quite well imagine that that is a difference which would be real and yet would not be shown in what I may call the ordinary published lists of brokers' prices.—No, it is not shown there.

2360. Inasmuch as one price is not a real price, you cannot get that difference shown by the lists?—No.

2361. But on the whole you think that, whoever gets it, as between crusher and merchant, it tells in favour of Hamburg to that extent?—I should think to the extent of quite 5s. to 10s. per ton in favour of Hamburg. It also makes it very difficult indeed for a crusher to work in England.

2362. Is that all due to the fact that Hamburg is a big going concern?—That is so.

2363. If Liverpool were rendered a big going concern in just the same way, then Liverpool would have that same advantage?—Certainly. Although Hamburg is quite a free market the only way I have been able to cover my oil at any time has been to buy Hamburg palm kernels forward, and then, when I could buy a cargo coming to Liverpool, I have had to sell my Hamburg palm kernels, and make my loss or my profit, as the case may be, upon them.

2364. Supposing you did, after the war, get a Liverpool market which was at all like the Hamburg market, that market could operate perfectly well, even though some of the crushing might be done in Bristol or in Hull?—Quite.

2365. Just as in Hamburg, it operates perfectly well, although you get some of the produce shipped to Bremen?—A very great deal of the business in Hamburg is done through Liverpool. The way the business is done is this: Every morning wires come to the brokers in Liverpool from brokers in Hamburg, making bids for palm kernels or asking prices for palm kernels. Nearly all the West African importers are in Liverpool, and the Liverpool broker goes to the West African importer and says, "I have these inquiries; what price will you take?" and then cables go out with the offers to Hamburg. That business could be done in exactly the same way if palm kernels were wanted at different ports in England.

2366. Now, as to the crushing business, I believe you began in 1912 to crush palm kernels?—Yes, early in 1912 we began to crush palm kernels. We crushed cotton seed and other seeds before that.

2367. Of course, you test your palm kernels for shells, dirt, and free fatty acids?—Yes.

2368. Do you also test the cake after manufacture?—We test the cake for oil.

2369. I suppose you have never tested palm kernels themselves for oil?—Certainly, we test every lot of kernels for oil.

2370. How much should you say the oil content was?—It varies.

2371. Would you say, taking one lot with another, the oil was 48 or 49 per cent.?—Very often palm kernels will have 49 per cent. of oil, and I have known palm kernels go up to 50 per cent. of oil, and down to 47 per cent., some even down to 46½ per cent.

2372. But 48 to 49 per cent. is a good average?—Yes, that is an average.

2373. With regard to the percentage of oil and the percentage of cake, have you got what one would call a more or less steady percentage, taken over the whole year?—Yes; I think 45½ and 54½ per cent. you may take as a fair average of the mixed palm kernels which we crush.

2374. I suppose you take all the oil you can get out of your palm kernels?—Yes.

2375. Is there any point below which the value of the cake produced begins to fall?—We have never found it so. We have had no complaints about the low percentage of oil in cake.

2376. As a matter of fact you have not really sold out cake averaging under 5 per cent. of oil?—No. We have got a little cake down to 4½ per cent., but it is very difficult, and I should say our cake average is at least 6 per cent.

2377. Taking it over the whole, it is 6 per cent.?—Yes, on the whole.

2378. Have you any experience which would enable you to give an opinion as to what the effect would be if you could get a compressed cake made from extracted meal with only 2 per cent. of oil?—You cannot make a compressed cake from meal.

2379. Supposing you could get a cake from meal, and supposing that in one way or another you could in your feeding stuffs get it down to 2 per cent. of oil, have you any knowledge at present as to how far that would affect the price?—The opinion of big cake-makers, and the opinion of Mr. Bibby (whom you may have as a witness), is that you cannot make cake from extracted meal.

2380. I was thinking of its feeding value, whether as cake or as meal.—The reason is that the extracted meal is so fluffy and light that instead of a cake of about that thickness (*illustrating*), you will have a cake about three or four times as thick. It is lighter, and they do not like it. When the cake is made from extracted meal it powders very much, and the powder gets up the nostrils of the animals, and they do not like it. That is one great reason why extracted meal is objected to when it is fed alone, but if it is mixed with molasses or something of that kind to make it sticky and keep it together, it is different.

2381. So far as the oil is concerned you cannot say whether the lack of oil is an objection to meal at present?—No, but I should think it is some objection.

2382. But you cannot put a value upon it?—No.

2383. We have heard a lot of talk about oil-crushing machinery not being up to date in this country. I have seen your machinery, so I know that it is good, and is of the best; but do you know whether it is up to the German machinery from the point of view of working?—Our opinion is that we can get a greater output from our machinery than they get from any German machinery that exists.

2384. Would you say that there was any other machinery in existence at the present time of about the same character?—Not in this country. I should like to say that owing to the greater pressure and the more rapid way in which we work our machinery the repairs are perhaps more costly than is the case with the German machinery in the way they work it.

2385. But if you work yours more rapidly your actual cost, even giving in the repairs, ought to be less rather than more, because otherwise you would not work it so quickly?—Quite so.

2386. How far does the machinery enter into the question? Taking the old kind of presses of a good type, before you put up your machinery, how much more would you say it would cost per ton?—I mean the kind of machinery where you put the stuff in in bags and squeeze the oil out. Would it cost 5s. a ton more to manufacture?—I should say about 5s. a ton more.

2387. And it would leave rather more oil, too?—It would leave rather more oil in, and you would not get the output.

2388. Apart from your newest machinery, taking it all in all, how much per ton would you say the Germans were better off than we are in regard to crushing? Can you put a figure upon it?—I should say the Germans might be 5s. to 10s. a ton better off with their most up-to-date machinery.

2389. But on the whole you now think you about equal them with your new machinery?—Quite.

2390. Have you done any extracting?—Yes, we have an extraction plant.

2391. In your own experience, does extraction cost more or less than crushing?—It is a comparatively small extraction plant, but our own experience is that it costs us about 50 per cent. more to extract the oil.

2392. Is that the experience of Messrs. Bibby, too?—It is; 50 per cent. more. I will give you the

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figure; it is about 30s. a ton, which is Messrs. Bibby's experience.

2393. Then why do they do it?—Messrs. Bibby's crushing plant is not very large, to start with, and they are compound cake-makers, and can use up all sorts of meals. There are many seeds and nuts from which Messrs. Bibby can extract oil, which they could not possibly crush, because it would not pay them to do so. It does not pay you to go off one small lot of nuts to another small lot of nuts, because with crushing machinery you want to keep it going on one nut or seed; whereas in the case of extracting the oil you grind the nut into meal, put in your solvent, and get your oil out, and you can alter it at almost a moment's notice.

2394. You can alter your rollers, you mean; could you use your palm-kernel crushing machinery for crushing copra?—Yes.

2395. Economically?—Yes, quite.

2396. But not for ground nuts, I suppose, because that is rather a special thing?—It is rather a special thing.

2397. You could use the machinery for things like copra?—Yes, and we could utilise our machinery for ground nuts, too.

2398. And for soya beans?—Yes.

2399. Roughly, it means that any machinery that will crush palm kernels will do for other seeds, palm kernels being the hardest?—Yes; it is only a question of altering the rollers.

2400. As to the chemistry, when it comes to refining the oil, how much a ton would refined oil run to more than crude oil?—They are charging anywhere from 5*l.* to 10*l.* a ton more for it.

2401. How much of that difference is due to waste, and how much of it is due to the actual cost of the process?—There are many processes, nearly all of which are secret processes, and some of which give more waste than others. It is very difficult to tell you about it, but I can give the figure of the cost of refining, roughly, which I should say is anywhere from 30s. to 3*l.* a ton, including the loss. There is only the free fatty acid and the soap stock you get out of it; there is no great loss of weight, but you get a by-product which you have to sell at a very much lower price than the refined oil.

2402. Then it comes to this, that the chemistry is a very important part of the whole business?—A very important part. Chemistry, and experience in refining is what you want.

2403. Then there must be a very large margin of profit in this?—Yes; refining is very profitable just now, anyhow.

2404. Before the war, how did we stand as regards Germany in the matter of chemistry as applied to refining?—I consider we are quite equal to Germany in refining. We have here the American process for refining, and the Americans, in regard to some oils, are a long way ahead of the Germans. We also have the Danish process and the German. Then we have the Erith Oil Mills, and their experience. So I consider our experience is quite equal to that of the Germans, and that we can refine oil equally well.

2405. You do not think we are at all handicapped in that way?—I do not. We bought a German process, a very up-to-date process, from a firm who refined the oil for Messrs. Jurgens and Messrs. Van den Berghs, the big margarine makers.

2406. I suppose it is possible to buy a lot of processes which do not always come off when it comes to refining the oil?—We generally see that they will come off before we buy them.

2407. German oils have habitually been sold f.o.b. Hamburg at a price lower than oil has been selling at in Liverpool?—No, that is not so. Of course, until the war we bought most of the oil produced by the German oil mills, and a certain quantity I generally found I could buy cheaper from the African Oil Mills than from Germany or anywhere else. Very often the African Oil Mills' price was 2*l.* or 3*l.* a ton less than that at which I could buy it from Germany.

2408. Do you think that would represent the normal price, or would it represent advantages which

the African Oil Mills get through their connection with the carrying trade?—I can say that at the time I could buy oil at perhaps 33*l.* a ton, we, with our up-to-date machinery, and all sorts of facilities for making it, would be finding it cost us perhaps 36*l.* or 37*l.* a ton, but where the difference came in I do not know.

2409. Therefore, on the whole, the fact that you could buy African Oil Mills' oil below the German price is not an answer to my suggestion that the British price was probably higher than the Hamburg f.o.b. price?—No.

2410. The case you give is an exceptional quotation?—Yes, quite exceptional. The better answer would be this, that I could nearly always buy oil from Germany f.o.b. at less than it cost me to crush.

2411. It is crude oil which we are talking of now?—Yes.

2412. What do you put that down to—better crushing?—No; I say we can crush equally well. I put it down to the free market in palm kernels, and to the extra cost of handling—that is, the 2s. 6*d.* a ton I have spoken of—as against Liverpool, where there is no market at all, in fact.

2413. Would that really account for it? I am now getting down to facts apart from generalities. If I take 2s. 6*d.* for the landing charges, and say 7s. for the value of a constant market, that would be 9s. 6*d.* per ton for the advantage which Hamburg has in respect of palm kernels. On a 45 per cent. oil product that means 1*l.* on the oil or thereabouts—a few pence more or less?—Yes, roughly.

2414. Though that might account for 1*l.*, would it account for the whole of the difference in price?—Of course, there were occasions when Germany, for some reason or other best known to itself, dumped oil on the British market, and then there would be a greater difference.

2415. Was the export price habitually lower than the internal price?—Yes.

2416. That is quite apart from the dumping, which means selling below cost?—Yes, quite apart from the dumping.

2417. (Sir Hugh Clifford.) With reference to the employment of tramp steamers, the employment of any tramp steamer by a firm on the West African Coast entails the loss of twelve months' rebate, does it not?—It is twelve months or longer.

2418. It is not longer than that, I think?—It is at least twelve months.

2419. I notice that in your notes which you sent in you say you consider that at the present moment freight is paying for passengers, and that the industry is considerably crippled by the shipping monopoly that exists?—That is my opinion.

2420. I take it you do not see any practical way by which that difficulty could be removed?—The only practical way is for the people who control the produce each way, that is, the produce shipped out there and the produce shipped home, to join together and arrange for a line of cargo boats that will carry the stuff cheaply. That is the only way I can see.

2421. And at the same time forfeit their rebate?—I think it would pay them to forfeit their rebate.

2422. That is practically the only way in which you think the shipping monopoly could be combated?—Unless the present shipping companies would agree to the merchants chartering boats and thus having a free market for freight.

2423. I am afraid that is not a very probable contingency.—No, I am afraid it is not.

2424. You said the cost of obtaining oil by extraction was about 50 per cent. higher than the cost of obtaining oil by crushing?—Yes. I calculate that today it is round about 20s. for crushing and 30s. for extracting in Liverpool.

2425. Is the oil produced by extracting more valuable than the oil which you get by crushing?—No. They generally want it at about 10s. to 1*l.* a ton less. For soap-making it is just as valuable.

2426. It is more expensive to produce and less valuable when produced?—But you get more oil out of the palm kernels, that is to say, a larger percentage of oil.

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2427. Taking that into account, is it a paying process as compared with crushing?—I have a calculation here, and I make it that it gives you oil at much about the same price; but if you extracted large quantities I do not think it would be possible to get rid of the meal. You can sell small quantities of meal, which, of course, is mixed in and lost sight of; but I should say it is an impossibility to sell large quantities of meal.

2428. Is the process of extracting oil being conducted on a large scale in Germany?—On a fairly large scale, but I should say crushing is on a much larger scale in Germany than extracting.

2429. Do they make much use of their meal in Germany?—Yes. Of course, they must make use of it.

2430. They never attempt to make it into cake?—No. I think they mix it with the meal made from the cakes. They grind the cakes up and mix the extracted meal with the meal they thus make from the cakes.

2431. The crushing continues to be much the more important of the two methods?—I should say so.

2432. As regards the Congo, are you able to tell us at all what the position is as to the production of palm oil and palm kernels there, or is all your information of a confidential character which you would rather not divulge?—I can only tell you in a general way that we are going ahead there very rapidly now, and in the course of the next two years we shall have large quantities of oil from the Congo and considerable quantities of palm kernels.

2433. What I rather wanted to get at was, what is the position of the Congo as a possible immediate future competitor with the West African Colonies in the matter of the production of palm oil and of palm kernels? Are you in a position to give the Committee any information on that point?—I do not think that it will be a very strong competitor under perhaps a couple of years.

2434. But, after all, two years is nothing.—After two years, I think, the Congo will be a competitor.

2435. Take the next decade.—I think we shall get huge quantities of palm oil from that quarter, undoubtedly.

2436. Is there a sufficient native population to work it?—Yes. Since the rubber industry has been practically killed there is sufficient population, but we have had great difficulties, of course.

2437. Are those difficulties likely to be overcome?—They have been more or less overcome now.

2438. Do you know at all what the price of labour is in the Congo, as compared with the labour in Nigeria or the Gold Coast? I daresay you are aware that in the Gold Coast it ranges from 1s. 3d. to 1s. a day, and is considerably cheaper in Nigeria.—I cannot give figures, but I should say the cost of labour in the Congo is much cheaper. We have other expenses, because we are building schools and hospitals, and we keep medical attendants, and are trying to stamp out sleeping sickness and all diseases, and that is very costly.

2439. Is your labour a sort of indentured labour?—No.

2440. Is it free labour from the villages surrounding your land?—Yes; it is free labour from the villages around us.

2441. Have you any means of compelling the native to work?—No means at all.

2442. Have you any difficulty in inducing him to work?—We have had great difficulty, but we are reaping the benefit of our energies.

2443. How do you propose to overcome those difficulties?—I say we have overcome them. The natives have gradually got educated. At one time we had at our place at Loverville perhaps one thousand natives, and then in a month we have had perhaps fifty; then they will go away to different villages and tell their relations and friends, and we shall have another big lot come. They are gradually getting educated to the fact that it is a good thing to work. Of course, we are showing them pretty things to buy, and that sort of thing, and they want to earn money to enable them to buy these pretty things. That is what it comes to. We are gradually overcoming the difficulties.

2444. A regular labour supply has been the principal difficulty, I suppose?—Yes, that has been the principal difficulty. There is no difficulty as to fruit; of course, the fruit is in large quantities.

2445. With regard to the erection of crushing machinery on the Coast, what you are putting up is machinery for expressing the oil from the pericarp?—Yes, for pressing the oil from it—not extracting it.

2446. Not extracting, but expressing the oil from the pericarp?—Yes; and we also have nut-cracking machines.

2447. Have you machinery that is perfected for that purpose?—Yes, we consider we have now.

2448. Is it more than in an experimental stage?—Much more.

2449. Is it giving satisfactory results?—Yes, very satisfactory.

2450. Are you getting a sufficiently regular supply of fresh fruit?—Quite sufficient. When I say "quite sufficient," I mean it is increasing every week.

2451. Is the oil which is being produced from the fruit satisfactory in every way and suitable for edible as well as other purposes?—Yes. We are now gradually getting more very fine oil from the Congo.

2452. What percentage of free fatty acids do you get?—We have had some over here with as low as 8 per cent.

2453. (*Professor Dunstan.*) You said with reference to oil in Germany that you could buy it cheaper in Germany than you can produce it here; I am speaking of palm-kernel oil.—I have hitherto been able to do so.

2454. Do you attribute that entirely to the cost of entry of palm kernels to Liverpool and the attending expenses, and not to the better skill or better machinery of Germany?—Not at all to the better skill. I attribute it principally to the poor market that is here, and the difficulty of buying palm kernels in Liverpool.

2455. That is to say, the internal arrangements at Liverpool?—That is so.

2456. With regard to the Congo, are you proposing to ship palm kernels largely from the Congo, or do you intend to crush them in the Congo and ship the product here?—We have no intention at present of crushing palm kernels in the Congo.

2457. You say the Congo will be a competitor with the West African Colonies in future, as far as the export of palm kernels is concerned?—That is so.

2458. You are proposing to send a large quantity of palm oil into this country from the Congo?—Yes.

2459. Will that be what one may call refined, or better prepared palm oil, which is suitable for edible purposes as well as for soap-making purposes?—The best of it will be suitable for edible purposes, but we may have stale fruit, and, of course, we shall not throw it away; we shall de-pericarp that, and press the oil out. We expect, however, that most of the oil will be suitable for edible purposes, and certainly some which has come over has been quite suitable. I should say we have had it quite equal to the oil which has been used for edible purposes in Germany, and, in fact, it has been used for some years in Germany for edible purposes.

2460. Shall I be prying into any secret if I ask you for what purpose that edible oil will be chiefly used?—For margarine-making; it is absolutely the best for the purpose.

2461. (*Sir Hugh Clifford.*) It requires no colouring?—It is not altogether a question of colouring, but it is the texture of it; it has the consistency of butter, and is the nearest thing to butter.

2462. (*Professor Dunstan.*) Will it not be a very serious question to be taken into consideration in connection with palm-kernel oil, that in the future there will be a supply of another oil, namely, palm oil, which can be used for the same purpose, and which can be produced possibly rather more cheaply?—Yes, but there are other oils which may easily come into the market later on in a very large way as competitors with palm-kernel oil. There is the cohune nut, of which there are millions of tons under the trees in Spanish and British

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Honduras, and it is only a question of finding a way to collect them; they have a cracking machine, and it is only labour they want there.

2463. There is the question of labour and the difficulty as to the distribution of the trees?—Yes.

2464. Of course, palm oil is a very important product of the West African Colonies?—Yes.

2465. And it will be a serious competitor with palm-kernel oil if it can be produced of a quality which enables it to be employed in the manufacture of margarine?—I quite agree.

2466. So from that point of view it is desirable for this Committee to keep its eye on the question of refined palm oil?—I agree. It comes to this, that the West African Colonies, if they produce better palm oil, may make more of the palm oil and less of the palm kernels.

2467. Exactly. As you mentioned the subject of cohune nuts, I should like to say that we do not at present know exactly what the cost of handling the cohune nut is going to be.—No.

2468. The difficulty of shelling it, for instance, is very much greater than the difficulty of shelling the palm kernel.—Yes.

2469. So at present we cannot say with any accuracy that the cohune nut is a probable competitor with palm kernels.—No, but I would like to tell the Committee that there is one apparently serious competitor which is just coming into the market, and 3,000 tons have already lately been imported into Liverpool—3,000 tons of kernels, not nuts—and that is the babassu nut from the Brazils. A firm in Brazil wrote us about six weeks to two months ago, and said they would undertake, and get a bank to guarantee, delivery at a price, of 10,000 tons a month. Now, that is a very important quantity—nothing has come of that inquiry yet, but the price at which they were offering the babassu nut, compared with the price of palm kernels, was roughly about 2*l.* a ton cheaper than the palm kernels, or the equivalent of 2*l.* a ton. If that business materialises to the extent of 10,000 tons a month, it is going to interfere with palm kernels very much indeed. The babassu nut produces a magnificent oil.

2470. I have only recently heard of this arrival in Liverpool, and I cannot at present find any information with regard to the distribution of this tree in the Brazils. Have you any information you can give the Committee upon the subject?—No, I have not inquired into it very deeply, but we are just now crushing about 500 or 600 tons of the babassu kernel, and are investigating the matter.

2471. Are there any other seeds which you would mention as likely to be important competitors of palm kernels?—There is copra, of course. A good deal of copra is produced in our own colonies, such as the South Seas. Copra can be produced at a price to compete with palm kernels. If one had planted copra, say, 10 years ago the cost of copra brought into this country would be very much below to-day's cost of palm kernels, but the market value of copra is about 7*l.* a ton more than the price of palm kernels at the moment. I would only point out that if there was too much copra it would be a big competitor of palm kernels, and would reduce their value materially.

2472. Is it not true that at present the value of palm kernels would, to a large extent, be determined by the scarcity or abundance and cheapness of copra?—Yes; they go together very much.

2473. For the manufacture of margarine and of soap it is equally valuable?—Equally valuable. Sir George Watson may tell you that you can use all palm-kernel oil for manufacturing margarine, but our experts tell us that you cannot use more than 50 per cent. of palm-kernel oil. I mean if you use, say, 50 per cent. of palm-kernel oil and coconut oil in margarine-making, only half of it should be palm-kernel oil; that is to say, you must use some coconut oil, because it is necessary to make a good article.

2474. (Chairman.) To get a good article you can use as much as 70 per cent., say, of coconut?—Yes.

2475. But if you want to substitute palm-kernel oil

for coconut, you can only substitute it up to 50 per cent.—Exactly.

2476. (Professor Dunstan.) Can you explain why that is?—No. I am not a margarine expert, and cannot tell you exactly why it is. I think it would be very difficult for an expert even to tell you. You can only know by experience and testing.

2477. It is not a question of texture in the margarine?—It may be partly texture. Of course in the summer time it is necessary to use some palm-kernel oil, because it is better for the hot weather.

2478. With regard to the competition of other seeds, have you anything to say about ground nuts?—Ground nuts do not compete, and could not be substituted. To some extent hardened oils might be substituted for palm oil.

2479. I was coming to that later. The chief difficulty about ground-nut oil, I suppose, is that it is not a solid oil?—No; it is a liquid oil.

2480. As you have just hinted, if it were hardened it might then become important?—It might then become a substitute.

2481. Generally, what are your views on the question of hydrogenation in its bearing on the palm-kernel oil business? At the present time I understand a very large quantity of fish oil and linseed oil is hardened and employed as edible fat?—Yes, a very large quantity of fish oil. Whale oil makes a magnificent hardened fat. We own 50 per cent. of a Norwegian firm who are without doubt the best fat hydrogenators in the world, and make a better product than has ever before been made. They are producing to-day, roughly, 40,000 to 50,000 tons of hardened fat in a year.

2482. Principally from fish oil?—Principally from whale oil, and it has been used very largely indeed on the continent for margarine-making, though not in this country. It is used in this country for various purposes. A great many cooking fats are sold in Scotland more particularly, and it is used there, and some of the smaller margarine firms, I believe, are buying it through dealers. We are getting the whole of that produce back into this country now. The whales are caught in our Colonial waters, or practically the whole of them—about 85 per cent.—and licences are given to the Norwegians to catch the whales. The Government would not agree to renew these licences unless the whole of the whale oil came to this country; they would not allow it to go to Norway, although the whales were caught by the Norwegians. We eventually got the Government to agree to allow us to send the oil to Norway on condition that we brought it all back into this country, so we are bringing it back, and that oil to some extent is a competitor of palm-kernel oil, and might become so to a much greater extent.

2483. In view of the very large supply that we could get of fish oil, and the possibility of converting it into a suitable fat for the manufacture of margarine by hydrogenation, is not that an important aspect of the matter for the Committee to attend to?—You have to get the margarine manufacturer to use it, and there is a very great objection to using it in this country.

2484. What is the objection to its use?—Because it is fish oil.

2485. (Mr. I. Couper.) What do you do with the palm-kernel cake which you produce?—We have sent it to Germany, and sold it in Hamburg. We shipped it from the coast to Hamburg, and sold it there.

2486. Was the freight heavy on such a low-priced article?—Very heavy.

2487. Would you say that the freight on cake plus the freight on oil was largely in excess of the freight on palm kernels?—Yes, certainly.

2488. So there is that disadvantage to local manufacture?—Yes, there is that disadvantage.

2489. Your firm, in a very praiseworthy fashion, I think and always have thought, established certain mills in West Africa?—Yes.

2490. There was a good deal of criticism about it at the time?—Yes.

2491. The experience you have had in Nigeria has not been altogether satisfactory in regard to the machinery?—How do you mean with regard to the machinery?

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2492. Shall I say it was due to climatic and other local conditions?—The machinery is all right there, and you can work it all right. Climatic conditions did not interfere.

2493. There were other difficult local conditions, such as native labour and skilled labour?—Skilled labour was a difficulty. Of course, we had to employ more white men than we should have done, as we had to send out small overseers, such as spell foremen, whom we should not employ in this country in the business of crushing. We had to teach the natives, in other words, and, the machinery being a little intricate, the natives were careless and so the machinery got broken, and there were a good many repairs. It is very difficult to teach the natives how to work and handle the machinery.

2494. Like all of us interested in West Africa, you found the difficulties in connection with the staff were very large?—Yes, for the white staff.

2495. You have now ceased working for the moment in Lagos and Opo?—Yes.

2496. At Ajua you had a little plant?—Yes; that is, for depericarping—for palm oil and kernels.

2497. You told us that was successful?—Yes, quite successful. We bought a concession there which enables us to collect the fruit from the trees ourselves and employ natives to do it. That makes it satisfactory.

2498. Do you find the conditions in the Congo as to labour better than in Nigeria, or are you up against the same conditions there?—The low price of labour has helped us very much indeed in the Congo. We have found labour much easier since the price of rubber has fallen, so that it does not pay to bring rubber from the Congo.

2499. But you have to send the same number of overseers to the Congo?—Yes.

2500. Then there is some other reason than that question of labour for your continuing in the Congo and being hopeful as to your prospects there?—They are two different propositions. At Lagos and Opo it was crushing the kernels; in the Congo it is depericarping the fruit, making the palm oil, and cracking the nuts.

2501. But you ship the kernels?—Yes. We do not crush the kernels to make kernel oil in the Congo.

2502. You ship the kernels from the Congo to England or to Durban?—We bring them over to England if we can get freight.

2503. Is it less expensive to bring palm kernels from the Congo than from Nigeria?—No, it is more expensive. Part of our concessions are about 15 miles up the Congo.

2504. Has the question of getting fresh fruit had a great deal to do with it?—Yes.

2505. I understand a better oil is produced from the fresh fruit?—Yes.

2506. Perhaps that is one of the great advantages of having local machinery?—Yes, for making palm oil.

2507. Has it any reference to the palm kernels?—Yes. I consider it makes a much better oil to crush the kernels on the coast; in fact, the oil I have sold in this country that was crushed on the coast, I was easily able to make 1*l.* a ton mere for. The refining was much easier; the kernels were fresher, and made a better oil.

2508. Would it be fair to suggest that your concession rights in the Congo are much more favourable than anything you could expect in Nigeria or on the Gold Coast?—There is no question about it; they are absolutely more favourable.

2509. And possibly that is a factor of the highest importance in comparing the two?—We should most certainly have put our money into British Colonies if we had been helped by the Government with the concessions in a similar way to those we have on the Congo, and we should have been only too delighted. We opened up in Sierra Leone, and spent a big lot of money there, but it was quite impossible to get the natives to bring in fruit; they would not bring a bit in.

2510. Of course, you found an entirely different condition of affairs in the Congo to the conditions in the more civilised and older British Colonies?—Yes.

2511. So you could hardly expect, perhaps, the same privilege in the one part as in the other?—No, but we might have had similar privileges.

2512. We have heard something about the importance of the part which the chemist plays. Are your chemists working all the time on new ideas?—We have a research laboratory, and a great number of our chemists are always working at new ideas.

2513. Do you look for further development in the uses of edible oils?—Yes.

2514. You do not think margarine is the ultimate purpose, necessarily?—We are always looking for improvements and progress in everything.

2515. In view of the history of the last few years, further progress in that direction might reasonably be anticipated?—Yes.

2516. If protection is to be sought and obtained, would you put a Colonial duty on exports, or a duty on imports here?—I should certainly not put a duty on imports here. If I had to decide, I should prefer an export duty. You mean a duty on exports to foreign countries, and that it should come free to this country.

2517. Exactly. Would not that damage the palm kernel as against other edible nuts?—I suppose whatever duty was put on would have to come out of the pockets of the natives. If the competitive nut is to be considered, I think it must be so—I mean that which is produced somewhere else, like copra.

2518. Is there an ascertainable daily market price for palm-kernel oil in this country?—No. There is a nominal price, but it is very little guide. I have known a nominal price of 38*l.* a ton on the market, when I have bought perhaps two or three thousand tons at 34*l.* or 35*l.*; that is, 3*l.* a ton less than what the broker would tell you is the value.

2519. We heard something from Mr. Trigge as to co-operative arrangements which he had endeavoured to enter into with the millers.—There has never been any reasonable proposal from Mr. Trigge or anyone else—or any West African merchant.

2520. Is co-operation practicable?—I think co-operation might be practicable, yes.

2521. You do not think the interests of the millers and of the merchants are so divergent that it would be impossible for them to co-operate?—I think if it could be arranged for the interests of the miller and the merchant to be identical, it might help things very materially.

2522. (Mr. T. H. Middleton.) What is the daily capacity of the new crushing machinery which you referred to in your examination-in-chief? If you can answer that question I should like to know it.—It depends upon whether we are crushing palm kernels.

2523. I was thinking of the crushing of palm kernels.—I am not prepared to give you the exact capacity, but I can tell you that it is more than 1,000 tons a week.

2524. The extraction plant is quite small, I think?—A few hundred tons a week.

2525. Then your considered view is that future development will be rather in the direction of crushing than of extraction in this country?—Yes, the main reason being that you cannot possibly get rid of the quantity of meal.

2526. The market for meal, that is, the pig market, being too limited?—Yes, much too limited.

2527. You were asked as to the reasons which enabled the Germans to get rid of their meal. Is it not the case that the meal is largely used for pig-feeding in Germany?—No doubt; but it has to be mixed with other cakes and other meal.

2528. And made into gruel, I should think?—I expect so. You cannot get rid of it by itself in quantities.

2529. There is a large market in Germany for extracted meal. We have had evidence to that effect.—Yes.

2530. You do not expect a market for it in this country?—There has been a very large market in

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Germany. In fact, Germany has been the only market for the cake and the meal.

2531. Your general object is to get out all the oil you can and to leave as little oil in the cake as practicable?—That is so, because the oil is so much more valuable than the cake—that is the reason.

2532. Precisely. I suppose you analyse the samples of cake regularly as they come out?—Yes.

2533. What is the usual variation in the percentage of oil?—Anywhere from 5 to 8 per cent. I have known it go up to 9 per cent. when there has been something wrong. Of course, there is a very handsome profit to-day on crushing, and it is a question whether it does not pay you to leave a little more oil in the cake and get a bigger out-turn. The less oil in the cake the smaller the output. If you get it down to 10 per cent. you could increase your output very much indeed.

2534. So that when prices are favourable you pass the cake through quickly and do not extract so much oil?—Yes.

2535. It is not some difficulty in connection with the seed which prevents you from getting it to a uniform quality?—No; but it is very difficult to get the oil down to an exact percentage. You could get it to an average of about 6 per cent. with up-to-date machinery.

2536. About what is the temperature at which you work?—The exact temperature we work at is a special secret of the crushing trade. I can tell you, roughly, that it is about 100° Centigrade; that is within 10 points.

2537. Who buys your cake; is it the compound cake manufacturer or the distributor to the farmer?—We sell some cake direct to the farmers, some to dealers, and some to the compound cake makers.

2538. Who have been your largest customers in the last six months, or has there been any variation within the last six months?—There has been a greater demand from the farmers than from the compound cake makers in the last six months, for the simple reason that the compound cake makers made large contracts for the purchase of cake nine, ten, or twelve months ago, and they are getting deliveries.

2539. You have noticed a distinct increase in the demand from farmers?—Yes, a big increase. We have no difficulty in selling all the cake we can offer.

2540. And that, I suppose, accounts for the increase in the price?—Yes, we have been obliged to put up the price as the only means of stopping orders. We cannot supply all the orders, so we put up the price to stop them coming in, but they still come in.

2541. The competition of palm oil with palm-kernel oil was mentioned. Would the success of the palm-oil trade tend to cheapen the production of palm-kernel oil?—If you take the two together, yes.

2542. If you make more of the palm oil, you can sell palm kernels for less?—You are speaking of the natives, I suppose.

2543. I am speaking of the manufacturers of palm oil.—But the manufacturer of palm oil perhaps does not possess the kernels.

2544. I was under the impression that you bought the whole fruit.—Yes.

2545. You extract the oil from the pericarp?—Yes.

2546. And then you sell the kernels?—Yes. If you take the whole proposition together, I do not think the quantity, except from the Congo, is going to be very large. It is not an important quantity of kernels that you will get from that source.

2547. If palm oil came into the market in such quantities as to prove a serious competitor to palm-kernel oil, there would at the same time be this compensation, that the palm kernels would be cheapened and palm-kernel oil would be lessened in cost, thus the trade would right itself?—Yes, no doubt it would right itself.

2548. (Chairman.) What you mean is that, after all, you cannot get your palm oil without also having your palm kernels, and you are not going to throw them away?—Quite so.

2549. That is what it comes to; so if you use your palm oil, you have to use the palm kernels also at one price or another?—Yes.

2550. (Mr. T. H. Middleton.) So we need not fear a great increase in the production of palm oil in competition with palm-kernel oil?—No.

2551. I am very ignorant of the prices of these commodities. Is there any source from which we can readily get the yearly variations in price of palm kernels and palm-kernel oil?—Yes, you can get it from any broker.

2552. Is there any published source such as there is, for example, in the case of sugar? If I want to get the price of sugar 88 per cent. f.o.b. Hamburg at any particular time I can turn it up at once?—Any Liverpool broker will give you the nominal price of the oil and the actual price of the kernels.

2553. Is there any printed information on the subject?—The brokers issue circulars from week to week, but they are far from correct. There are some papers published, but I should be very pleased to supply the information to you if you want it.

2554. I think it would be useful to the Committee to have the variations in prices.

2555. (Mr. G. A. Moore.) There is a small paper which has just been started in Liverpool, but it is quite new and does not yet cover the ground.—You cannot depend upon that paper.

2556. (Mr. T. H. Middleton.) If there is any printed information readily accessible to all of us I should like to know where it can be found.—If you want to go back for a number of years the only information is that contained in brokers' circulars, which go back a long time.

2557. (Chairman.) The price of oil in the brokers' circulars is more or less a nominal price, you say, and we could not take it that business was habitually done at that price?—The price might be one way one day and another way another day. I should be pleased to give the Committee information as to the price at which I have actually bought oil on different dates, and you can compare those prices with the nominal prices in the circulars, and then you will see the differences.

2558. (Mr. T. H. Middleton.) Can you give the name of the Brazil plant which you mentioned in evidence to-day?—I am afraid I cannot. I only know it as the babassu nut. It is like a small coconut, with a very hard shell like the cohune nut, as hard as boxwood. I had one sawn through. Then there are five or six kernels in the middle embedded in this hard wood. It gives a splendid edible oil.

2559. (Mr. T. Worthington.) You said that the advantage to Hamburg in favour of the crusher was some 5s. to 10s. a ton, and you attributed that advantage, outside certain additional charges in Liverpool, mainly to want of a free market in Liverpool for palm kernels?—Yes.

2560. How do you think a free market could be brought about in Liverpool? Is it entirely a question of making a larger consumption here, or is it also a question of the difficulty of transport from Liverpool as compared with the transport from Hamburg to continental markets?—I think if we can get a demand for the oil here, and if we can get crushers to crush more kernels, then we should get a market. I see no reason why we should not if once we get the demand for the oil.

2561. In other words, if we could increase our consumption of margarine?—That is so.

2562. Or if we could supply the whole of our demand for margarine in this country?—Yes, if we manufactured all the margarine used in this country and could increase its consumption, then we should solve the question.

2563. You think then we should have sufficient for a free market?—I think so.

2564. If you were able to make that amount of oil could you get rid of the corresponding amount of cake in this country?—I think the farmer is gradually being educated up to using the cake. It is very fortunate for palm-kernel cake that there is practically no other cake now available. There is no undecorti-

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cated cotton cake available, or very little, and the farmer cannot get it, so he is obliged to use palm-kernel cake.

2565. There is copra cake?—Very little copra cake.

2566. With regard to the babassu nut, you said 10,000 tons a month were offered to you. Was it offered by a British firm?—No, by a firm in Brazil.

2567. But was it a British firm in Brazil?—I am making inquiries about the firm. I never trade with a firm without making full inquiries. This firm is evidently a firm of some standing, because it sold the babassu nut through very respectable brokers in Liverpool to the extent of 3,000 tons. It has not an English name.

2568. One is a little suspicious of these things because one knows Brazil a little.—Yes.

2569. (Mr. T. Walkden.) The Chairman questioned you as to the difference in the facilities at Hamburg and at Liverpool, and you mentioned the facilities given for shipping beyond Hamburg, say to Bremen. Did not the same thing rule up to a few months ago in Liverpool with regard to transit arrangements?—Not to my knowledge with regard to kernels.

2570. Did not Messrs. Elder Dempster give you a transit arrangement for shipping to Hamburg previous to the war?—Yes, I think there was transit to Hamburg, but no transit to Hull, Bristol, Dundee, or Aberdeen, where all our crushing centres are.

2571. You will remember that Sir Alfred Jones was very anxious that this trade should come to Liverpool—not only the trade in palm kernels, but in other products, and that is the reason why he gave these transit facilities.—Transit facilities to Germany?

2572. No, transit facilities even to the east and south coast parts.—There were no transit facilities for palm kernels.

2573. Do not you think it quite reasonable that, as previous to the war, Messrs. Elder Dempster granted transit facilities to Hamburg and to America and to Marseilles and other ports, after the war they should do the same thing, say, in the case of Hull or Bristol, because it would not be carriage for such a long distance as transit facilities, say, to New York?—I do not know whether Sir Owen Philipps would be prepared to do that.

2574. It would be only reasonable, if they did it previous to the war so far away as to America?—Yes.

2575. Do you think it feasible for many of the merchants in West Africa, outside one or two big firms, say—outside, for instance, the Niger Company or Messrs. Holt—to charter steamers?—Both those you name charter steamers, or they have steamers.

2576. Quite so, but would it not be a difficult matter for other merchants, of whom there may be 100 or 200, to charter a steamer and ship in bulk a whole cargo?—No, I think it would be quite easy, for instance, for Messrs. McIvor to charter a steamer, and for other important West African firms to charter a steamer alone.

2577. The difficulty is with regard to the export of Manchester cotton goods from here. Possibly one or two firms might be able to come together and load a steamer with Manchester goods along with some Liverpool goods?—Yes.

2578. But probably they would not be buying the homeward produce, and it would be difficult for them to load the steamer home?—Quite so.

2579. So chartering a steamer might be rather difficult for them?—I do not think there would be any difficulty at all, because the charterers could arrange with the merchants who had produce to bring home to send their produce in the same steamer.

2580. You said you thought it would pay them to lose the primage?—I think if a comprehensive scheme was devised to run a line of cheap cargo boats, there would be such a saving that it might pay the merchants to lose the primage.

2581. That is, to start a cargo line in opposition to Elder Dempster & Co.?—Yes; the merchants possess the goods.

2582. Quite so, but it must work both ways. An exporter might send his goods out and not want to

charter a steamer for delivery of produce to different ports, because it would not pay him, and yet he would lose his primage both ways?—Yes.

2583. It might be worth the while of the Niger Company or of Miller & Company, who deal in produce, to charter a steamer home, but if they charter one steamer they would have to forgo the primage on their other cargoes?—I only give it as a way to get rid of the primage.

2584. (Chairman.) To sum it up, it is a question of combination so as to get freights out there and back again and to have a sufficiently constant trade so that any given merchant does not feel he is at the mercy of Messrs. Elder Dempster & Company as regards the amount of primage on the rest of his trade there and back?—That is so. That is one of the chief reasons why we had to close our mills on the coast, because we were not allowed to charter tank steamers, and that is the only way in which the oil can be brought over cheaply.

2585. (Mr. T. Walkden.) That is why I asked about the difficulty of getting outward freights.—Yes.

2586. (Chairman.) I do not think this question of rebates has much bearing on the trade as between Hamburg and this country except in so far as the chartering of special steamers perhaps facilitates trade to other ports.—Except this, that the Woermann boats are now most of them sold and we possess them. After the war there may not be an arrangement between the Woermann Line, or any other line to Germany, and Elder Dempster & Company, and the Germans may run cargo boats or charter boats for their merchants. Then the question would apply.

2587. In that case, yes, but so far as the rebate applies to both places the matter is not the point.—That is so.

2588. (Mr. T. Walkden.) In the past the market has been in Hamburg, but now palm kernels are coming here and practically all the firms situated on the coast are importing the palm kernels here. Do not you think that will have a tendency even after the war, so that once we get the market here we shall be able to retain it?—No; the market is not at all a free market even now. I may tell the Committee that there is a great deal of buying being done lately by neutrals of palm kernels, and those kernels are being stored in all parts of the country, in hop warehouses in Maidstone and Ipswich, and at Hull, Grimsby, and Fleetwood. All over all the country our ports are being stocked with palm kernels and oil which are being purchased by neutrals, I suppose with the idea that after the war they will be of more value when eventually they can get the stuff out of this country.

2589. The idea of this Committee is to try and see if we cannot retain this trade after the war. Therefore, if we get the firms interested to erect mills for crushing we shall have a better chance of creating a market here?—Certainly.

2590. It has been mentioned that it would be a good thing to get these palm kernels home clean and with a very small percentage of shell and dirt. It would be all to the interest of the natives out there that they should come home clean because it would affect the price?—Yes.

2591. The freer the kernels are from dirt and shell the better price they fetch on the market here?—Certainly. We have to calculate a full allowance for shell and dirt.

2592. I suppose even the cake would be better if the natives prepared the kernels cleaner and in better condition?—Certainly.

2593. Therefore do you think it wise to have Government inspectors, or some control, so that the kernels should be brought in clean?—I think it would be very wise.

2594. You will have had experience in buying palm kernels from Lagos and some of the Gold Coast ports, or Liberia, where they contain plenty of shell and dirt up to 15 per cent. Those palm kernels got a bad name on the market?—Certainly.

2595. So it is to the interest of the colonies and to the interest of the trade here that the kernels should come over as clean as possible?—Certainly.

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2596. With the experience you have had of factories on the Coast, do you think it is feasible to establish factories on the Coast and to make them pay?—Yes, I think they could be made to pay, but you must certainly be free to charter tank steamers to bring your oil home, because if you do not do that it must be a failure.

2597. I suppose the extra cost of coal and having to duplicate your staff all tends to add to the expense?—I think all the difficulties could be overcome, but I think that to make mills for crushing kernels on the Coast successful they should be owned by the merchant. A crusher cannot be at the mercy of the merchant; the crusher must get a constant supply of kernels and cannot be at the mercy of the merchant to put the market up against him when he likes.

2598. It would be to the interest of the crusher and to the interest of the merchant to work together instead of working through a broker?—I think so.

2599. Then they would be able to get their outward cargo and their homeward cargo?—That is so.

2600. (Mr. G. A. Moore.) Can you give me any idea of the present importation of palm oil and palm kernels from the Congo?—No, up to the present it has been unimportant. I think we have lately had 500 or 600 tons of oil into Hull, and that has been the largest quantity up to now. I mean within the last month or two there have been 500 or 600 tons, but we have found shipping very difficult lately and have been unable to bring it to Liverpool, and have had to take it to Hull as there were no facilities anywhere else.

2601. Do you suggest that the Congo is going to become a serious competitor with the whole of Nigeria within the next two years? You said it was going to be a very serious competitor.—I say that we shall have within the next two years, in my opinion—I am giving it as my own opinion and not speaking for Lever Brothers—that we shall have serious quantities of palm oil from the Congo competing with what oil it may compete with.

2602. It would still remain a small percentage of the total from West Africa. It may possibly arrive at 5 per cent. of it then?—What is the quantity of palm oil now imported into this country from West Africa?

2603. I think 50,000 tons from Nigeria, but it will vary from 25,000 to 50,000 tons from Nigeria alone.

2604. But I am talking about the demand for palm oil in this country. The quantity used in this country is certainly not more than 15,000 tons, and I consider the oil that is likely to come from the Congo will be in sufficient quantity to compete with that—

(Chairman.) The exports of palm oil from Southern Nigeria, which after all takes up far the greatest part of it, both to the United Kingdom and to Germany, total 1,661,000 cwts.

2605. (Mr. G. A. Moore.) It is about 50,000 tons to this country.—The great part of that total has gone to other countries—by far the larger part of it.

2606. I asked the question because, compared with the competition which palm kernels and palm oil will meet with from other articles, I do not think that the oil, &c. coming from the Congo will be a very serious factor.—You may be better informed than I am, but I consider it will be serious.

2607. With regard to the cohune nut, which you have mentioned, do you know how many cohune nuts it takes to make a ton of kernels?—I know it takes a great number of tons, but I have not the figures before me.

2608. It takes about 8 tons of nuts to make a ton of kernels.—Yes.

2609. Do you know how many people there are in that part of the world to the square mile?—I know there are very few.

2610. The Colonial Office inform me that there are about 4.5 people to the square mile. Consequently I do not think we need talk of the cohune nut as being a competitor with palm kernels.—I do not know. We were nearly able to get the Government to agree to our import of labour into that country. If they had agreed to it, it would have become a very serious competitor in a short space of time. We had the cracking machines.

2611. The Hamburg market for palm kernels, although we speak of it as the Hamburg market, is a market the business of which is done in Liverpool almost entirely?—A good deal of it is done in Liverpool.

2612. And it has always been a very free market of recent years in Liverpool?—Only for kernels to Hamburg.

2613. In what way do you mean that Liverpool is not to-day a free market for palm kernels? I understood you to say that the market in Liverpool, even to-day, is not a free market?—Not at all a free market.

2614. Why?—Because you cannot go there and buy kernels to Liverpool the same as you could buy kernels to Hamburg before the war. You cannot buy from day to day 100, 200, 500, or 1,000 tons. It is not at all a free market, but is a market which is being very much manipulated by the importer, and is interfered with by neutrals buying huge quantities of kernels and storing them all over the country. I do not call that a free market.

2615. But you do not consider that neutrals buying kernels interferes with the freeness of the market. Does not that give us a broader market as sellers?—It interferes in this way, that the palm kernels are not going into consumption but into warehouses, and are accumulating. I consider it restricts a market in such a thing as palm kernels if the crusher knows that there are large accumulations taking place in this country which may be put on to the market any minute.

2616. At the same time it makes a broader market for the importer?—It is a better market perhaps for the importer, but I would not call it a broader market.

2617. The outward cargo for West Africa is, with the exception of the spirit trade from Hamburg and Rotterdam, fairly well centralised in Liverpool?—Yes.

2618. Consequently we may expect that Liverpool, other things being equal, would get a cheaper inward freight, because an outward cargo would be more easily procured there?—You would think so, yes, especially if the ships are owned in Liverpool.

2619. Therefore, cannot we say that an ideal arrangement of the crushing industry, if it is to be established in this country, would, in order to facilitate the trade and enable it to be worked as cheaply as possible, be for the mills to be situated somewhere in the neighbourhood of Liverpool?—I think the mills should be situated somewhere near the consuming centres. If there is a consuming centre in Liverpool of oil for edible and soap-making purposes, I think the mills should be there, and as near as possible to the consumer; and if there is a consuming centre in London they should be there.

2620. The flour-milling industry, for instance, has been an enormous success in Liverpool. Do not you think the same causes would operate to make the crushing industry a similar success in Liverpool, if it were established on similar lines?—Of course, flour is a thing which is consumed all over the country, and the north consumes enormous quantities of flour, because it is very thickly populated.

2621. Cake and oil, after being refined, would also be consumed all over the country ultimately?—But the consumer is the manufacturer of margarine and of soap. The big consumer to-day of palm oil and palm-kernel oil for soap-making is my own firm in Liverpool. That is why we built our crushing mill right on the spot so that we can pump the oil from the mill into our soap pans. Liverpool may become a big centre for margarine, and, if so, I think the palm kernels should certainly come there; but if London becomes the big centre for margarine, then I think the palm kernels should come to London, or a lot of the kernels should.

2622. (Sir W. G. Watson.) I understand you say there is no free market for palm kernels in Liverpool?—No.

2623. Is not that because there are not sufficient buyers in Liverpool to induce the West African merchants to consign their palm kernels there?—Quite so; that has been the cause, no doubt.

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2624. Do you also agree that there are not sufficient buyers in Liverpool of edible oil to encourage British oil millers to establish their works at Liverpool at the present time?—At present there are not sufficient buyers.

2625. You said that there was a difference between Liverpool and Hamburg of 5s. to 10s. a ton. Do you also agree that the Hamburg oil mills have the advantage of sending their oil to the Dutch margarine works at considerably smaller cost as far as carriage is concerned, than a British oil miller can, whether established at Liverpool or at London?—Certainly.

2626. And do you agree that the difference is about 25s. a ton?—I should think quite that, including the packages.

2627. That is a much larger figure than the amount of advantage which the oil merchants in Hamburg have owing to the free market for kernels in Hamburg?—Yes, I agree with that.

2628. I think you said your mills were modern and were established in 1912?—Yes, but they have been very much improved since 1912. They were based on the German principle, but were an improvement on the German with greater power and worked more rapidly, our idea being to get a big output, and to get the oil content of the cake lower than the Germans could. It has taken some time to tune the plant up to what we think is almost perfection to-day.

2629. But probably not perfection to-morrow. I understand that in addition to your mills you have refineries. Did you make any refined edible oil prior to the war?—No.

2630. Will you agree with me that the question of chemistry in connection with the oil industry is very important?—Very important.

2631. I think you will also agree that one of the conditions of my firm in dealing with oil for the purposes of margarine is that we should send chemists to the mill in order to see how the refinery is worked?—Yes.

2632. That is to say, without the chemical knowledge you could not get what we term a high-class edible oil?—Quite so.

2633. With regard to palm oil, do you agree that if it is taken up by margarine manufacturers for edible purposes palm-kernel oil will have a fall in price, and will be taken up by the soap people again?—Yes.

2634. In connection with cake do you know that palm-kernel cake, after being pressed in Germany, is put into machines to make it into meal, because it sells much better as meal than as cake?—I dare say.

2635. Only yesterday I was asked whether we should alter our presses in our new factories to do it in that way because it could be done much cheaper at first than afterwards.—They do a great deal of mixing of cattle food in Germany, and it is more easily mixed as a meal.

2636. As a matter of fact I use coconut cake for my cows, and I am told that the best thing to do—and I always do it—is to split it up, and damp it by putting water on to it. You could damp your meal much better than your cake, and, as a matter of fact, in Germany they get 4s. a ton more for the meal, because it costs 4 marks per metric ton to split the cake up.—Yes.

2637. With regard to the cohune nut the difficulty of labour was spoken about. In British Honduras we have found that since the war broke out there has been any amount of labour to crack the cohune nuts; but in spite of that I do not think the result is satisfactory because the nut is so hard and so expensive and troublesome.—I do not know about that.

2638. (Sir F. Lugard.) With regard to the mills in Africa, are they for oil or for kernels?—In Lagos and Opobo the mill was simply for crushing kernels, the same as the crushers do here. In Ajua, Sierra Leone, and one or two minor places, and also in the Congo, it was for de-pericarping the fruit and making the palm oil, and then cracking the nut and freeing the kernel, but not for crushing the kernel and making kernel oil.

2639. There are three reasons which you have given us why the mills have not been satisfactory in Nigeria. One was the difficulty of obtaining a regular supply of

fruit.—You are talking now of the crushing mills in Lagos and Opobo?

2640. Yes. The second reason was the primage system.—Yes.

2641. The third reason was the difficulty with regard to the European supervision.—Yes, and the fuel was also a difficulty.

2642. The fuel difficulty can be got over by the development of the coalfields?—Yes.

2643. As regards the difficulty in getting a sufficient and regular supply of fruit, is there no feasible system of contracting with merchants in a large shipping centre, for instance, such as Port Harcourt?—Until the last three months, when things had got very difficult indeed, there was more or less a fight in Opobo, and the merchants were paying there fully 1l. a ton more than the equivalent in Lagos. Every ton that was shipped from Opobo to this country and sold at the market price there was a loss upon. Messrs. Gaiser were there, and when we got our mill up our firm of McIver & Co. were trying to buy kernels to supply the mill, but the merchants said: "Oh, no, we are not going to let Levers have kernels to supply their mills; we will fight for them," and there was a fight and we never could get our kernels unless we paid 10s. to 30s. a ton more than the equivalent value in Hamburg or Liverpool, so that was against it at once.

2644. I fail to gather the reason for that. What was the benefit to them of preventing your getting a regular supply?—I do not know. The merchants in West Africa look upon it in this way—that they were there years ago; there are a certain number of merchants, and they feel that the trade that can be done there belongs to them, and they are very much up against a firm that wants to take the trade away. That is just ordinary competition. That is what happened in Opobo.

2645. As regards the second reason, that is, the primage system, you said you thought that ought to be got round by the merchants combining, or by individual large merchants chartering vessels for themselves, such, for instance, as the Niger Company and Millers?—I do not think I said it ought to be got round in that way; I said it could be got round in that way.

2646. Has your firm ever done anything in that direction?—Yes, we thought we would see whether we could save money to enable us to keep the mills open at Opobo and Lagos. We found packages cost us very heavily. We had, first of all, to buy the casks and barrels in this country, send them out to Opobo and Lagos, pay a very heavy freight on them, and then we had to get coopers; black coopers are very difficult to get out there, and very careless, and the casks were so badly coopered that when we brought the oil home in casks there was tremendous leakage; so it was very costly indeed. The packages were very costly and the loss very costly. Then we said: "This proposition cannot pay unless we have a tank steamer." So we chartered a tank steamer, and in the different tanks we arranged different systems of heating, and said we would experiment by bringing home palm oil in bulk; because there is, no doubt, tremendous wastage in bringing the oil home in the other way. We chartered a steamer and then we got into serious trouble with Messrs. Elder Dempster & Co. We carried out the experiment, but then we had to stop at that.

2647. I cannot understand why you should stop at that if Elder Dempster & Co. make a profit on their ocean-going vessels. Have you sufficient freight for them both ways?—We pay a rate of freight outwards on soap and other goods in large quantities through McIver & Co., and McIver's bring home large quantities of palm kernels. When we pay the freight Elder Dempster & Co. say: "We will return you so much per ton at the end of twelve months if you continue to ship by our line, but if you do not ship by our line, and if you charter a boat, you will have to forfeit the whole of that rebate."

2648. Do not these difficulties which you describe equally affect your works in the Congo and also affect the Germans, who, you say, were able to ship refined

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oil, or at any rate oil which was converted into margarine, home from the Cameroons? How did the Germans get over the three difficulties?—It is not the same shipping line. I think to the Congo it is the Belgian Line—the Congo-Belge—and they are not in the arrangement with Woermanns and Elder Dempster & Co. It was always our intention that when the quantity got sufficient—and it still is our intention—to have steamers of our own from the Congo, and then we shall arrange for tank steamers, or whatever suits us best.

2649. And you do not anticipate you would have sufficient trade in British West Africa to make it worth your while to do the same there, or to combine with some other large firm, such as Miller Brothers or the Niger Company?—I am not speaking as Lever Brothers, because I do not wish to do so on this point, but I may say I personally certainly think it could be arranged with British West Africa equally well as with the Congo, but there is this difficulty that where you are big merchants and are constantly shipping goods you want to utilise the regular lines at times, and I think if you went into competition with them in the way suggested you would find you would have great difficulty in getting your stuff over by the regular lines, because if anybody's goods had to be left out of a ship, yours would be the goods left out.

2650. But you would depend on your own boats?—Yes, but if you chartered boats you would not run them quite so often as the regular lines run, and there would be times when you would want to ship by those lines.

2651. You told us you could get better oil, and you proved it a success, by having mills situated locally. Germany has proved the same thing by having her mills in the Cameroons. Why cannot these difficulties be surmounted in Nigeria and in the British Colonies. You are able to have a mill in Durban which is in a British colony. Why cannot you equally have mills in West Africa?—I think all these difficulties can be got over, certainly, but it wants a lot of going into. They are difficulties that could be overcome, and I think the crushing of palm kernels in West Africa at suitable ports would be a successful and paying proposition.

2652. (*Chairman.*) Do you mean crushing kernels or crushing pericarp, or both?—I mean both.

2653. (*Sir F. Lugard.*) I understood you to say you favoured an export duty being placed on palm kernels exported to countries other than the United Kingdom.—Yes, as against an import duty here.

2654. You also told us that neutrals had been buying large quantities of palm kernels and storing them here.—Yes.

2655. Would not it be necessary to impose an export duty here in order to prevent the export of these large quantities to foreign mills?—I take it that if there was an export duty, whether the neutrals paid it in England or paid it direct, they would have to pay that duty; but these are free kernels to-day.

2656. We have discussed the question of how much oil should remain in the cake. As Germany had a very large market for her cake, do not you think she purposely left the 6 per cent. of oil in the cake in order to obtain a good market for that cake?—No; I am quite sure the Germans got every pound of oil they could out of their kernels, because we have investigated all that matter.

2657. If mills were established in Africa, we should, of course, obviate the necessity of having a tariff over here or in the colonies?—Yes; that is, mills for crushing kernels. But would not you want to protect them with an export duty, because you would not want Germany coming in as a competitor if you had mills in West Africa?

2658. Then you would be shipping home the product, but not the kernels?—Quite so.

2659. Therefore you would need a tariff?—Not on the kernels which were crushed there.

2660. You spoke of the disposal of the meal in Germany. Do you think that had anything to do with the beet industry?—I think it probably had.

2661. They probably had facilities for dealing with it by means of utilising the slices of beet?—Probably; but Germany crushed enormous quantities of all kinds of seeds, and it was much easier for them to mix and get rid of a lot of extracted meal than it would be for us in this country.

2662. (*Mr. T. Wiles.*) Your crushing mills at Lagos and Opobo appear to have been closed chiefly through the difficulty of freight?—That was one of the chief difficulties.

2663. So I suppose the Committee may take it that your firm has done everything in its power to get over the shipping monopoly there?—No, I would not say that. We have not taken any very strong or active measures to get over that monopoly.

2664. Has the line of steamers which calls there at the principal ports any particular rights in those ports which other steamers have not? Have they their own quays?—No, not at Liverpool.

2665. I mean at the West African ports.—They have branch steamers in Lagos, because the bar alters from about 14 feet to 18 feet, and there are times when the ocean steamers cannot get over the bar, and therefore branch steamers have to be used to bring out the produce and to unload the liners. They are possessed of all the branch steamers out there which tramp steamers would not be possessed of.

2666. Then, if a new shipping line started for those ports they would be at a great disadvantage compared with the present lines?—So far as branch steamers are concerned, yes. Then there are lighters at Sierra Leone and the Gold Coast which Elder Dempster and Company own through subsidiary companies, and there would be difficulty with regard to them; but those difficulties could all be overcome.

2667. Most of the importers of palm kernels in this country are in Liverpool?—Yes.

2668. Then I cannot understand the difficulty which you have in buying palm kernels. If the Liverpool importer offers them to Hamburg and sells them in Hamburg, surely you have to pay the profit if you buy them back in Hamburg for use in Liverpool?—Hitherto the Liverpool importer has known that he has a freer market in Hamburg, so he orders his kernels to be shipped to Hamburg, because he knows he can always sell them in Hamburg as there has been such a free market; but in Liverpool the importer knows there are only one or two or three buyers and he does not feel that he is justified in shipping palm kernels to Liverpool on the chance of selling them later.

2669. If the sale of this palm-kernel cake and the consumption of it is successful with the agriculturists here, what will be the effect upon other cakes which are now manufactured in this country?—Of course, it would compete with other cakes and reduce the quantity of other cakes used, certainly.

2670. Therefore, the machinery which is used by other millers would be put out of use to a certain extent?—Yes, but I think it could be altered pretty much. A lot of mills could crush palm kernels by a little alteration in the rollers, and so on, quite economically enough.

2671. Would the machinery used to crush palm kernels crush soya beans and so on?—Oh, yes.

2672. Then, I take it, if you have a plant suitable for crushing soya beans or other seeds, very little new machinery would be needed in order to enable you to crush palm kernels?—No; some alterations would have to be made, but not very many.

2673. Then the establishment of the trade here now would mean very little risk?—If you are going to put up up-to-date machinery for crushing palm kernels and copra more particularly, it would mean that risk. If you take all the present crushing power in England, there is enough power to do it. It does not do it so economically as up-to-date machinery; but it does crush soya beans and other seeds as economically as new, up-to-date machinery could do it. After putting in up-to-date machinery you might find that you could not get palm kernels, and then the mills would be competing with each other in crushing other seeds, and there would be too much crushing machinery, and it would be bad for the crusher.

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2674. (*Chairman.*) Supposing we were starting again to compete with Hamburg on the conditions that obtained before the war, we were at a disadvantage as regards freights before the war, because they had through freights to Bremen?—Yes.

2675. We are at a bit of disadvantage as regards landing charges?—Yes.

2676. On the whole you think we are at a bit of disadvantage per ton as regards the market?—A considerable disadvantage.

2677. Though we have picked up and in many ways are equal to them in chemistry and in some of our machinery, yet they have a certain amount of advantage through it being a settled business and a running business?—I agree.

2678. There is a further advantage which they have in the margarine trade being established in Holland and having a very free settled market there to which they can sell their oil cheaply?—And also a large margarine trade in Germany.

2679. Lastly, they are accustomed to this cake in a way our farmers are not?—Quite so.

2680. Therefore, on the whole, they have advantages in about six or seven different points which we have to get over so as to arrive at the real conditions?—I quite agree.

2681. Apart from your own connections as soap-makers and as West African merchants, how far would you advise an independent man to put his money into the business of crushing under those conditions, or under what guarantees? You yourself have both trade connections and expert help. How far should you say that any independent capital could be asked to be put into the trade under those conditions, that is to say, into new mills; or would the tendency be, when the war is over, for the water to flow in the old channels?—I consider the freight difficulty is important, and I consider the rebate difficulty is important. If conditions were the same as before the war, I would not put a penny into the crushing business in this country. I say that for some long time the oil-crushing business in this country has been a dying industry.

2682. The business of crushing generally, as apart from palm kernels?—Crushing generally has been a dying industry in this country, and I would not put a penny into it.

2683. (*Mr. T. Wiles.*) Could you give us the figures of the out-turn of the crushing business in this country during the last five years?—It has gradually gone down.

2684. There are figures available about the industry, and in figures which have been put before me I have seen a gradual increase.—The only money made by crushing in this country has been made in speculation, that is by buying the seed when it is very low in price, and then the whole of the money which has been so made might have been made by just selling the seed again, and taking the profit on it. The actual crushing has been a very bad proposition for many years.

2685. (*Chairman.*) Another point raised, which Mr. Couper had not time to pursue, was whether you thought some sort of agreement between crushers and millers was a possibility and might be an advantage. You said you had not had a business proposition with regard to it actually put to you which you could

consider, but that you did not rule it out as a possibility?—No, I do not rule it out as a possibility.

2686. What form of agreement? There was considerable misunderstanding the other day as to the evidence given by two witnesses, one after the other. Would you propose as a basis for it an agreed price between crushers and millers varying on a sliding scale according to the market price of oil, the ratio to be settled later?—No: that was based on a proposition which I made some time ago to the most important West African merchants. It was based on the price that was paid to the natives. We were to take the kernels or the greater part of the kernels they collected from the natives, and the price was to be a certain profit over the price paid to the native. But we could not fix it up; we did very nearly fix it up, but we could not get the proportions fixed which each merchant should have; so it dropped. Then Mr. Trigge interviewed a broker and they had a chat together, and on my original proposal it came to this: they found that oil at, say, 38*l.* a ton, the crushers getting practically no profit, made the kernels 19*l.* a ton.

2687. Cake also coming in at, say, 6*l.* 10*s.* a ton?—About 4*l.* 10*s.* at the time this proposition came. Now inasmuch as the value of palm kernels, as regulated by supply and demand, made the price 14*l.* a ton, it meant that the importers said, "This would suit us very well, and it will give us 5*l.* a ton more for the kernels, so "we will suggest this." But there was nothing left for the poor crusher. In other words the merchants said, "The crusher is making a huge profit, we want that profit, and if we make this arrangement we shall get it, and the crusher will have none."

2688. Then, on that particular basis, you did not consider business. But supposing there was, more or less, the ratio of oil and cake got from a ton of kernels of, say, 45 per cent. and 55 per cent., or 45½ and 54½ per cent., and supposing you could agree on a price which should average a proper return for the crushing, though that may not be a proper ratio, would not it be feasible to arrive at a ratio?—It is not feasible to base it on the price of oil on the market, because, as I have said, it is a more or less nominal price. If oil is to-day 38*l.* a ton I could manoeuvre to bring that oil down in twenty-four hours to 34*l.* or 33*l.*

2689. That is as things are, but supposing you had a free market, it would not be so easy?—But you do not get the same free market in oil as in kernels. I am not buying oil, and am fully supplied with it for a time, and may not be buying it for the next three months.

2690. Then the real difficulty against an arrangement of that kind is the impossibility of getting a true price for oil by which to regulate it?—That is the main difficulty. I say it is quite impossible. At times when oil is very scarce it would be open to the importer—I do not say he would do it—to put the price of oil up, and it would always be open to us, being possessed of large quantities of oil, to put the price down by bearing the market; it would be very unsatisfactory.

2691. That is the difficulty?—That is the great difficulty. Then, of course, you would have to bring the cake into consideration.

2692. (*Mr. G. A. Moore.*) I may say the proposition came before me, and I agree with Mr. Knowles's view as to the feasibility of the scheme?—It is very difficult.

After a short adjournment.

Mr. JOSEPH WATSON called and examined.

2693. (*Chairman.*) You are a member of the firm of Joseph Watson and Sons of the Olympia Oil and Cake Mills at Selby?—Yes, they are an associated company. Joseph Watson and Sons own all the shares.

2694. You do a large crushing trade. How long have you been established as crushers?—Four years as crushers.

2695. I think you crush practically every kind of seed?—We crush palm kernels, copra, Egyptian cotton seed, Bombay cotton seed, soya beans, and linseed.

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2696. Do you do any business as merchants?—No, we buy from the merchants for our own use.

2697. You buy seeds for your own use; you sell the oil and you sell the cake. You do not yourselves use the oil or the cake?—We use some of the oil for soap-making.

2698. But you do not use the edible oils?—No, we sell all those.

2699. With regard to buying seeds, you no doubt find you have competitors as crushers in Germany?—Yes.

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2700. How far do you find that in the market you are at any disadvantage, if at all, as compared with German competitors? In other words, how far does the fact that there is a free and continuous market in Hamburg as compared with the market in Liverpool operate against you?—Are you speaking only with regard to palm kernels?

2701. Yes, I am at the moment.—The quoted price is always the Liverpool price and the Hamburg price.

2702. You mean the price quoted in the brokers' circulars?—Yes, but there is a rebate given to the German crusher in some form or other, and we have never yet been able to find out how it is given.

2703. Does that mean that the brokers' price quoted in the circulars in England is, so to speak, a nominal price and not a real price, or that both more or less represent the open prices given, but that the German crushers get a rebate afterwards?—I should imagine the latter to be the case, but I cannot say for certain.

2704. One witness put the German advantage, through being always able to get a quotation when wanted and so on, at something between 5s. and 10s. per ton?—I should have thought it was more than that, much more.

2705. Would you say that the advantage of the market in Germany really amounts to more than 5s. to 10s. a ton?—I should have thought so. I base my belief on the fact that we have had a German mill manager up to the time of the war who came from the largest palm-kernel crushing firms in Germany. Messrs. Brinckmann and Messrs. Thors. We wanted to go into the palm-kernel trade some two or three years ago when he came to us, and he explained that we had not the slightest chance of ever making it a success, owing to the fact that the Germans get a rebate in their country. I can only tell you what he told me.

2706. You say it is a minimum advantage of 10s. a ton?—Yes.

2707. As regards carriage of the kernels to the factory, how far do you find you are at a disadvantage as compared with Germany?—I should say on the East Coast we are at an advantage if the shippers would give us the same facilities on the East Coast as on the West, but they will not do that, neither the shippers nor the merchants. We can always buy in Liverpool at a lower price than we can buy in Hull, although Hull is a cheaper port than Liverpool; we have no dues at all in Hull. During the war, Hull has been a very much better port for the shipping people to come to than Liverpool, because they get quick despatch, whereas in Liverpool I believe in many cases boats have been held up for four or five weeks; but in spite of that neither the West African merchants nor the shipowners will come to Hull except at a large premium.

2708. Taking the different items in order, first of all, so far as landing charges are concerned, we know that on the whole Hamburg has an advantage over Liverpool.—Of about 2s. a ton, I should say.

2709. We have had it generally stated at something between 2s. 6d. to 3s. 9d. a ton.—I put it at 2s. as against Liverpool.

2710. What is your advantage over Liverpool?—We have no charges at all at Hull. We take the stuff straight over-side into barges from the importing steamer. We have only the lighterage to pay from the ship to our mill.

2711. Are you speaking of mills at Selby?—It costs no more to Selby than to Hull.

2712. How do you take the produce to Selby?—In 200-ton barges.

2713. So practically you stand to Hull much as Harburg stands to Hamburg?—I should say in an equally advantageous position.

2714. As regards crushing, do you test the oil in your cake when you sell it?—Yes, every batch.

2715. Can you give an average of the amount of oil you get from a ton of kernels and the amount of cake?—43 to 44 per cent. of oil and 56 per cent. of cake. There is no loss in crushing.

2716. Then, roughly speaking, you must leave about 8 to 10 per cent. of oil in your cake?—8 per cent.

2717. Of course the amount of oil in palm kernels varies a lot. How much is it on an average, 48 or 49 per cent.?—It varies between fine and off grades in kernels very much, usually 2 or 3 per cent.

2718. The sort of averages we have had given us are these: one was 45½ per cent. and another was 45 per cent. of oil got from the kernels.—We have crushed 36,000 tons of kernels since the war broke out, and our average is 44 per cent.

2719. That leaves about 8 per cent. of oil in the cake?—I should say roughly 8 per cent.

2720. Giving an average of 48 per cent. of oil in the kernels?—Chemists do not always agree about it; one man will say 9 per cent. in the cake, and another will say 8 per cent.

2721. On the whole I suppose you get as much oil out of the kernel as you can?—We get as much as we possibly can, but our machinery was not put up for palm kernels; it was put up for crushing cotton seed and linseed, and therefore our machinery as it stands to-day is not capable of getting out quite as much oil from the palm kernels as the German mills, or as some of the English mills. We are capable of putting up a mill in this country which would get more oil out, but we now crush with Anglo-American presses; if we had the proper machinery, we could get another 1 per cent. of oil, I should say. Those with the latest presses could speak better than I can; I have no experience at all with box presses.

2722. That is with the new machinery?—Yes, with the proper palm-kernel crushing machinery.

2723. All in all you get as much oil out as you can?—As much as we can.

2724. Because oil pays you better than the cake?—We get 40l. per ton for the oil and 6l. a ton for the cake.

2725. How much extra would you say that not having actually the best machinery costs you?—Another one per cent. of oil.

2726. And the cost of crushing as well?—I do not think our machinery is more expensive. If you take oil at 40l. a ton and cake at 6l. a ton the loss is 34l. on 100 tons.

2727. Do not give the figure unless you like, but what would you say it would cost you to crush a ton of kernels—1l.?—Rather more. You mean the actual cost without profit?

2728. Yes, the actual cost without your profit?—25s. a ton.

2729. Do you extract oil at all?—No, and I have no experience of extraction at all.

2730. You do not know the cost of extraction?—No.

2731. Do you refine oil?—Yes.

2732. I see the price of refined oil generally, is 7l. or 8l. a ton more than the crude oil.—Yes.

2733. What is the cost of refining?—The very maximum, 3l. a ton.

2734. Does that 3l. a ton include the waste and so on?—When you take 8l. as the difference between refined and crude oil the terms are not quite the same; one is sold naked without casks, and the crude oil is sold in casks as a rule.

2735. Is refined oil sold naked?—We always sell our refined oil naked.

2736. Then the difference would be greater?—Yes, as I say, the terms are different. The actual cost is not more than 3l. a ton; if you take crude oil and refined oil on the same terms the refining does not cost more than 3l. a ton.

2737. Do you attach much importance to the chemistry of it?—A great deal.

2738. We have heard throughout that the chemistry means a great deal.—It is very nearly everything.

2739. All in all, how do you put the German chemistry as compared with our own?—Far ahead of us.

2740. The Germans are better than we are at present?—Yes, they are far ahead.

2741. Would you say that the German oil was better than our oil?—Not a bit.

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2742. Then in what way does the German superiority in chemistry tell?—Do you mean the chemistry as connected with the refining of oil?

2743. Yes, I am dealing with the refining at present.—I am talking of chemistry as connected with the crushing industry.

2744. In what other parts of the industry does it tell—in the heat at which you do the work?—The whole process of crushing is really a scientific process; it is not just putting seed in the press and getting the oil out.

2745. I do not want you to give us any of your chemical secrets, but in determining what sort of point in the crushing process besides the refining process does the chemist come in?—The heat is a very important point, and the grinding is a very important point.

2746. You mean the nature of the grinding?—Yes, and the way you grind it, and the drying of the seed.

2747. On the whole, would you say the Germans are ahead of us at the present moment?—I should say so, certainly.

2748. But their actual output is not really superior? The refined oil is certainly not. I believe our refined oil is as good as any.

2749. Then it comes to this, that if the output is the same in quality, but at the same time their chemical knowledge is superior to ours, if it does not produce any better article it produces the same article rather cheaper. It must have one or the other effect?—Yes, possibly.

2750. I am only wondering where their advantages come in?—We use the chemist to find out more what is coming next year than what is here to-day. We are always looking ahead and trying to find out something new.

2751. You must have been selling a lot of palm-kernel cake and oil?—Yes.

2752. Is that plain palm-kernel cake or compound cake?—We sell it in both forms.

2753. Do you find a fairly ready market for it now as palm-kernel cake?—All the palm-kernel cake we make we can sell very readily. I should not say that we could sell it all in the form of palm-kernel cake, because the farmer is rather a conservative person. If you do not tell him it is palm-kernel cake and you make it up in some other form he will buy it, but if told it is palm-kernel cake he will not buy it.

2754. But even as palm-kernel cake are the requirements for it increasing?—Yes, we have no difficulty in getting rid of our cake.

2755. Not now?—No.

2756. But how was it before the war?—We never crushed it before the war.

2757. You do not make margarine at all?—All our output goes to the English margarine makers.

2758. Have you considered palm oil as a possible competitor for margarine making?—I believe if palm oil could be produced with a very low percentage of free fatty acids it would be. I am told it is the finest oil that can be produced for margarine making.

2759. Is it better than palm-kernel oil?—I believe it is much better. I think the melting point of palm oil is exactly the melting point required for making margarine.

2760. Have you considered the question of the newer nut, called the cohune nut?—No.

2761. Or the balassu nut?—No, we have never touched any of those.

2762. Some of them are being imported at the present time.—I have no information about them.

2763. You have not gone into those matters?—No, I could not give you any information.

2764. Supposing you were advising a person who was investing capital, would you advise him to put capital into crushing machinery, and, if so, on what terms and under what conditions?—I should not advise him to do so.

2765. Why?—Because immediately the war is over the trade will go back to Germany.

2766. You think it will?—It must do so under the conditions which have existed, unless some alteration is made. It is impossible for us to compete with the

Germans in palm kernels if there is 5s. a ton against us. We are pleased to work for 5s. margin, if we can get it, at normal times, and if the Germans have an advantage of only 5s. in their favour on palm kernels we could not touch them at all.

2767. To what do you put that down? With your freights to Selby and no landing charges you are pretty nearly as well off as Hamburg and Bremen.—I should say quite as well off.

2768. Then their advantage does not come in in that respect?—Not at all.

2769. Then there is the question of their rebate when buying from the merchants?—Yes.

2770. And the question of their having a settled and going concern in the way of a crushing and refining business, with chemists who have been trained in the work?—We have that training now, and they have no advantage over us there.

2771. And we have the sale of the cake now?—Yes, we have all that.

2772. Then where is the advantage in their favour which would make the trade go back to them after the war, so that you would not advise me to put money into it?—Because you have not got the shipowners secured yet. You want to know what they are going to do, and how they will help the Germans against the English, and how they will compete with the German lines. The Woermann line carries all their stuff to Germany, and if the English lines are going to compete with them, I take it they will have to give the same rebate as the German lines give.

2773. Supposing that the British lines were ready to carry to Hull as well as to Liverpool, and that, even if they did have a primage system and so on, it was the same under agreement with the Woermann line, and there were no extra rebates given by the Woermann line over those given by the British lines, to that extent Hamburg and Hull would again be on an equal footing? Yes.

2774. The shipping lines did not carry to Hull before the war, but, with regard to Liverpool, before the war the rebates were the same?—They were, as far as one knew, but I imagine that the Germans got some advantage which we did not get in Liverpool.

2775. You mean, in the shape of private rebates from the shipowners?—I always imagined so. I do not see how else it could be done.

2776. Then in discouraging me, a cautious Scotsman, from putting money into the crushing business, what would be your real apprehension after the war?—That the Germans will again get palm kernels carried cheaper to Hamburg than we can get them to Hull.

2777. Then it is wholly a question of the shipping business?—I think so, unless the German Government pay a rebate on their export, which they have not done in the past.

2778. On what?—On the oil. We can never touch the German trade; we cannot expect to ship oil into Germany; the Germans would never have that. Why should they?

2779. I am thinking of the German trade to neutral countries, oil to Holland, for instance, and selling oil to our own margarine makers in this country, which are both possibilities that are open.—The Germans for many years have consumed far more fat for edible purposes than we have; they started the margarine trade much earlier than we did, and they have all sorts of edible fats which we do not look at. It is only recently that the margarine trade has become more popular here and therefore the Germans had all that trade at their door, so to speak. Then the Dutch margarine firms and the German firms are practically one, and some of the Dutch people have their factories in Germany.

2780. Supposing Messrs. Jurgens and Messrs. Van den Bergh came over here and set up a factory—as well as the Maypole factory—would that overcome the difficulty you feel in advising me to put money into the industry?—Assuming you have got the shipping people all right.

2781. Then it is not only the question of the shipping business, but the question of selling the oil to the margarine makers?—Without the shipping

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people you cannot possibly do the trade—if the shipping people are going to give Germany an advantage over England. That is a most important thing. No tramp steamer can go to the West Coast; it is not a free trade.

2782. What you want is to be given equal shipping rates?—Then we can beat the Germans.

2783. All other disadvantages notwithstanding?—Yes. Then I do not care what happens.

2784. Notwithstanding the existence of the present big market in Hamburg?—That does not affect us at all. We have got the trade here, and we shall keep it. We can crush just as well as they can.

2785. Can you crush as cheaply as they can?—Quite as cheaply.

2786. Would you say you were crushing palm kernels as cheaply at this moment?—No, I should not say we are doing that, because our machinery is not getting the best results; we are leaving one per cent. of oil in the cake which we ought not to, and therefore they have the advantage over us there; but if we knew we were going to get any help in this country, we could to-morrow morning put down new plant.

2787. What do you mean by getting help in this country?—If we knew that the Germans were not going to get an advantage over us in the freight.

2788. That is the only serious drawback?—As far as I know.

2789. (*Mr. C. C. Knowles.*) You were not buying kernels before the war?—I never bought any at all before the war.

2790. But you know something about the market before the war?—We have always bought palm kernel oil in the soap trade, and have watched the market.

2791. In buying palm-kernel oil before the war I think you used sometimes to buy German oil, and sometimes African Oil Mills oil?—Practically all German oil, but we may have had small amounts in proportion to our requirements from the African Oil Mills Company.

2792. I thought you had bought considerable quantities from them?—Not in proportion to our requirements. The majority of our oil always came from Germany; or if the German market has been against us we have bought Ceylon oil, which comes from copra.

2793. Do you consider it would be an advantage for the shipowners, such as Messrs. Elder Dempster and Company, to do the crushing in this country; that is to say, for the shipowners to own the mills, or some mills, in this country?—It depends upon whether they have the capacity of running mills. Like every other business, it depends upon how well you manage your business. If a shipowner can manage it better than I can, I should say he would succeed, but if I can manage it better than he can, I should get on better. An oil mill is, as you know quite well, entirely run on small profits; you have to look out for the pence, almost, and, if the least thing goes wrong, your money runs away. It is entirely a question of management, machinery, and organisation.

2794. If you were the owner of a line of steamers working from West Africa, bringing palm kernels over to Europe, do not you think you could better afford to run a mill than an ordinary man who puts his money into it, because you would have the advantage of carrying the kernels to the mill?—If the shipowner can buy kernels cheaper, certainly, but I do not see why a shipowner should be able to buy his kernels cheaper than others can buy them on the open market. He would always have people competing with him, because he would not be the only shipowner, unless he had a monopoly. If it is to be a monopoly, and one shipowner is to carry all the palm kernels from West Africa, he could do the trade, but if it is an open market so that any shipper can carry the kernels from the West Coast to here, then he would not succeed better than we could.

2795. If it is a free market for freight, so that you can charter ships as against the shipping lines, there would be an equal advantage for the ordinary crusher?—Exactly the same chance.

2796. But if that is not so, there must be a big advantage for the owner of the shipping line that has

a monopoly, to own a mill?—Certainly. All monopolists have an advantage, there is no question about that.

2797. I think you know something about the margarine trade?—I have been in it and gone out of it again, as it was so unprofitable. I went in last November and came out in June.

2798. Not because you did not think it a good business?—It is a good business, if we had fair competition, but we have not had fair competition; we have had unfair competition.

2799. Do not you consider we should be able to manufacture in this country all the margarine that we eat?—I have told the Government so on several occasions, this year and last year, when they were sending orders to Holland. I told them we ought to have the business here, because our machinery was standing idle and we could not employ it, while Dutchmen were sending margarine into this country.

2800. Outside protection, do you not think it would be very helpful if the margarine imported into this country from foreign countries was marked on the wrapper and on the box and everywhere that it was made in that foreign country. Do not you think that might help the British manufacturer to get the trade?—I do not think there is much patriotism; if a man could buy it a halfpenny cheaper made in Holland than he could buy it made in England, my opinion is that he would buy that which was made in Holland.

2801. Do you believe in protection to help us to get this crushing trade from Germany?—That is rather a large question which I cannot go into.

2802. It has been suggested here that there should be an export duty on palm kernels in West Africa; that is to say, that all neutral countries and all countries outside the United Kingdom should pay an export duty, and that we should get the kernels without the export duty, or should have a rebate of the duty. Do you think that would help the crushing trade here?—I am sure it would as against Germany. You mean to give the rebate only to England?

2803. To give it only to the United Kingdom?—Certainly, that must be a help.

2804. Do you think 10s. a ton would help us?—It would, unless somebody gave the Germans 15s. a ton, or some other rebate. If we have 10s. a ton advantage and Germany has nothing, we shall do all right. Give us 5s. advantage, and we shall beat them; that is quite enough. We do not want more than 5s. out of it.

2805. For soap-making purposes palm-kernel oil could be used much more freely than it is used to-day if the price was low enough?—I see we used 95,000 tons last year of palm-kernel oil in this country. That amount could very easily be doubled without any difficulty if the price was right.

2806. That is, at a price competing with other fats?—Yes.

2807. (*Professor Dunstan.*) The figures you give are for all purposes, and not for soap making only?—We used 95,000 tons altogether. We imported 35,300 tons.

2808. (*Mr. C. C. Knowles.*) From where?—I cannot say from where, but mostly from Germany. It is copra and all sorts of oils. We produced 57,300 tons.

2809. (*Professor Dunstan.*) From copra and palm kernels together?—Yes, all nut oils. I can only give the figures for nut oils.

2810. (*Chairman.*) I thought you said it was 95,000 tons?—We re-exported 7,500 tons of palm-kernel oil, and 1,200 tons of other nut oils, giving a balance of 95,000 tons. We imported 35,300 tons of palm-kernel oil.

2811. (*Mr. C. C. Knowles.*) From Germany?—Presumably all from Germany and perhaps Belgium, in 1914.

2812. (*Sir Hugh Clifford.*) Brought in before the war?—Yes.

2813. (*Mr. C. C. Knowles.*) I think there must be something wrong in those figures. A much larger quantity was exported.—Of palm-kernel oil?

2814. Of all nut oils. I do not see how the quantity could have been used here?—I have had these figures checked and re-checked.

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2815. The figure I have is 104,000 tons imported into this country.—My figures are less what was exported.

(*Sir W. G. Watson.*) We used to bring in 30,000 tons.

2816. (*Mr. C. C. Knowles.*) And you were practically the only ones importing. You brought 30,000 tons of crude oil in, and I should think Messrs. Loder not more than about 10,000 tons at the outside, that is 40,000 tons, and for soap making there were certainly not more than 30,000 tons, which all told comes to 70,000 tons?—The figures for three years are, 37,000 tons in 1912, 82,000 tons in 1913, and 95,000 tons in 1914.

2817. The quantity seems to me to be very large.—The figures have been checked.

2818. (*Sir Owen Philipps.*) You tell us that if the German millowners had an advantage in freight they would naturally be able to knock out the English millowners?—Naturally.

2819. Assuming the freight was equal, what do you anticipate will happen after the war?—Germany will get her own trade back for her internal consumption, and I think we shall keep the outside trade.

2820. Are not the German millowners quite free to import their oil into this country?—Quite free.

2821. Would you be equally free to export your oil to Germany?—No, I do not think we should.

2822. Therefore does it occur to you that this state of affairs might exist after the war: might not the German millowner be able to get such a price for the article he sells in Germany that he could afford to sell his balance at a low enough price in England to knock you out of the trade?—You mean by putting such a duty on oil going into Germany that it would not allow outsiders to compete?

2823. I thought there was an import duty on oil in Germany. You said you cannot do the trade there?—We cannot do trade there.

2824. Therefore the import duty is high enough to stop you doing the trade?—You asked, if Germany had kernels at the same price, how could we send oil there? At present we should have the freight to pay from Hull to Hamburg, and would be at that disadvantage against Germany.

2825. But the Germans have sent oil here in the past?—I thought you were dealing with our sending oil to Germany.

2826. (*Chairman.*) The point put to you is this: you say you could not compete with oil in Germany because you have the freight to pay from Hull to Hamburg?—Yes.

2827. *Sir Owen Philipps* then asked you, if that is so how can German oil compete with English oil in England when they have the freight from Hamburg to Hull to pay?—Only by getting a rebate either from the German Government or someone else to allow their imports to come in here. I believe they have always had some rebate given them.

2828. (*Sir Owen Philipps.*) Apart from rebates, is it not a fact that at present there is a tax on oil in Germany? If you imported into Germany oil from your mill in England you would have to pay a tax, and therefore you cannot compete at all, quite apart from the question of freight?—I cannot speak as to that tax. I do not know whether there is or is not a tax, but I believe there is one.

2829. You may take it from me that there is a tax, and therefore you cannot compete?—Yes.

2830. Does not that allow the German millowner to get a price in Germany for his oil higher than he gets outside?—Certainly; I suppose so.

2831. Therefore as it is not possible that after the war the German millowner, protected by that tax against outside oil being imported into the country, can afford to send his balance of the oil to England and knock you out of the trade as a millowner?—What would the freight be from Hamburg to Hull?

2832. Leave freight out of the question altogether for the moment, because it affects both arguments.—I cannot answer until you give me the freight from Hamburg to Hull.

2833. Assume that in time of peace it was 10s. either way.—That would be 1l. on the oil, because we only get half the oil.

2834. No; you misunderstand me. Assuming that the ordinary freight on oil, either from here to Germany or from Germany here were 10s. a ton, if the German millowner is protected in Germany and can sell his oil, having no outside competition, for more in Germany than he otherwise could, could not he afford to sell his surplus oil in England at 1l. a ton or 10s. a ton cheaper than he would otherwise?—It depends entirely on how much more he could get for his oil in Germany. If he got 2l. a ton more for his oil in Germany than we get in England for our oil, then he would have 1l. a ton to pay freight on the oil, and 1l. a ton profit.

2835. And that 1l. a ton would in bad times practically knock you out of the trade?—Yes; 1l. a ton is a great deal.

2836. So that alone would be quite sufficient to stop people from investing money in new mills in this country?—If they did that, we could stop it by putting 1l. a ton tax on their stuff that comes in here.

2837. Quite so; but short of that you cannot suggest any other way in which you can meet it?—Unless there was an export duty, as has been suggested, which would stop it, supposing you put an export duty on all kernels from West Africa.

2838. That is another way of producing the same result?—Yes; that would stop it.

2839. You talked about freights, and you had told the committee that in your opinion for years past the Germans got freights to Hamburg from the West Coast of Africa cheaper than to England?—Yes.

2840. You have also told us that you had not up to the time of the war imported any kernels into Hull yourself?—We never crushed a kernel before the war.

2841. Therefore you are not telling us anything from your own practical knowledge?—I have told you my authority for it, namely, our mill manager, who was managing at Messrs. Thors's and Messrs. Brinckmann's; he was their practical man, and did all their work. He told me they got a rebate.

2842. Did he tell you that it was from the shipowner, or from the Government?—I cannot say which. He told me they got a rebate which would prevent us ever touching the trade in this country. At that time palm kernels were 2½l. a ton on the average for the year 1912. If you take oil at 40l. a ton and cake at 6l. a ton and put the two together, you will see that you get about 2½l. a ton; and therefore the German was on the face of it paying 2½l. a ton for his kernels, and selling his oil and cake at 2½l. a ton, showing 2l. a ton loss.

2843. There has been a question of the manufacturers at Hull combining to reduce the price of palm kernels against the merchants. Is there anything in that?—I should not have thought so. I did not know that anyone in Hull, bar one extracting company, did anything in palm kernels. We were the first people to go into the palm kernel trade. I believe the British Oil and Cake Company bought some a few months ago; 10,000 tons the West African people told us they bought; but whether it was true or not I do not know. I do not know of any other crusher in Hull who has ever touched kernels. The West African people can tell you, because they know to whom they have sold. One firm, the Hull Extracting Company, extracted some, but bar them I have no knowledge of any other man in Hull crushing except ourselves.

2844. Since you started crushing palm-kernels you have been able to get all the kernels delivered in Hull that you wanted?—No; we have not a kernel in the place to-day. I cannot get them. They will not bring them there. Only last week I offered to pay 5s. a ton extra if delivered to Hull instead of Liverpool.

2845. You have told us already that you have crushed 36,000 tons since the war?—Yes, but most of them came into Liverpool, and we brought them across by rail, and paid 15s. a ton carriage. I can give you the whole of the Hull imports since the war. In January, nothing; in February, 2,700 tons; in March, nothing; in April, 4,731 tons; in May, 8,744 tons; in June, 3,292 tons; in July, 858 tons; and in August, 3,568 tons.

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2846. (*Chairman.*) That is about 24,000 tons altogether?—Yes, but a great deal of that quantity has been sold to Messrs Van den Berghs, who are re-exporting them. It has been stopped just lately, but they re-exported a lot, and they have large quantities in store. Then Van den Berghs are buying palm kernels now and storing them all over the country, at every port in the United Kingdom, and preventing us from buying them. Yesterday we bought palm kernels at Liverpool at 14*l.* 16*s.* 3*d.* a ton, and Van den Berghs paid 15*l.* 5*s.* direct to Hull.

2847. The price of 15*l.* 5*s.* was for delivery at Hull?—Yes. They bought them to store them there. All the storage in Liverpool, I believe, is absolutely blocked, and they have stored palm kernels all up the East Coast everywhere.

2848. (*Str Owen Philipps.*) Can you suggest any way in which the British shipping lines can help in this matter?—They have put on over 25,000 tons of shipping to Hull as a new trade, in spite of the war, and you tell us that has been no help to you, and that all the kernels have been bought by a firm who are going to export them to the Continent?—I would not say that. I say the Hull Extracting Company have bought some, and we have got some of these kernels, and Van den Berghs have bought some.

2849. I thought you said you got none?—No; I said we bought large quantities from Liverpool. You asked me, how did we get them if they were not coming to Hull? We bought a large percentage of them in Liverpool and brought them across to Hull by rail, paying 15*s.* a ton to get them into Hull; that is the only way we can get them.

2850. You think that at the present moment the English millowner is being actually handicapped by the Continental millowners?—There is no question that Van den Berghs are buying every palm kernel they can put their hands on; they are buying them all; we cannot touch them. Our mill has been standing idle now, I should say, ten days, because we cannot get a kernel into the place; we cannot get them by rail from Liverpool.

2851. (*Mr. C. C. Knowles.*) If that is the case during the war, unless there is some Government action is it not going to be very much worse the day peace is signed?—I do not think so, if there is free transit for these things; but no tramp steamers can trade now.

2852. Why not?—I cannot tell you why. They do not trade, and I am told they cannot, and that they are not allowed to. I do not know who it is prevents them, but they cannot trade, and the fact is that these tramp steamers are not coming to Hull. A good many of these Hull palm kernels have come over, I believe, in the Albertville boats. Are not they Belgian steamers? If we can get ships that will bring the stuff to Hull, Hull is the cheapest port in the United Kingdom, as is acknowledged by all shipowners. You have there very quick discharge. I do not claim it for Hull only, but I think this stuff ought to go to Leith and to London, and all round where cotton seed can go. We can always buy cotton seed from Alexandria and get it shipped cheaper to Hull than to any other port in England, and we can buy linseed and get it cheaper to Hull.

2853. (*Chairman.*) Because there is a free freight market?—Yes, but there is not a free freight market now in kernels.

2854. (*Str W. G. Watson.*) I think you have a large oil mill at Selby, near Hull, and you also refine oil there?—Yes. I believe you have had some of our oil.

2855. Would it not be of great advantage if Jurgens and Van den Berghs put their margarine factories alongside your oil mill?—I would rather put a factory there myself.

2856. But I thought you had gone out of the margarine trade?—We would go into it again if it were profitable.

2857. Would not there be a great saving if you could have a pipe taking the oil from the mill into the margarine factory?—Unquestionably the margarine factory ought to be on a site close to the oil mills.

2858. Do not you think Van den Berghs and other firms have a great advantage in that the margarine which the British public consume is largely made in Holland, and these German millers can easily and cheaply export their oil from the German mills to the Dutch margarine works at a cost not exceeding 5*s.* a ton?—Unquestionably it is a great advantage.

2859. On the other hand, to take oil across from a port in England to a German or Dutch port, after you have paid for the cost of returning the drums or the loss between the cost and the selling price of barrels, the net cost of transporting the oil would be about 30*s.* a ton?—I should think 30*s.* is on the low side.

2860. In other words, the German mills have a very great advantage in that respect?—Yes, so far as the margarine trade is concerned.

2861. The prospect for the future is that these nut oils will be required largely for edible purposes, more especially margarine?—I think it will be an enormous trade. The margarine trade is only in its infancy; it has only just started. We did not touch it until about a year ago.

2862. I understand you are not so much in favour of a duty in England, but you are rather in favour of an export duty from the colonies?—I am in favour of having no duties, or no export duties at all, if Germany is not getting some advantage. If Germany is getting an advantage in the way of freight or in any other way, then to compete we must have the same advantage—whether you put it on as an export duty or as a duty on German oil coming in here, or as a duty on margarine coming in here; I have no views as to that; but if the Germans have rebates given to them and we have not, we cannot compete with them, and the trade will go immediately the war is over.

2863. I think you are wrong in thinking that the Germans get rebates; but another point will, I think, explain how the Germans sometimes sell, as you say, at a loss. Some people run the mills night and day and sell the produce at the market price of the particular time, and trust that at the end of the year they will be all right, but sometimes there is a small loss.—It is a principle we have gone on for four years.

2864. Would not that explain the particular price at the time, when you say the Germans were paying high prices for nuts, and selling oil cheap?—If you were doing a very large trade, as they were in that year, of 95,000 tons, and losing 2*l.* or 3*l.* a ton, it would come out to a pretty large figure at the end of the year.

2865. Would not that price which you quoted refer to a few months rather than to the whole of the year?—I have taken the average price for the year, which was 23*l.* It was either in 1912 or 1913.

2866. I understand that prior to the war you did not crush any palm kernels?—No.

2867. Did you refine any oil for edible purposes?—Not palm-kernel oil, but we did refine cotton oil.

2868. (*Mr. G. A. Moore.*) Is it to your advantage to buy palm kernels in Liverpool at 14*l.* 16*s.* 3*d.* a ton if you can get them at Hull at 15*l.* 5*s.* a ton?—I prefer to make a loss rather than pay a broker an exorbitant price to get them to Hull. I will not encourage that. I am trying to break it down and trying to make the merchant and shipowner sell kernels to Hull at the same price as to Liverpool. I buy in Liverpool and pay the carriage to Hull rather than be cornered by the shipowner and the merchant, which is what they are trying to do. They are trying to take advantage of the position, and say: "You cannot get kernels to Hull except on our steamers, or from us; and if you will not pay our price you shall not have them at all." Rather than have that I cart them over from Liverpool.

2869. (*Chairman.*) Excuse me, but is it not rather cutting off your nose to spite your face?—It is; but this trade is not going on for a month or two; it is going on for a year, or many years. I think it is a wrong principle.

2870. (*Mr. G. A. Moore.*) What do you think the effect of putting an export duty on palm kernels would be? At present we have the bulk of the supply in British colonies and have therefore control of the shipment of most of the palm kernels. If the local government were to put an export duty of 2*l.* a ton on

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palm kernels shipped anywhere but to the United Kingdom and the colonies, what do you think the effect upon the market generally would be? What would Germany do under such circumstances?—It would have no choice. If palm kernels were too high in price it would give up that trade and go on to copra.

2871. You think Germany would buy copra and we should have the palm kernels?—That is right.

2872. We know that palm kernels and copra are very much on the same lines.—There is 5*l.* a ton between them.

2873. That difference varies according to the range of prices?—Of course; but on to-day's price there is 5*l.* between them.

2874. What other oils come anywhere near them in competition?—Hard oils, do you mean?

2875. Any oils. Can you substitute cotton seed oil?—No.

2876. Or can you substitute soya oil or linseed oil for any of the uses to which these other oils are put?—No.

2877. Are there any other oils that come into competition with palm kernel oil and copra?—I do not know of any. You mean for the edible fat trade?

2878. Generally speaking what we find is that we are affected, or we sometimes have been, by the price of cotton seed and cotton seed oil. That is sometimes used as a market argument at all events.—If palm kernel oil came down to the price of cotton seed oil, soap-makers would use palm-kernel oil instead of cotton seed oil, but you cannot substitute them entirely though you can use a larger percentage.

2879. Would it be necessary for the Germans to have palm kernels to a certain extent, at any price, no matter what they cost them, or would they be able to subsist entirely on copra?—I should say they could do without palm kernels entirely and live on copra.

2880. Leaving the palm kernels entirely to this country?—I should say so. From the margarine point of view I cannot speak with accuracy. I should say it could be done; but perhaps the margarine might not be as good. However, Sir George Watson can tell you much better than I can.

2881. Going back to the question of freight, do not you think the outward cargo at any port would have an effect upon the inward freight on inward cargoes to that port?—I could not offer an opinion.

2882. Do not you think the shipowner would be more likely to run his ship to Liverpool, where the outward freight is to be had, rather than go to Hull at the same price, where he can get practically no outward freights to West Africa?—Is that the case? I thought a good many of these boats went to Rotterdam to take in gin, and that sort of thing, to places like West Africa.

2883. They would have to move from port to port at all events; they could not reload at Hull for West Africa.—In other words you mean you cannot take palm kernels to Hull for that reason.

2884. I suggest you could hardly expect to be put on the same terms as Liverpool, seeing that Hull has not got the outward cargo that Liverpool has.—If that is the case we cannot hold the trade; that is obvious, if the shipowners cannot give the same facilities.

2885. Is not that an argument, not against this country, but against Hull in favour of Liverpool as a crushing centre?—No, because when you get the produce to Liverpool you have to distribute it. You have to distribute all the cake, and it is a very heavy carriage on cake from Liverpool to the rest of England as against what it is from Hull. Hull is by a long way the best centre for the cake, and that is a very serious item.

2886. (Mr. T. Walkden.) Previous to the war the market for palm kernels was in Hamburg?—Very largely.

2887. Speaking from the importer's point of view, naturally he would send his palm kernels to Hamburg because he could sell them there better than if he sent them to Liverpool?—If the trade was there, certainly.

2888. Now we have got the trade here and we want to retain it. If we have crushing mills and if we get

the kernels here, we want the market to be, say, at Liverpool. We could not have one market in Liverpool, another at Hull, another at London, and another at Bristol. If we could have the market in Liverpool, and if the steamship companies would give you transit facilities as they did previous to the war, so that the freight would be the same to Liverpool, to Hull, to Bristol, and to London, that would help the trade materially?—That is the thing. We want the stuff at the same price to Hull as to Liverpool.

2889. The shipping companies previous to the War gave facilities so that you could tranship to Hamburg, to New York, and to other places. If the shipping companies would help you in that way, that would assist you?—That is what we want—to be on the same terms.

2890. (Mr. T. Wiles.) How do you get your goods into your mill—by lighter or by rail from Hull?—By lighter. It costs 1*s.* 3*d.* a ton from the boat into our works.

2891. What does it cost you from Liverpool by rail?—15*s.* a ton.

2892. When you buy palm kernels do you usually buy them in Liverpool?—The larger proportion of those we have bought have been bought in Liverpool.

2893. And you have no difficulty in buying them in Liverpool?—None whatever.

2894. There is always a good market?—Not always, but taking the year round since the war there has been quite a free market.

2895. (Chairman.) What has it been in normal times?—I have no experience of it in normal times.

2896. (Mr. T. Wiles.) I do not think we can ask you questions about the pre-war state of the market, because you did not crush palm kernels before the war.—No, I did not crush any palm kernels before the war.

2897. If you developed a large trade for this cake from agriculturists, what do you think would be the effect upon your other cakes, that is to say, your compound cakes and your linseed and cotton cakes?—They will all be consumed. The trade here is quite large enough to consume them all.

2898. You do not think that making a trade for the new cake will decrease the consumption of linseed and cotton cake?—No, I do not think so.

2899. You think animals will be raised to eat the new cake?—Certainly. We import cakes very largely in normal times. Germany always sends a lot of cake here, but whether she is going to do that in the future or not one cannot say. So long as there is not imported cake here, we can consume all the cakes we can make here.

2900. Can you give us any statistics of the crushing industry to show whether it has increased in the last five years in Great Britain?—I should say it has largely increased. Our mill was not in existence five years ago, and we have a capacity now of crushing ordinary seed to the extent of 400,000 tons a year. That is entirely new.

2901. Then you would say, generally, there has been a large increase in crushing plant in the last five years?—A very large increase. Our mill alone is a large increase without other mills. 400,000 tons a year on the top of the existing trade is quite a large increase.

2902. Have you machinery for crushing soya beans?—Yes, we crush them very largely.

2903. Can you utilise your machinery for crushing palm kernels or soya beans?—Yes.

2904. I take it your soya bean trade has been largely stopped because there is no export trade now?—We can consume all the soya cake that is made in this country.

2905. You do not sell any for export at all?—Yes, we do, because they pay such a high price for it. We tried to stop it, but the Government would not do that. There is quite a free trade for all the soya cake that can be produced here now.

2906. Can you give us your reasons why Hull is a cheaper port than Liverpool?—For one thing there are no landing charges.

2907. You think that is the principal reason?—That is the only reason I know.

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2908. Have you any shipping lines from West Africa to Hull running regularly?—Messrs. Elder, Dempster, and Company have brought a few ships in since the war. I do not think they brought any in before the war, but I cannot speak with accuracy as to that.

2909. (Mr. J. Couper.) You gave our Chairman certain advice in the matter of an investment in the unlikely event of his desiring to erect a palm kernel crushing mill in this country. Will you tell me in the same manner, if I were to desire to do the same thing, what it would cost me to erect a modern mill of effective size?—I can tell you what our mill cost if you would like to know it. It cost 350,000*l.*, and has a capacity of 400,000 tons a year.

2910. Would it be effective to construct a mill with a possible output of only a quarter of that?—The cost would be proportionately heavier. Supposing you put up a mill to crush 200,000 tons it would cost you more than half 350,000*l.*

2911. We have heard a good deal about shipping expenses and difficulties. Surely if it were open to the Germans to charter a tramp steamer the benefit of that facility to the Englishman would disappear? If it were open to both the Englishman and the German to charter tramp steamers where would be the advantage of the Englishman over the German?—My experience in the freight trade is that where you can charter tramp steamers if you take linseed or Egyptian cotton seed or any other seeds, and if it is open to the world to compete, any boat can go and fetch the things here, and you have a free market in them, and a free market in freight, because you can go where you like, and charter them to whatever port you like.

2912. I can understand that, but is it going to benefit the Englishman more than it would benefit the German. Prior to the war I take it the German was not able to charter steamers?—I do not know how they manage their shipping business. Their own line—the Woermann line—took a very large percentage of the palm kernel trade. I cannot speak as to what percentage they had, and whether they were subsidised or not I cannot say at all.

2913. In your view is it impossible to obtain any definite information as to the advantage which the German is supposed to hold over the Englishman?—It is outside my own personal knowledge because I am not interested in shipping and know nothing about it at all. I dare say you could get the knowledge from shipping people.

2914. One hears so many stories. I heard of a German bill of lading from West Africa for, shall we say, 10 packages, and delivery being given of 11 packages, but I have never had it substantiated. I was anxious to know if your manager had given you any information about it.—No, he has never given any trade secrets away.

2915. You said in reply to one question that your mills had been idle for the last ten days owing to the lack of palm kernels?—Yes.

2916. Therefore a constant supply of palm kernels is most desirable, indeed essential, to the successful working of a mill in this country?—Certainly.

2917. Would that need induce you to enter into some co-operative scheme with the merchants under which a regular supply of kernels was assured to you?—I have already offered to take 150,000 tons from the West African merchants only three months ago. They asked me to meet them, and I met all of them and made a bid for 150,000 tons to be sent here spread over twelve months.

2918. Why was it refused?—The price at that time was 1*l.* 10*s.* a ton, and they asked 17*l.* That is the reason.

2919. There was no elasticity in the price?—No, they tried to fix up some arrangement by which they would never supply the Germans again, but I pointed out that that was a rather impossible thing because, if they did not, somebody else would go to West Africa and buy kernels, and send them to Germany. It would be impossible for them to carry out such a promise that they would not supply the Germans, because if

they did not some new trader would go there and ship the kernels to Germany.

2920. Would you be prepared to enter into any co-operative scheme which would allow for market variations in prices?—I would take all the palm kernels up to 150,000 tons that the West African merchants will ship from West Africa, and enter into a contract to-day at to-day's prices with them, to ship them over the next twelve months, and deliver them to Hull.

2921. But to-day's price is surely very much less than the average price over recent years?—It is higher than when I met them last time. We could not pay the average price because there would be no profit in it.

2922. Then you contemplate switching off to other things when the market suits you?—If they will not sell palm kernels to me we shall have to go on to something else.

2923. If the price of palm kernels is too high you will go on to something else?—Yes—to cotton seed, linseed, or soya beans.

2924. There is no inducement to you to stick to palm kernels?—At the time I met the merchants copra was very low in proportion, and paid better than palm kernels at the moment; I believe it was down to 18*l.* or 19*l.* a ton. I am prepared at any time the West African merchants and the shippers come along to take at least half the amount that they have ever shipped. They have never shipped 300,000 tons to Germany in a year, and I will take half of it any time they come along.

2925. Will you take them on the basis of a price which fluctuates with the value of oil?—It is absolutely impossible. It is not business, because you can put the price of oil up or down as you like. I can put oil up in price 5*l.* a ton to-morrow if I wanted, or I could put it down 10*l.* a ton.

2926. Would you enter into partnership with the West African merchants?—Certainly not.

2927. (Professor Dunstan.) You told us that since you commenced to crush palm kernels you have had no difficulty in finding an outlet for the cake at a fairly satisfactory price?—None whatever; it has been quite satisfactory.

2928. Was that outlet to a large extent in Yorkshire?—All over England and Scotland.

2929. Are the Yorkshire farmers taking to the use of this palm kernel cake?—I should say the Scotch farmer is taking to it more than any.

2930. What about the Yorkshire farmer?—He is taking some, but the Yorkshire farmer is rather slow to move.

2931. Not slower than some others?—I should not think he is taking his fair proportion.

2932. It has been said that one of the advantages of crushing palm kernels at Hull would be that you would get a near market for the cake amongst the Yorkshire farmers?—Scotland is a near market because the carriage is very cheap to Aberdeen, Leith, or Dundee. The carriage to Leith is less than it is to North Yorkshire from Selby.

2933. You mean sea carriage as compared with rail carriage?—Yes.

2934. After the war, supposing we get a very large increase in the amount of palm kernel received in this country, and supposing Hull becomes an important centre for crushing, what would you propose to do with the cake which you probably would not be able to sell in this country? I am thinking of the imported cake which you refer to as being sent to this country from abroad. Supposing Hull can supplant that by cake made chiefly from palm kernels sent from West Africa there will probably be a considerable surplus of cake which we shall not be able to use in this country?—I should not think so under present conditions. The cake trade is an awfully difficult question to deal with because it depends on so many things. It largely depends on the price of maize and the price of hay, and the condition in which the crops are gathered in a particular year. If you have a bad year, and it rains during harvest time, you get a lot of spoil wheat, barley, and oats, and the farmer grinds it up and feeds his cattle with it instead of its being used for other

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purposes, and then you always get a bad cake trade. But taking a normal year there is no doubt we can consume the cake. If you take the German import of palm kernels, which was 300,000 tons, and at the same time the import into the United Kingdom was something like 70,000 tons, making 350,000 to 370,000 tons, which is the largest amount of palm kernels which have ever been shipped, then as a rather rough calculation you may take half that as cake—that is 180,000 tons, or something under 200,000 tons of cake—which is nothing at all in England.

2935. (Chairman.) What would the total of the cake consumed in England be?—Of all sorts of cake?

2936. Yes, apart from the maize?—It is millions of tons.

2937. (Mr. T. H. Middleton.) It was 1,200,000 tons last year, so that your figure of the palm kernel cake would be one-sixth of it?—It was 1,282,000 tons of cake of all kinds; and out of that 329,000 tons were imported.

2938. (Professor Dunstan.) Then in speaking of the importance of Hull as a crushing centre you have not in view the fact that you might have to export the cake to foreign countries?—We imported cake in 1914 to the extent of 329,000 tons, and we exported 41,000 tons, so on balance there were 280,000 tons of imports into this country. Therefore, we are large importers of cake at present.

2939. Is it not true that besides Germany some of the Scandinavian countries use palm kernel cake to a large extent, and will want it after the war?—The United Kingdom has been selling to Scandinavia since the war. Last month we sent them 10,000 tons.

2940. Is not that trade likely to go on and is not Hull very favourably placed for the trade?—Very favourably placed. They bought largely from Germany in the past.

2941. Taking whatever Germany could not use itself?—Yes.

2942. You told the Chairman that German chemistry was very far ahead of English chemistry. What exactly did you mean by that?—In Germany, any large go-ahead firm will get the best chemist it can. Money is no object. They will find the best man, and will turn that man loose in the business for two or three years, and tell him to do what he can and to find out all he can. They do not put him at a dish and tell him to make certain tests, but they turn him loose in the works for two or three years to find out what he can, and at the end of that time he tells what he has found out. We do not do that in England. We get a man at 300*l.* a year and put him down to make certain tests. The English manufacturer is frightened to give a man 1,000*l.* a year and turn him loose. He dare not do it. The Germans do that and have the sense to do it. We have never realised it here. We always want results. We take a man and say, at the end of a year, "What have you done?" He may say, "I have done nothing, but I am going to do it next year." In Germany they do not do things in that way.

2943. But is not that the fault of the manufacturer rather than the fault of English chemistry?—Certainly. There is not the opening for the chemist here that there is in Germany.

2944. It is not that English chemistry is at fault, and that the German chemistry is better?—No; it is the employer, the manufacturer, who is at fault. There is not the field for the chemist here that there is in Germany.

2945. I agree, but I do not think the point was quite clear from the answer you gave the Chairman. Those statistics that you have produced, are they the published statistics of the Customs and the Board of Trade?—I imagine so. I told my man to get them out for me, but where he got them from I cannot say.

2946. Probably from the official returns?—Yes, from official returns; but I cannot tell the book from which they were got. They have been checked three times, and I do not think you will find any mistake in them.

2947. (Sir Hugh Clifford.) You told us that you thought a previous witness had understated it when he put the initial advantage that Germany had over Great Britain at between 5*s.* to 10*s.* a ton on palm kernels.

You said it was more than that?—I have always been given to understand it was more than that.

2948. Have you any data or any facts upon which you can case an estimate as to it?—None whatever. The sole facts I have are obtained from Mr. Koch, who was works manager, practically general manager, to Messrs. Brinckmann and Thorls in Hamburg, who are the largest crushers in Europe. We copied our mill from theirs.

2949. All he could tell you was that there were certain definite advantages?—He said there was no question about it.

2950. But he was quite unable to give you any details on the subject?—Quite.

2951. You were not able to form any estimate of what it amounted to?—No; but I should have thought that it was at least 10*s.* a ton, if not more.

2952. You said it cost 25*s.* a ton to crush. Does that figure include wear and tear of your machinery and everything?—Yes, 10 per cent. for depreciation, and 5 per cent. interest on capital.

2953. And supervision?—Everything except profit.

2954. (Mr. T. H. Middleton.) What is the usual variation in the quality of the cake you are turning out now? What percentage of oil does it generally run to in palm kernel cake?—It ought to be 7 per cent. It is 8 per cent. It is rather difficult to answer your question because one test may give 7 per cent, and another may give 8 per cent.

2955. But the usual run is 7 to 8 per cent. on the whole?—Yes.

2956. Do you find any demand from Scotland for a high percentage of oil in the cake?—No, not in palm kernel cake. They have never asked for it.

2957. Have you any complaints about the cake being too hard?—No. Palm kernel cake is a very soft cake. The trouble is that it breaks up so easily. You cannot make a hard palm kernel cake.

2958. Have you any complaint about it going rancid?—No, we have never had any such complaints. We have never had the chance because the day it is made it goes out of the works. There is such an enormous demand for the cake at the present time that we never have cake in our works.

2959. What is the present price of it?—7*l.* 12*s.* 6*d.* I believe our price is.

2960. That means how much at, say, Aberdeen?—The same. Ours are carriage paid prices. We pay carriage to anywhere in the United Kingdom.

2961. How much has the price risen in the last six months? There has been a very sharp rise I think since the spring?—I should say not more than 12*s.* 6*d.* I could tell you accurately if you wish to know; but I have not the prices in my mind.

2962. The point I want to know is whether you find the demand has been increasing rapidly. Are the farmers keener to get it than they were six or nine months ago?—Yes, they are awfully keen to get any cake to-day. The position in normal years is that the crusher is very busy up to April or May; and then during June, July, August, and September he is piling up stocks ready for the winter. That has not happened this year. June was busier than May; July busier than June; August busier than July, and September busier than August. To-day no crusher has a cake in his place. There is not enough cake to go round, and when winter comes I do not know where you will get it from. You will be without cake.

2963. There is a very large root crop in Scotland?—A large root crop always brings a large cake trade.

2964. (Chairman.) You said you had been told some things by your manager who was with you. Did you ask him how the rebate was given, or would it be possible to get the information from him?—I will try to see him and find out if possible. He is in the Wakefield Internment Camp, and I will make it my business to go next week and see him. I am sure he will tell me if he knows.*

2965. Our previous witness put down 5*s.* to 10*s.* a ton as the German advantage, not as rebate from the shipowner, but as the advantage obtained principally

* The witness could not obtain further information.

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from there being a continuous market at Hamburg, with the possibility of a quotation any day and any hour, and of getting kernels when wanted, and not being without them, say, for ten days. He did not put down the advantage as being due to the shipowner, but to the difference in market facilities.—I should not have thought that that was correct from my own experience since the war. I do not know that I have ever gone three days without being able to buy kernels in Liverpool; there has always been a daily price, but the prices fluctuate very much.

2966. With regard to the possibilities of Hull Mr. Moore asked you as to your export from Hull. Do you send any coal from Hull to the near Continental ports?—Yes, very largely.

2967. Therefore, it is not a question merely of the advantage to Hull of shipping direct to West Africa, because you could quite well get a return freight on coal from Hull to the near European ports, and start from, say, Rotterdam to West Africa?—You could do that with a tramp steamer, but not with a regular line, because it wants to go back. That is why we should not be at the mercy of one line. If you have free tramp steamers they can take a charter at Hull and go anywhere in the world.

2968. You said you made your offer to the merchants some time ago for palm kernels, although copra on a comparative standard was lower in price at the time than palm kernels?—Yes.

2969. What induced you to make that offer for palm kernels then? It was not philanthropy?—No; but because palm kernels are very much easier to crush than copra. Copra is a very sticky and nasty thing to have in your mill, and there are troubles connected with it which the crusher does not like. I do not think there is any crusher in this country, besides ourselves, who ever crushed copra.

2970. (Mr. C. C. Knowles.) There is Swift's mill.—I do not believe any other crusher except ourselves ever tackled it, and it is a very difficult article to deal with, so that if we can have palm kernels we would rather have them.

2971. (Chairman.) You said that given equality in the matter of freight, that was all you really wanted?—Yes.

2972. Given equality, in the matter of freight would you be prepared to put up your margarine factory next door to your oil mill?—Certainly.

2973. Although shall we say most of the selling agencies are in this country, and a good deal of the trade is in the hands of what would be your foreign competitors and, some of them, your English competitors?—We had quite a nice trade, as Sir George Watson knows, outside the tied houses, and if we had had a mill for making margarine at our premises we should then have made a good profit, but our mill was in Godley, and all the palm-kernel oil had to go from Selby to Godley, in Lancashire, which cost something like 1*l.* a ton, which put us at a disadvantage. We hope in time to come we shall be able to beat the foreigner, because he always has his freight to pay from Holland here.

2974. Do you know the German internal prices for margarine before the war?—I do not.

2975. If I said the price was about 9*d.* a pound, do you know if that would be about it for German-made margarine?—I could not form an opinion at all. It was 5*d.* in this country before the war.

(Sir W. G. Watson.) It was dearer in Germany than here, but the reason for that is that the business is done in an entirely different way. The stuff is put up in small packets, and they advertise the packets, and the cost of that has to go on to the price paid.

2976. (Chairman.) If margarine was sold in Germany before the war, can you tell me the price of it as compared with the price in this country charged by the German Margarine Trust?—I cannot.

2977. In other words, would they depress prices in this country to almost losing prices, relying on their German business?—I have no information.

2978. (Mr. C. C. Knowles.) The Chairman has told you that a previous witness said that he considered English crushers were at a disadvantage in buying

palm-kernels as against the Germans by at least 5*s.* to 10*s.* a ton. You have had a great deal of experience in buying in all sorts of markets, both free and closed markets, and I would like you to describe the two markets. In Hamburg before the war you could buy palm kernels and sell palm-kernels just as you could buy and sell Consols on the Stock Exchange, and that naturally attracted to that market, as one can easily understand, dealers from all cities—from London, from Liverpool, and from other centres all over the Continent?—Yes.

2979. It also attracted speculators, and it naturally attracted the importers, not only importers here but the German importers from the German Cameroons and so on; in fact, the whole trade went there because there was a free market?—Yes.

2980. That is because nearly all the palm kernels were being consumed there, and that brought the trade there?—Yes.

2981. If there were only one or two crushers in this country, namely, the African Oil Mills and ourselves, inasmuch as the African Oil Mills got the most of their supplies under a fixed contract with the African Association, something like 1,000 tons a month, at fixed prices, that did not help to make a free market in Liverpool. It became nearly a one-man market, and you could easily understand that the importers did not care to bring palm kernels freely in the same way to Liverpool as to Hamburg?—Naturally, because there was nowhere to sell them.

2982. You can understand that there can easily be a difference in favour of the German between dealing in a free market at Hamburg and dealing in a practically closed market in Liverpool?—Yes, it is quite possible. There practically was no market in Liverpool, you say, but I only take your word for it, because I do not know.

2983. With regard to keeping the crushing of palm kernels in this country after the war—which is the point we are dealing with to-day—I do not know whether you agree with me that unless there is a market for the oil in this country, and unless we can compete with the Germans in the market for the export of the palm-kernel oil, not to Germany but to other countries, such as America and so on, we cannot expect to keep the trade. We must create a demand for the oil from the palm kernels we crush, and we must arrange so that we are on equal terms with the Germans for the export of any oil we make, and unless we do that we cannot expect to get the trade?—Certainly.

2984. To do that we must popularise margarine as much as possible and make our people consume it as much as possible, and also bring the Dutchman here, or get the Dutchman's trade?—Yes.

2985. We must stop the import of it into this country?—Yes.

2986. Unless we can do that, is it impossible, in your opinion, to get the trade?—No, I should not say that, because you always have America.

2987. America has the Philippines, and there are two or three mills put down in the Philippines. They are shipping copra oil from the Philippines in tank steamers at a very cheap rate; that trade is increasing very largely. The Philippine Islands belong to America, and I think that, just lately, that trade has cut off their demand for oil from this country practically altogether. The total export from Germany, including to the United Kingdom, was only 38,000 tons?—38,000 or 39,000 tons. Where is Holland going to buy its palm kernels from after the war, and where is it going to get its oil to make its margarine?

2988. From Germany, as before?—Germany is not going to get the palm kernels if you put an export duty on them in order to give England a preference over Germany.

2989. I say unless we do something of that sort I do not think we can expect to get the trade.—There is always the carriage back from Holland to this country. If Holland pays the same price for her oil in Holland as we pay for it in England she always is at a disadvantage in selling her goods in this market except to tied houses, because she has the carriage to pay to England.

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2990. Yes; but she can get to nearly all the big consuming ports with as cheap a freight as the margarine works in this country can get to those centres—very often cheaper?—I mean Holland cannot afford to import margarine at the price we can manufacture it at, because she has her freight to pay from Holland to England. Therefore we always have that advantage in the margarine trade, given fair competition; but we have not had it in the last 12 months because Holland has been allowed to buy oils of all descriptions in enormous quantities, until the trade was stopped in May or June this year. I have quoted to different departments of the Foreign Office and to the War Trade departments a case where a Dutch firm bought a cargo of whale oil at 23*l.* a ton, and it was reported that it was sold to Germany at 70*l.* a ton, or part of it. Germany did not get the whole of it, because it was stopped before it reached her, but she got some. Supposing Holland sends 3,000 tons of oil into Germany at a profit of 30*l.* or 40*l.* a ton, she makes 120,000*l.* or so on the deal. She sends weekly to England 1,000 tons of margarine, say, at 1*l.* a ton loss; but she has been in the position in the early part of this year of exporting oil to Germany at enormous prices which enabled her to send back the margarine to this country at 1*l.* or to 2*l.* a ton loss.

2991. (*Chairman.*) You mean she can dump the margarine in this country, because she can get enormous profits in Germany?—She has made millions out of oil.

2992. You will remember that there is an Anglo-Dutch Trust which makes margarine in England as well as in Germany?—When oil jumps from 20*l.* to 40*l.*, 60*l.*, or 80*l.* a ton, the profit is so much greater.

2993. But the same principle applies?—I do not see how they can artificially keep up the price.

2994. Supposing there is an import duty on margarine in Germany to the extent that they sell

for 9*d.* there what they sell here for 7*d.*, will not the sales in Germany more than compensate her for letting loose her surplus over here?—But if you put everything up you will put the cost of manufacture up.

2995. (*Mr. C. C. Knowles.*) Can you suggest any way by which we can retain the trade of crushing palm kernels in this country after the war?—I am quite certain that if we can buy our palm kernels in a free market in this country with delivery to all ports at the same price as Germany can get them delivered at her ports, we want nothing more; we can do the trade; we can sell the oil and the cake; we have the machinery and some brains here.

2996. (*Mr. G. A. Moore.*) Have you had any experience to judge of the difference between the value of cake before the war in Germany and in this country?—Here they would not touch it at any price, I know, and all the palm-kernel cake was exported from this country to Scandinavia.

2997. (*Sir Owen Philipps.*) Have you any idea what freight you would have to pay to-day if you took a tramp steamer from West Africa to Hull?—I have not the slightest idea what the freight is by boat from West Africa. The price being paid on the coast I am told is 9*l.* a ton to-day, and the price at which the kernels are sold here is about 15*l.* a ton. That leaves a margin of 6*l.* a ton for freight and other charges, but how is it divided have no information at all.

2998. (*Professor Dunstan.*) It might perhaps interest you to know that I have recently been looking into this industry in Marseilles. You said just now that there was a great scarcity of cake in this country. Are you aware that there are many warehouses filled with cake in Marseilles which they cannot dispose of—groundnut cake, copra cake, and rapeseed cake? They are most anxious to sell it and cannot sell because the French Government so far will not allow it to be sent away.—I did not know that.

The witness withdrew.

Adjourned to Wednesday next, at 11 o'clock.

SEVENTH DAY.

Wednesday, 29th September 1915.

Colonial Office, Whitehall.

MEMBERS PRESENT:

Mr. A. D. STEEL MAITLAND, M.P. (*in the Chair*).

Sir HUGH CLIFFORD, K.C.M.G.
Mr. L. COUPER.
Professor WYNDHAM R. DUNSTAN, C.M.G.
Mr. C. C. KNOWLES.
Sir F. LUGARD, G.C.M.G., C.B., D.S.O.
Mr. T. H. MIDDLETON, C.B.

Mr. G. A. MOORE.
Sir OWEN PHILIPPS, K.C.M.G.
Mr. T. WALKDEN.
Sir WILLIAM G. WATSON.
Mr. T. WILES.
Mr. T. WORTHINGTON.

Mr. J. E. W. FLOOD (*Secretary*).

Mr. LEWIS A. SMART called and examined.

2999. (*Chairman.*) I see from the earlier paragraphs of your precis* that you have a great deal of experience in the whole of the West Coast of Africa and the conditions there.—That is so.

3000. I am now going to ask you some questions with regard to machinery. You say that the economic size of a factory is one which will treat about 10,000 tons per annum?—Yes.

3001. You have arrived at that as being the minimum size which will do the thing economically?—With sufficient prospects to warrant one in embarking on the enterprise.

* Not printed.

3002. Does that apply as much to England as to Africa?—You misunderstand me. That is 10,000 tons of cleaned fruit for a palm oil plant on the Coast, not a kernel plant in Europe.

3003. It will treat both pericarp and kernel?—Yes. The 10,000 tons is relative to fruit, not to kernels at all.

3004. You mean it to apply also to a factory which will treat the pericarp and the kernel?—Yes.

3005. Both?—Yes.

3006. In your opinion can the same mill treat both?—Yes, if suitably designed. All mills cannot necessarily treat both, but I think the mills should be so designed that they can treat both because of the

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great benefits that will accrue from being able to keep the employees working permanently at oil extraction.

3007. Will that be as economical in competition with, say a big mill dealing with kernels only? You are contemplating a mill in West Africa which will treat the pericarp fresh, keeping the kernels and treating them when pericarp is not available?—Yes.

3008. Do you think that that will compete on equal terms with a big mill in this country or in Germany which is specialised for crushing kernels?—I would wish to have an opportunity of going carefully into figures before answering that question. You see you cannot treat the palm fruit at home here; it must be treated on the coast, and my suggestion is that the palm-oil mill which necessarily must be on the coast, should as a supplement, treat kernels, the kernels being a side line of course.

3009. Have you analysed the pericarp at all?—Yes, very many times.

3010. Can you make anything of the residue of the pericarp or cake can be made with the kernels?—Do you mean an edible product, or anything of that sort?

3011. A feeding product.—No. I have always looked upon it as fuel for the boiler. You require a large amount of fuel, and the residue of the pericarp, plus the shells of the nuts, can supply it.

3012. The fibre of the pericarp is of no use for feeding cake like that of the kernel?—No; I look upon it as too fibrous altogether. At the same time that is not a branch that I feel qualified to express an opinion regarding. I may say that in some districts it is made up into balls and sold for fuel.

3013. Do you think there is likely to be a decrease in palm oil in Nigeria?—Provided that cocoa catches on there, and I consider that that is a likely contingency.

3014. Have you seen any signs of it at present?—No.

3015. You are judging by the Gold Coast?—Yes. The criterion of what is good cocoa land is, do good palms grow on it? Natives on the Gold Coast very largely look out for the best palms and cut them down and grow cocoa with greater success on the land. Only to-day my attention has been drawn to a statement by Mr. Farquhar in which he confirms or rather originates the idea that cocoa is likely to compete seriously. Shall I read it?

3016. I think we are all familiar with it. One other point with regard to palm oil: you say that a good mill would recover twice the quantity of oil by machinery that is at present recovered by the natives?—Yes.

3017. All our evidence goes to show that although the quality of the oil recovered by the natives may not be particularly good, yet they recover a very large percentage, and that you could not recover more than 10 or 12 per cent. more than they recover. Your experience is quite different?—Absolutely, and I have made so many tests, certainly many many hundreds, that I am thoroughly satisfied with my figures in that regard.

3018. You have taken the fibre after it has been treated by the natives and you have recovered as much oil again from it as they had previously done?—That would not be the sole source of the loss. At the same time there is a very large amount of oil remaining in it. Oil goes away in the water and in many directions. I have taken a known quantity of fruit and ascertained the oil in it, and what oil I can take out, and I have noted the quantity of oil that the natives got from that quantity of fruit.

3019. This, to a certain extent, affects the question of setting up factories in this country, because it may mean Nigerian competition as distinct from German. Have you precise figures or do you speak from general inferences?—I could give you absolute details of many tests. Roughly speaking, the natives get about 10 per cent., and we can get about 20 per cent. The quantities, however, vary greatly in different districts.

3020. Obviously. You say also that you have inspected two factories in the Cameroons and two factories in Togoland?—I have, and I have the original of my notes here if you have any questions to ask.

3021. Perhaps you could let us see them. Are they in such a shape that we can deal with them?—More or less—I could have them typed out for the Committee if they interested them with regard to any of the factories.

3022. They would interest some of the members, I am sure. From your experience, what is the quality of the palm oil which is produced in them?—The quality of the oil made at the Agu Plantation in the north of Togoland is exceedingly good. I had an opportunity of meeting those responsible for running the place in Agu and also the management in Germany, and I got the working figures. I was allowed to make my own tests as to the free fatty acid content and the output of the mill, and so forth, and there can be no question that they are making an oil with from 7 to 8 per cent. of free fatty acid; when it is delivered in Hamburg. It goes exclusively for margarine manufacture, and does not materially increase its content of free fatty acid on the road home.

3023. You know that of your own knowledge?—I have seen the accounts and returns from the people who buy it. It is sold on a sliding scale on the basis of 12 per cent. free fatty acid, and so much more per $\frac{1}{2}$ per cent. that the free fatty acids fall below 12 per cent.

3024. Do they have much difficulty in getting fresh fruit to keep the factory in continuous operation?—Yes; they cannot get it. The fruit is invariably treated the same night. They had a general plantation and they unfortunately cut it down to plant cocoa and rubber before they realised its value. Now they have not sufficient themselves, and the natives bring in the fruit spasmodically, and it is so poor that they cannot use it for the higher quality oil.

3025. Have they a regular plantation?—No. They left those trees that were on the ground when they took over the land, or certain of them, and have cleaned them and pruned them (pruning is not quite the correct expression), and cleared up the undergrowth round them and cultivated them, and they are now getting a very good yield of fruit from the trees.

3026. How many tons per acre; as much as three?—It is of the order of three. I can verify the figure at once. I think it is about 2 $\frac{1}{2}$.

3027. I think we may go as far as discussing how economical a plantation system may be as distinct from questions of tenure which it gives rise to. Your opinion is that by a plantation system they can run it economically, but they have not a large number of trees?—Those are the only circumstances under which it can be run economically, in my opinion, to make a high-class oil. When you cut the bunch of fruit, if you try to separate out the individual fruits it is a very tedious job. You can hardly do it in practice. If you leave it four or five days and shake the bunch 90 per cent. will fall out, and the native will separate them in that way and not pick out the fruits one by one.

3028. Now a question about machinery in general. You say that crushing plants for cotton seed are not suitable for kernels?—No.

3029. Would you say that it comes to this practically: We leave aside two kinds of available oil material to start with. We leave aside ground nuts and copra. As regards linseed and the rest, you would say that plant suitable for crushing kernels will take linseed by altering the rollers?—Yes.

3030. But not necessarily *vice versa*?—Not necessarily *vice versa*.

3031. Reverting to Togoland for a moment, do they extract or crush there?—They crush.

3032. You say that at Harburg they crush or extract (Sir George Watson knows a good deal about this, I think) according as their market serves for cake or oil?—Yes.

3033. They keep alternative plant, either of which they can run at its maximum as the occasion serves?—Yes, or both.

3034. That means, supposing that the market is high for oil and down for cake, they will do much more by extraction than by crushing?—That is the tendency.

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3035. Does not that mean that, at any rate, one part of their plant must be comparatively idle?—No, it means that if they are not working full bore, they work full bore on that section which pays them best, and if there is any standing idle, it is that portion of the plant that for the time being least pays them.

3036. Contemplating alternative working means also contemplating not running full pace with one set of your machines?—Yes. They used to crush almost entirely, but solvent plants which are largely on the battery system have been added since, and they are used when circumstances warrant it.

3037. If you put up a mill now to run alternatively —?—I should not do that.

3038. Therefore the experience of Harburg is not a guide to us at the present moment?—No. That is one of the things that has happened; it has come about; mills have grown in that way.

3039. How far would the same mills that crush kernels crush copra?—Practically the same.

3040. Will the same extraction mills extract copra?—Yes.

3041. Does not slime cause a good deal of trouble in copra which you do not get with kernels?—Yes, you get that.

3042. The same mills will do both as a business proposition?—As a business proposition, subject to such reasonable modifications as you would not mind making from time to time with any plant.

3043. Quite apart from the hardness of palm kernels, I always thought that copra had extra difficulties of its own in the crushing?—Yes.

3044. What are they?—It is so long since I did much work with copra that I would rather look up that point, if I may.

3045. Copra oil is so nearly an alternative to palm-kernel oil that it is no good taking measures with regard to one unless you know what will happen with regard to the other.—I follow.

3046. Other members of the Committee have specialist knowledge and will deal with that. Now, you say you can leave practically any desired percentage of oil when you extract?—Yes.

3047. If you want to leave 5 per cent., can you leave 5 per cent.?—Approximately. You cannot hit it off to a decimal percentage.

3048. Nor can you with crushing. How is that result arranged?—By stopping the process after it has run so many hours less than it would have run to decrease down to, say, 1 per cent.

3049. Does that apply to all alternative methods of solvent extraction?—Yes; you can stop it at approximately any point that you desire.

3050. With any of the alternative methods?—Do I fully comprehend what you mean?

3051. You have given us three in your memorandum.—I have done it with both B and C, but never personally with A.

3052. Would it not be easier with A than B or C?—I do not see why it should not be done with A, but I have only done it with B and C.

3053. By "extraction" I always mean extraction by solvents. You say that extracted meal keeps better than crushed cake?—Yes, that is my experience—when suitably dried.

3054. Again, all our evidence goes the other way.—I should not press my views in this case because they are based on comparatively small experience, but I was very careful in my records in the matter. I have kept extracted palm-kernel meal over two years and had it perfectly sweet at the end of that time.

3055. Perhaps Mr. Middleton knows more, but I think our experience is that, so far as meal is lighter and more exposed to the action of the air, the oil left in it tends to get rancid the quicker?—That is what one would anticipate.

3056. You have definitely used it, and not had that experience?—Yes, with thorough drying. Thorough drying is the material factor.

3057. Do you find it difficult to use?—I have no experience of feeding stock with it, if that is what you mean.

3058. Only horses?—Yes.

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3059. So far as horses are concerned, your experience is that practically you can almost substitute it for oats?—Yes, I did that and I think that, while my weighings were, as I note, not necessarily reliable (they were on an ordinary cart weigh-bridge) the result was sufficiently promising to warrant one carrying the investigations further.

3060. Anyway, you think it is worth more experiment to prove it?—Yes.

3061. As to the cost of extraction by solvents you put it at 7s. 6d. a ton cheaper than crushing?—Yes.

3062. What do you put crushing at?—I would rather not answer that question, because there are 101 points that come into it, the size of the mill, the class of material you are treating and the extent to which you have automatic handling appliances, and so on. I would be glad to prepare figures on an alternative basis and put them in if you like.

3063. I think we may close at once with that offer, so I will not press you now. Supposing I had a mill with the very latest machinery, and not merely American presses, and it could turn out 500 tons a week, you would not like even to hazard an estimate?—No. I would like to be sure of my figures.

3064. I think that is prudent, but still on the whole you would say that the solvent process is 7s. 6d. a ton cheaper?—Yes.

3065. With regard to value as feeding stuff for cattle, is that within your personal knowledge or would you rather not be particularly cross-questioned about it?—I make it a practice of encouraging my German-speaking technical assistants to go across to Germany for their holidays, and two of them, each being a Bachelor of Science, brought home the same information which I subsequently verified from different sources.

3066. Could you get us the prices in Germany before the war with regard to extracted meal and crushed cake?—I will try.

3067. You say that extracted meal is more digestible than oil cake?—That paragraph was prepared from their notes based on their visits and on my own to the Harburg district.

3068. I should have thought that indigestibility was one of the charges that could never be brought against kernel cake, and that on the whole its ratio of digestibility is probably higher than that of any other feeding stuff?—Meal is higher still, probably.

3069. You cannot get much higher than 98 per cent.?—No. This is not my subject. I am an engineer.

3070. It is in your memorandum; that is why I ask. Then there are the substances left, the mucilage, and so on. I have a note to ask you about them. I only direct your attention to them, you notice.

3071. One point, strictly within your usual career, is the question of elevators. We have had very differing ideas. Do you think that an elevator would be of advantage for handling kernels in bulk?—On the Coast?

3072. Yes. What amount of kernels should you think ought to be handled in a year in order to make an elevator a business proposition?—It would entirely depend on the circumstances of each case. If you take some places on the Coast, a very primitive form of elevator, practically just an elevated tank, is all that would be required so long as one could get the necessary declivity down over the ship's bulwarks and into the hold for discharging kernels. Only a very elementary thing that would be necessary there. On the other hand at Liverpool, when it is a question of discharging quickly as one would with grain, there, of course, one would want first-class tackle, and the question of storage capacity, and a hundred things come in. This point, I would mention again, is one that I merely brought forward for discussion. If I may say so, I only wanted to direct your attention to it, other wise I should have brought facts and figures to support any suggestion I had made.

3073. On that, again, if I ask for facts and figures, you can supply them after?—I shall be happy to do so.

3074. Witnesses here have differed a good deal in their opinions as to what was practicable, largely

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depending on the amount of cargo that would be so shipped, and the possibility of bringing it to the elevator at the terminal on the West Coast?—The kernels brought home in bulk at present are not brought home so as to take anything approaching the maximum benefit out of bulk storage, and the tendency at Liverpool is rather to discourage that trade, I am told.

3075. What would you say was the minimum that would give full benefit from bulk storage? Do you mean a whole tramp steamer?—No, I am thinking of much smaller consignments than at present, and I anticipate a saving in sacks and handling.

3076. Referring to one or two quite disconnected points which you mention one after the other, you refer to the economical collection of palm kernels out there. Have you ever directed your own attention (you have travelled a lot you say) to the differing yield of different palms, not so much in the weight of fruit produced as in the proportion of oil in the individual fruit?—I found that that was such a large subject that I had to tackle only a portion of it, and that was the varying yield of oil and kernel. In the various districts, I focussed on one or two species; I did not take every type of palm. There are very many. I focussed on varieties representing most of the trees in the districts I knew best.

3077. I am not talking of the yield of fruit in weight, but given a particular fruit, is the proportion of oil greater and the proportion of shell less as regards the kernel or as regards the pericarp?—I took two different types of palm and I have my data all over the coast covering a large percentage of the whole. I can give details.

3078. Are they different varieties of palm, do you think?—There are probably twenty or thirty.

3079. Do you think they would breed true?—I have heard it said that they will not. I have no experience.

3080. The main thing is whether you can cultivate it for the individual type to breed true. Now do you think that wages in Germany are, on the whole, lower than here with regard to this industry?—When the wages in the oil mills round about Hull were about 28s. they were 22 marks in Hamburg for the same service.

3081. If I took the staff right through in Germany for the same amount, would the wages bill in Germany be less on the whole?—To the best of my knowledge, yes, but I am not qualified to express an opinion.

3082. You put it in your memorandum.—I use the expression "labour," I think?

3083. Yes. As regards setting up here you state that there should be some security given to the industry in this country if it is set up?—Yes.

3084. Alternatively you would like to see an export duty on the kernels from the coast?—Yes.

3085. What would happen to English mills if that took place? Will there be, do you think, a large production of kernels in the Congo, as well?—The present export from the Congo is not very great; it is quite small. Lever's operations there are quite another matter.

3086. If there was a great export from a neutral place where there was no export duty, it would merely mean that Germany would tend to take that and England would take palm kernels from Nigeria?—But that would still, in my opinion, leave Germany hopelessly short of her total requirements.

3087. The copra trade is almost half as big again as the palm-kernel trade, taking the world's available production.—Yes. The production of the West Coast is negligible.

3088. It is practically an alternative to palm kernels for use in making margarine, having very much the same class of oil?—Yes.

3089. Is it any use putting an export duty on palm kernels if the Germans could get all that they want from copra and had a sort of extra source of palm kernels as well from the Congo?—I should want to see what proportion of copra at present goes to Germany—whether the balance of the copra, assuming it all went there, would be sufficient to supply their growing requirements, because if the total of copra, which already goes largely to Germany and to Marseilles, was not

equal to Germany's requirements, then they would want palm kernels.

3090. Therefore it turns simply on the amount of their requirements and the additional possibility of supply, but in so far as the German shortage in kernels could be made up from copra or from other sources, to that extent an export duty would not have as much effect as one could wish?—That is my opinion, but it is obviously a thing one would want to go into very carefully.

3091. An export duty is suggested, but it is subject to more considerations than appear at the first blush?—Yes.

3092. Thank you very much.—I would like to say, Mr. Steel-Maitland, before you finish, that you will notice in my précis that I do not deal fully with oil mills in West Africa for treating the pericarp and kernels of palm fruit. I wished to consult one of my clients in this matter, namely, Messrs. Miller Brothers of Liverpool. With their permission, I have here for any members of the Committee who wish it, a report made to Messrs. Miller on the 9th March 1914, summarising the position between us as at that date, and particularly dealing with certain machinery which we had just previously inspected in France and Germany. From that report (I think you have had an opportunity of going through it, sir) you will observe that we divide the various processes available into four groups, and at a meeting that I had with Mr. Miller yesterday when he gave me permission to put in this report, if it is desired, he gave me to understand that provided facilities are given for putting up such plant on the coast, his firm are prepared to put up plant to test all four systems each against the other and give the results to the Colonial Office.

3093. A test on the coast, you mean?—Yes. His reticence and hence the delay in my mentioning this is because he feared that it might be misunderstood as an attempt to rush the matter. I said that I would only put this forward provided it was clearly understood that it was a public spirited thing that was being done, and not an attempt to rush either the Colonial Office or the Nigerian Government. They will test all four systems at their own expense if they are given proper facilities.

3094. I am quite sure that the Committee very much appreciate Messrs. Miller's readiness to place the result of their inquiries at the disposal of the Committee, I am sure that we all agree, and at the same time I have not the least doubt that the Nigerian Government (others can speak upon that much more authoritatively than I can) also appreciate their offer. It will not be misconstrued, certainly.—It involves big expenditure. I have copies of the report, if the Committee would like to see them.

(Chairman.) I am sure the Committee would like them circulated.

3095. (Mr. C. C. Knowles.) You said that the economical size of mill on the coast to extract palm oil and crush kernels is one capable of doing 10,000 tons of fruit per annum?—Yes.

3096. What proportion of kernels would there be in the 10,000 tons and what proportion of palm oil?—That would vary with the season, and, of course, with the district.

3097. Roughly?—Approaching 20 per cent. of palm oil and the corresponding figure would be about 13 or 14 per cent. of kernels. I generally find that the kernels and palm oil vary in inverse ratio.

3098. Is it your experience that they get such a high percentage of palm oil from the fruit and of kernels from the fruit?—In the districts in which I have done most of my research work, yes. I have often got the palm oil as low as 9 per cent.

3099. Research work? It is not experience from actual working with machinery?—The figures I am now giving to you are those from what I might term laboratory tests made on the coast zig-zagging through the forest and taking trees, and going back to the same trees at different periods of the year, and accumulating data in that way.

3100. Machinery would not bring out that percentage of oil, would it?—By solvent extraction from

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the fruit that I was treating, yes. With a plant treating about 10 cwt. a day which I operated out there, we got consistently for about three weeks on end over that figure.

3101. Fourteen per cent. of kernels and 10,000 tons of fruit. That would be about 1,400 tons of kernels a year?—Yes.

3102. Dividing that by 50, it comes to about 28 tons of kernels per week.—I accept your figures.

3103. Do you think that that would be a quantity that you could crush economically? You must bear in mind that you must send out white labour there to superintend.—Yes. In the first place you would only crush kernels when there was no fruit coming forward, and that would mean that kernels would be treated for only so many months of the year.

3104. How many months of the year?—Probably about four to five.

3105. During four or five months you would be crushing about 28 tons of kernels per week?—Yes.

3106. (Chairman.) You would want to multiply by 12 upon 5, or 12 upon 4?—I am accepting your figures. One would supplement by purchases so as to keep the mill working economically.

3107. (Mr. C. C. Knowles.) But would your mill crush kernels?—It would be simply to keep my hands together. The primary object of treating the kernels out there is to keep my mill hands, who are necessary for treating the pericarp, from being dispersed three or four times a year, according as the palm-fruit seasons vary, and even if I treat the kernels at cost price or at a slight loss, so long as it keeps my men together and keeps their hands in I do not care.

3108. Do you think it requires as much expert supervision and expert labour to extract the oil from the pericarp as it does to attend to palm-kernel crushing machinery?—I would have a good technical staff in charge of the whole thing. I would not subdivide them and say, "This man shall be on such and such a portion, and this man on such and such another."

3109. You have been in the Cameroons, I think?—Yes.

3110. I do not think you mention (I have not had time to read through your précis, I have just glanced through it) Jurgens' Mills?—They are in the syndicate for palm oil culture at Maka.

3111. Do you mention that mill?—Yes, but not by name. Van den Bergh's are in it too, and I visited it in 1912.

3112. They have had various processes working?—Yes.

3113. The process which they use now is, as you describe, to put the whole of the fruit into the press?—Yes.

3114. Do you know what quantity they have been shipping from the West Coast to Hamburg of edible palm oil, as it is called?—Very small quantities.

3115. What quantity do you think?—I should think that the Agu Plantation was probably sending off about 4 tons a week, or something like that. That was its entire output when I visited the plant in June of last year.

3116. Mr. Anton Jurgens told me himself two years ago that he was receiving from his own mills there about 36 tons every ten days?—We are talking of different mills for the moment. The figure I mentioned just now was for the Agu Plantation.

3117. (Sir Hugh Clifford.) In Togoland?—In Togoland.

3118. (Mr. C. C. Knowles.) I mean the total export of edible palm oil from the Coast.—I cannot speak as to that. It is a figure that anyone could inquire into, I should think.

3119. You rather favour extraction?—I do.

3120. Because you think it is cheaper. It costs less per ton to extract than it does to crush?—Yes, and there are other reasons. Are you talking now of on the Coast?

3121. No; I am talking of Germany or this country?—Well, I am particularly anxious regarding the solvent extraction on the Coast. For one reason it means that the refuse that goes to the boiler will be free from oil, whereas if you press you are sending to

the boilers as fuel stuff that is worth 20l. a ton. And then, again, the question of wear and tear comes in. That is all important in a place like West Africa.

3122. We are interested more deeply, I think, in dealing with kernels here and in the question whether it is cheaper to extract or crush. I think you told the Chairman that you considered it cheaper to extract?—Yes, that is my opinion.

3123. About 7s. 6d. a ton cheaper?—About 7s. 6d. a ton cheaper.

3124. Have you ever designed or erected any extraction plant or crushing plant in this country or on the Continent?—Yes, quite a number, and at the present time I have one just starting upon the Manchester Ship Canal, a small one. I have 14 of the same units working in other places.

3125. That is extraction?—Yes.

3126. When you design a plant, and when you build it, naturally the crusher wants to know what it will cost. You have been able to prove that extraction is really cheaper than crushing? That is your experience?—That is my experience.

3127. With regard to the meal, do you suggest that if we extracted the palm kernels here, you could really sell the meal and get rid of it. Is there a market for the meal?—I am not posing as having any knowledge of the present market in this country, but I know that the Germans have had no difficulty in getting rid of it. I have verified that.

3128. Is there more crushing or more extracting in Germany?—At the present time there is more crushing, but the tendency is to go for extraction.

3129. When you erected the mills on the Continent, did you go into the question of power? What power do they use? Do they use a turbine?—Are you talking of the crushing part of the mill?

3130. Yes the power for crushing. Power is one of the principal items.—Quite so. It is one of the big items. They have all been steam power.

3131. Turbines?—No, compound, reciprocating condensing engines.

3132. Do you not consider that you can get cheaper power by turbine engines than by others?—You are opening up a very wide subject. I would not care to have a steam turbine for a job of that sort under, perhaps, 1,000 horse-power.

3133. What size mills have you erected—to crush how many tons per week?—About 120 tons per week.

3134. Is not that a very very small mill?—Yes.

3135. Do you know what some of the mills in Germany crush?—I am familiar with the figures. It is enormous.

3136. Take the Bremen Company?—I could not say their crushing capacity, but it is enormous.

3137. At least 6,000 to 8,000 tons a week?—Probably.

3138. Some mills go up to 10,000 or 12,000 tons a week?—Yes.

3139. One hundred and twenty tons then is very small?—Very small.

3140. (Sir F. Lugard.) You told us just now that to keep the mill going economically in Africa would require about 10,000 tons a year?—Yes.

3141. Later on in your memorandum you say that the area required for a plantation is 14 square miles to produce 25,600 tons?—Yes, in full cultivation.

3142. Yes.—That is brought up to 3 tons per acre. It would take, perhaps, 20 years.

3143. You might reduce the 14 square miles to a proportionate figure which would be about 5½ if 10,000 tons would do, and still keep the mill working?—Yes, with this difference, that you would want to get the 10,000 tons to start with, you see. You would not want to wait 20 years to get it, and you must have sufficient fruit to warrant a start being made. If you got a 14 square mile area that yielded 10,000 tons of fruit, and that could, with the expenditure of money, be brought up to 25,000 tons, then you would have a good proposition. If it only gave 2,000 or 3,000 tons of fruit to commence with, it would not be worth tackling.

3144. When it came into eventual bearing, 5½ square miles would produce the 10,000 tons, and meantime you might perhaps make up by purchase from the natives?

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—Yes, but, of course, while 10,000 tons would warrant a plant at the present time, it by no means follows that it would warrant it 20 years hence. The hydrogenating of oils is coming along, and that threatens palm oil very badly.

3145. In the report which you have laid before us from the German Colonial Committee they say that to keep a mill in full swing requires 150 hectares?—If you read on you will find that is contradicted a little later on; there is a discrepancy in that. I noticed that myself.

3146. I did not see that.—It is hopeless. I discussed that with the speaker. He was entirely wrong, and he said he was misreported. I thought that he had made a mistake.

3147. That would give only 370 acres?—Yes, that is totally inadequate.

3148. It is not a matter of much importance, but I would like to criticise your figures a little. You speak of 7s. 6d. a ton as the cost of transport?—What transport is that?

3149. If you have 14 square miles.—Yes.

3150. As a rough-and-ready formula I have calculated that head carriage, if the wage rate is 1s. a day, works out at 2s. a ton mile.—My figure is 5s. a ton mile, is it not?

3151. It is 7s. 6d.—The reason of that is that the men must work their way through the bush paths. Your 2l. per ton mile is on a straight road that men can get along.

3152. 2s., not 2l.?—Yes, 2s. a ton mile.

3153. Yes?—That is for fairly good roads that people can step out on, but threading their way through bush paths is different. It is not material.

3154. You say that by introducing a system of plantations with machinery you would make an enormous saving in labour?—Yes.

3155. Are they not two separate propositions? Would not the sylvan industry remain, or do you propose that the whole area should be converted into concessions?—I think that there ought to be a certain area round each factory more or less devoted to that factory, and that area should be sufficient to act as a sort of regulator: you could purchase from a much wider area, and if the fruit was not coming in from the wider area you would draw on your own fruit from what I might call your concession area, and if the fruit was coming in properly from the greater area outside; if the natives were bringing it in and you were purchasing it, then within limits you would leave your own fruit alone.

3156. I want to bring before the Committee the difference between the lease system and what is called the concession system. There is no objection to an agricultural lease within certain limits of area, is there?—No.

3157. And there is no objection to the free purchase of fruit?—No.

3158. The objection to the concession system, as I understand it, is that it involves compulsion on the native to bring his fruit in and gives the whole area to the concessionaire?—You may take it from me that I should have nothing to do (and I am sure I can speak for Messrs. Miller Brothers) with any compulsion of natives, if that was proposed.

3159. How then can you get a concession giving the sole right to collect fruit within an area?—You would negotiate with the owners of the property, with the head of the tribe, and the natives, and pay them a fair rate for the right to collect the fruit, and having got the right to collect the fruit, you would require labour to collect it. Of course, and naturally, you would give the first opportunity to the men residing on the land of collecting that fruit, and if they would not, or if they had better work to do you would hire others.

3160. In practice, if there is a single individual landowner within that area who holds out with a freehold right to his own land what is the position?—He would have to be exempt. You would leave him alone and he would go on making his palm-oil as heretofore.

3161. What is to prevent him selling his small plot of land for the erection of a mill?—Nothing at all.

3162. Then, where would the guarantee for your mill come in?—Because you would have the collecting rights over the other land. If you were going to put down an oil mill there, you would have to have the cultivation and collecting rights on a certain area, say, x miles round that mill. If there was only one little plot that was not included, you could afford to do it, but if it was going to be peppered all over with plots that you had no control over, you would have to leave that area and find natives who wanted you to come to their district.

3163. Those collecting rights are to be acquired by absolutely free negotiation with the natives?—Yes.

3164. You further recommend in your memorandum that Government-aided central palm-oil factories might be established or run by the Government, similar to the Government-aided sugar factories in Antigua?—Yes.

3165. If the Government can collect small parcels for treatment in these central factories, why should not a private system do the same thing? My point is, why should it be absolutely necessary to have collecting rights round the private mill, whereas the Government might establish a factory without any such rights at all?—There would be an amount of pioneer work to be done and one would not ordinarily look to trading firms who must show a profit, to undertake that work.

3166. You mean that the Government would run it at some considerable loss?—Without endeavouring to make any handsome profit.

3167. Under what sort of conditions do you suggest the Government should run such a central factory?—I went into the conditions at Antigua somewhat fully. The details are not sufficiently clear in my memory, but the factory was put up there with, I think, money advanced on Government guarantee. This I do know—that the natives grew the sugar and brought it to the mill and it was there crushed, and they were paid *pro rata* on the yield of sugar and so forth from the cane. Those who brought the better cane got the better price. Those who brought the better palm fruit (there would be an amount of educative work to be done) would get the better price similarly for their palm fruit. It is a big subject, and I brought it forward from some evidence I gave before the West African Lands Committee some two years ago. That was part of the scheme for working up a lot of areas where they were probably going to run railways. It was all going to be a means to an end, because these would feed the railways and open up the district generally.

3168. With regard to the erection of mills in Africa, you do not anticipate any difficulty as regards the cake turning mouldy or the meal turning mouldy?—With the meal properly dried I do not anticipate difficulty, but as to cake I am not in a position to speak because I have never made cake in West Africa.

3169. In regard to the solvent extraction process, would there be any difficulty in using benzene and so on in the tropics?—I have used it in the tropics with quite satisfactory results.

3170. On the matter of protection you say that protection should be given until the mills are erected and that would take some time. For how long after?—Until such time as the mills were self supporting.

3171. About what time do you anticipate?—My idea is three or four years—something like that. You have to get the staff together and educate farmers to use the cake. A lot of educative work has to be done.

3172. With regard to standardisation of products or grading, you advocate that in contradistinction to having a Government inspector in the native markets?—Yes, or to supplement it.

3173. How, exactly, do you propose that the Government should undertake that with regard to oil nuts. Would it be necessary, for instance, to have an expert at every port of export?—It certainly would be an advantage.

3174. That would involve enormous cost?—It would, but the experience in the colonies that have adopted it, I believe, is universally satisfactory.

3175. It seems to me with the number of ports in West Africa (Sir Owen Philipps said about 100 in the whole of West Africa—99 I am told) the proposition

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of having a European inspector is a large one?—But Sir Owen Philipps includes Liberia and the French ports and so on. We should only be interested in the British ports. There would be nothing like that number.

3176. Even if it was a fourth of that number, with the system of reliefs that exists it is a big proposition?—It is a big proposition. I think you will find that I put this forward as a matter which I thought would have to be gone into. I have experience of the benefits of grading in Australia, where everything is graded and where things are known and sold by the grade marks.

3177. Are they not centralised to a fewer number of ports?—Yes, possibly they are. The number of ports, I admit, is a disadvantage.

3178. I will not go further into that subject, as I daresay Mr. Moore will ask you questions on it. You speak about the difficulty of dealing with unripe fruit. Have you any suggestions to make as to how you can discriminate?—I do not remember the reference. Is it not over-ripe fruit.

3179. No, unripe fruit—

3180. (Mr. C. C. Knowles.) You said that there was trouble in the matter of bringing in unripe fruit?—Over ripe. I think the unripe fruit reference is probably in the translation of the German conference.

3181. (Sir F. Lugard.) With reference to the agricultural society which you recommend, I gathered at first it was to be established in England, but later I gathered that you meant on the West Coast of Africa?—Clearly on the West Coast.

3182. You are aware that the merchants of Africa are chiefly agents and not principals?—I am quite aware of that.

3183. We have had an agricultural union in Nigeria for some time past, but it has never been successful, and I think it is gradually expiring.—Yes; it wants reviving badly.

3184. In spite of such stimulus as we have applied?—An enormous amount of pioneer work has to be done out there. You meet many men all treading the same road, each in ignorance of what the other is doing, and many of them in ignorance also of what the Government is doing; the amount of good work being done by the respective agricultural departments is enormous, but it wants organising, and at the present moment there is no organisation at all among planters.

3185. With regard to copra and cocoa they are more valuable products than palm oil, are they not?—Yes.

3186. They yield greater returns for outlay?—You mean the native gets more?

3187. Yes.—I can only say as to that that if a native has existing good palm trees you can pay him such a price for his palm fruit, that he will get as much as if he worked cocoa. I went into it very carefully with one lot of natives, and made a proposal which fell through. I proposed to give them such a price for palm fruits as would give them the same rates as they would make on cocoa.

3188. You suggest that the Government should encourage as far as possible the palm oil industry?—Yes.

3189. And no Government can press the natives to cultivate a losing crop?—But the point that I think material there is that, if they can get the oil mills going and get to know all about them, they may save it from being a losing crop. I believe that once the initial difficulties have all been overcome, we can give the natives such a price for their palm fruit as will compete with cocoa. I have been into that somewhat fully.

3190. You say that the palm tree takes about 15 years to mature?—Yes, to reach full bearing.

3191. For what period will it live?—I am told 100 years, but I have not verified that.

3192. (Sir Owen Philipps.) You told us that in Germany prior to the war the majority of palm kernels were still crushed?—Yes, I should think so, but I have no reliable figures as to the proportions.

3193. You believe that the advantages of extraction are so great that it will soon knock out all crushing mills?—No, I will not go so far as that.

3194. 7s. 6d. a ton. If that is the advantage is not that large enough to knock out all the mills in normal times?—You have to remember the capital expenditure. You cannot write off the capital expenditure on many of these mills (it must be coming on for half a million sterling), simply because of an improvement.

3195. A big crusher told us the other day in evidence that he looked on 5s. as a very handsome profit in normal times.—Yes.

3196. If that is so, would not that 7s. 6d. advantage in extracting knock them out very rapidly?—It means that any extensions that take place would be on the more paying system, but again you have to consider the market for the cake and the other products.

3197. Could you tell us anything about the market for meal? How is the meal consumed in Germany?—I could not say. I have only hearsay evidence, no first-hand evidence.

3198. If mills are erected in this country now, will they be able to hold their own without any Government assistance at the end of the war?—I very much doubt it, particularly if the export of palm kernels from West Africa declines, as I very much fear it will. Then there will be a scramble for the kernels.

3199. (Sir W. G. Watson.) You spoke about the establishment of mills in West Africa with a capacity of 10,000 tons per annum to deal with palm kernels and palm oil jointly. Would you mix the palm oil and kernel oil together or keep the respective oils separate?—Keep the respective oils separate. You only get fruit from the palm trees at certain months of the year and these vary with the different districts and the fruit must be treated the moment it comes in if you wish for good oil. You would treat the fruit as quickly as possible when it came forward, and instead of having the balance of the plant standing when sufficient fruit was not coming in you would treat kernels, and if necessary buy kernels, to keep the plant going.

3200. I am interested in margarine making. We bought palm oil, as we thought, on the market, and on analysis we found that it was mixed; is there any system of pressing the pericarp and the kernel all together?—Fournier, the big margarine and oil people, working in conjunction with another firm, put up a plant on that extraordinary principle. I told them before they put it up what would happen and it did happen. The whole thing was unworkable.

3201. The product that I refer to was marvellously good.—But you lost all your meal or cake and the percentage of extraction was dreadfully low.

3202. I do not know about that. I can only say that the product was excellent. Now you said that you feared that cocoa cultivation would affect ultimately the production?—Yes.

3203. Do you not think that if there is an immense quantity of additional cocoa produced, the price will go down and it will not be quite so profitable?—I say so in my précis. On that ground I suggest that the legislation might be stiffened a little to prevent the cutting down of oil-palms because the natives are bound to come back to these.

3204. You have had experience of palm-kernel meal being used for horses?—Yes.

3205. Is it used damp or used in the dry stage?—In the dry stage; they would not touch it when it was damp.

3206. You spoke about having lately erected a small mill on the Manchester Ship Canal?—Yes.

3207. My firm has assisted the Co-operative Wholesale Society to erect a mill there. Is this for the society?—No. It is within a mile and a half of the other.

3208. You spoke about 22 marks against 28s.—Yes.

3209. How long ago was that?—That would be in 1913, speaking from memory.

3210. My own experience is that the wages are 35 marks?—Over there?

(Sir W. G. Watson.) Yes, so far as my information goes.

3211. (Mr. G. A. Moore.) You think that it would be an economic mistake if the Government were to permit

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the devastation of the oil palm in favour of cocoa?—Yes, clearly, I think that that should be provided against.

3212. Is not the principal reason for thinking that the fact that the palm is remarkably free from disease?—Yes; it is an indigenous plant and I only know of one or two diseases which have any effect on it and they do not even kill the tree. The tree generally recovers. On the other hand cocoa is an exotic and very subject to pests.

3213. In erecting this small mill in West Africa which you speak of, you would not advocate the erection of a mill for the crushing of palm kernels by themselves, would you?—No.

3214. Having regard to the fact that you can extract the oil from the pericarp by the solvent process, and then use the same machinery for the extraction of oil from the kernel, you think that by that means you would be able to keep the factory in constant work all the year round?—That is exactly my suggestion.

3215. You told Mr. Knowles, and evidently he rather doubted your figure, that you expected to get 20 per cent. of oil from the fruit?—Yes.

3216. That is 20 per cent. from the cleaned whole fruit?—Yes.

3217. You have found very considerable variation in the yield of oil from different fruits, I think, you said?—Yes, from as low as 9 per cent. to as high as 35 or 36 without dealing with the frank varieties, as I may call them,—that is soft shells and so forth.

3218. Mr. Railston gives 10½ per cent. as the total amount of oil in the fruit. You mark that a poor fruit?—Yes.

3219. Is that very much below the average in Nigeria?—It is below my tests that I made in Nigeria. It is substantially below them.

3220. Have you any idea whether your average tests varied between such districts as Opobo and Brass and Benin, for instance?—I could not speak from memory as to that, but I can say that some fruit which I collected on the Benin river in April of last year, the day that I was sailing for Sekondi, I analysed when I got back to Sekondi, and it gave me 24½ or 24¾ per cent. of palm oil relative to the weight of cleaned fruit.

3221. Did you see the natives preparing the oil in that district?—I did.

3222. How did you ascertain the amount of oil that they got out?—Simply by noting the quantity of fruit that they treated and noting the quantity of oil that they made.

3223. Did you stand over it and see what was being done?—I was within 30 or 40 yards of it.

3224. The whole time?—Yes.

3225. When you say extraction is 7s. 6d. cheaper, is that the mere works cost?—No; that includes establishment charges, building, land, and everything else. They bulk considerably, of course, in the total. The floor space required for the extractors as contrasted with the actual oil presses is much less in the case of the extractor.

3226. You have not taken anything into consideration with regard to the extra quantity of oil that you got?—Yes.

3227. You suggested central factories because you had heard of something of the same kind in Antigua. What experience have you and when was your experience gained?—A considerable time ago, when Sir Courtenay Knollys was Governor there.

3228. (Sir Hugh Clifford.) In 1904-5?—Yes.

3229. (Mr. G. A. Moore.) Do you know what led to the central factory idea?—I believe difficulty in the natives getting rid of their cane and possibly the planters not paying a sufficient price for the natives' cane, but I should want to look at my notes on that.

3230. Do you know what system was in vogue in Antigua before that?—Yes, I believe they were entirely dependent on either their primitive sugar mills or on selling their cane to the planters.

3231. As a matter of fact, was not the establishment of the central factories in Antigua due entirely to the fact that the small mills could not deal with the vacuum process and to introduce that the central factory was

started?—In other words that the old fashioned mills they had were inefficient?

3232. Yes.—Yes.

3233. It was to introduce the vacuum process?—To introduce modern machinery.

3234. You are aware that one of the great difficulties we have to contend with in West Africa is the question of transport to the mill?—That is of the fruit?—Yes.

3235. Have you ever, as an engineer, thought out what would be the cheapest form of transport in substitution for head carriage. Is anything possible at all?—I have always looked at it that estate tramways are quite sufficiently promising, and I suppose one might have a mono-rail; I think that the ordinary estate tramways would be quite satisfactory.

3236. And what about power for traction?—For collecting fruit on the side lines it would be manual and on the main roads it would be petrol or steam.

3237. There is no possibility of introducing an animal of any kind to draw the trolleys along?—Yes, but one would only use them on the main roads, I should expect, and there I should think one would be better off with the small petrol locomotives similar to what one uses for underground work in mines.

3238. With regard to the preparation of palm fruit by machinery, do you consider that there are satisfactory machines in existence now to carry out the various stages, first of all, separating the fruit from the bunch?—No. That, I think, ought to be done by hand until the existing machinery is improved.

3239. Is the depericarping satisfactory?—Yes. It wants a good deal of improvement but it is sufficiently good to start with.

3240. Is there any depericarper in existence which separates the pericarp from the nut itself at the same time?—That is the function of all depericarpers. Perhaps I misunderstood you.

3241. With some of them, if I remember rightly, the smashed up pericarp and the fruit come out together, do they not?—The idea is to separate them. Even with the Haake plant they are separated.

3242. Satisfactorily?—Yes. I am against the Haake plant for other reasons, but it does discharge the nuts clean and at the proper place for them to be discharged.

3243. You are aware that before the nuts can be cracked they require to be dried?—Yes.

3244. Have you made any experiments with regard to drying?—Yes, I have made quite a number of tests of plant in actual operation.

3245. Have they been satisfactory?—Yes, provided that the plant was run carefully, but I found that there was a tendency to scamp the supervision with very bad consequences.

3246. Does it not have a tendency to turn the kernel brown as a result?—With certain forms of driers, yes, but not with all driers.

3247. My personal experience is that there is nothing but the sun that really satisfactorily dries the nut.—The sun certainly dries the nut to the finest degree, but is commercially impossible.

3248. Well, I have had many thousands of tons dried by the sun and I did not find it commercially impossible at all.—I mean when you are considering the quantities that will have to be treated. May I ask what quantities you contemplate?

3249. I have bought in a year 10,000 tons of nuts and dried them by the sun.—I should think that you would do much better than that.

3250. Now with regard to grading, what particular object have you, speaking particularly of palm kernels, in suggesting that we should have grading for palm kernels?—If you graded them, you would be able to ship them in bulk and practically mix everybody's parcels together and sort them out at Liverpool.

3251. When you talk about grading, that is what you really mean. Have you any experience of commercial grading?—I have none. I have experience of the working of it, but I have never tried to grade goods.

(Mr. G. A. Moore.) I do not know whether it is worth while pursuing this subject.

(Chairman.) I hardly think so.

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(*Mr. G. A. Moore.*) It would take me some time. I look on grading as absolutely impossible in Africa and absolutely unnecessary, for the simple reason that palm kernels practically grade themselves.

(*Witness.*) There is some misunderstanding. The general suggestion as to grading had no special reference to palm kernels. With regard to palm kernels if you ship in bulk then, coupled with grading, it will simplify matters. That is why it is mentioned.

3252. I will put one or two questions for the benefit of the Committee. In Liverpool we have practically the only grain grading system in the United Kingdom now. It is the only port where grading is done of wheat, and there, although we are in a position to pay a very handsome salary indeed, we have never been able to find a man who we think would satisfactorily perform the function himself. Consequently if that is the case in Liverpool, do you think it would be possible to have anything of the kind in Africa? No expert in the trade would be able to take everything into consideration and command the confidence of buyers and sellers. Under such circumstances is it possible to think of anything of the kind in West Africa?—I think that probably we are thinking of different things. I have experience of the export of graded stuff from Australia and if you can give us just such a system as that, I am of opinion that it would be a very great advantage with regard to certain of the West African products.

3253. Not palm kernels?—Not necessarily palm kernels.

(*Mr. G. A. Moore.*) I will not go into it farther.

3254. (*Mr. T. Walkden.*) Most of the points that I intended to raise have been already dealt with by previous questioners, but there is one question relative to the mill which you suggest erecting on the coast. I think you mentioned that there were three months in the year when you would want to crush the kernels?—There would be a period in excess of three months when there would not be sufficient fruit to keep the mill busy.

3255. Take a district where probably the collection of palm oil fruit does not last more than two months?—I have never found any district where the fruiting seasons aggregated only two months.

3256. Very little more. In Dahomey in some districts the collection of the fruit itself is limited to practically two months.—That is not my experience.

3257. Or three months.—I should say that you would have periods aggregating to quite six months.

3258. That is most unusual.—Take, for instance, the Benin River district: it starts in December; it goes easy to February; it goes briskly to June and July, particularly May and June. It falls off in August, and there is practically none till December.

3259. Is that absolutely the collection of fruit?—Yes. I am not interested in the shipment at all.

3260. I should think that you could only treat the fruit probably for four months at the outside.—It is longer than that.

3261. That is not my experience.—I have never got it down to four months in any district.

(*Mr. T. Walkden.*) That is all I want to know. That is not my experience.

3262. (*Mr. T. Worthington.*) Have you been in German West Africa, in the Cameroons?—Yes, and in Togoland.

3263. Have you visited the large German mills we have heard of there?—Yes, I have visited two in Togoland and three in the Cameroons.

3264. Do you know the amount that they do? What tonnage of kernels, for example, do they use up there?—They are not using kernels at all.

3265. Entirely producing oil from the fruit?—Yes.

3266. They ship the kernels?—Yes.

3267. To get at the amount of their work compared with the exports from the colonies, how many tons of kernels do they ship? That would give an idea of the extent of their work and what they use.—I could not give sufficiently reliable figures with regard to that without looking them up, but I can tell you that the capacity of the mill at Victoria in the Cameroons was about 8 tons a day when I was there.

3268. Eight tons of fruit a day?—Yes.

3269. Gross fruit?—Yes, and the capacity of the mill that Jurgens were interested in was from 10 to 11 tons a day. It does not follow they were working at full capacity, but they were approaching it. The capacity of the Agu plantation in North Togoland was about 7 or 8 tons a day, but they were working only about 2 tons because they could not get the fruit.

3270. Seven or eight tons a day means what tonnage of kernels left to be shipped?—There would probably be about 14 per cent.

3271. It is a very small affair putting it all together?—Yes.

3272. Have they no method of standardisation? Have the Germans tried that at all?—They are working towards that and crying out for it.

3273. What will they do to get it; what was their plan; what were they going to do?—Their plan had special reference to palm oil specially as an edible product and sold under special trade names. The matter is dealt with somewhat fully in the Report of the Berlin Conference that I put in with my evidence.

3274. The standardising had reference to the finished product and not to the raw material?—To the finished product. There is no chance of grading the raw material.

3275. There is no copra produced, at present, on the coast, is there?—Between 600 and 700 tons from the Gold Coast, and I think just about 100 or 150 from Nigeria.

3276. Do the coconut palms grow freely all along that coast?—Yes, but, in the places where they are growing, the rainfall is very poor, and they are not thriving. The seed nuts are very small. At Quittah, the rainfall of 1912–13 was under 18 inches. Coconuts want more.

3277. You do not consider that there is any prospect of copra coming forward as a competitor, if I may say so, with the palm kernel in West Africa?—Yes, I think it is an industry that it would very well pay to encourage.

3278. But if it will not grow?—There are vast districts where the rainfall and other conditions are suitable.

3279. But are the trees there?—No, it is a matter of planting them.

(*Mr. T. Worthington.*) That takes a long time.

3280. (*Mr. T. H. Middleton.*) You examined two types of oil palm yourself, *i.e.*, you studied two?—Yes, I have examined many more, but I cut out the others and focussed on the two which appeared to be the most useful to me.

3281. Can you from memory give the percentages of palm oil and kernel in the two types?—With regard to the Gold Coast I can give it from memory. Roughly speaking it was 20 per cent. of oil and about 14 per cent. of kernels.

3282. (*Chairman.*) 20 per cent. of palm oil relative to the total weight of fruit?—Yes, cleaned fruit, not bunches.

3283. 14 per cent., not of kernel oil but of kernels?—Yes.

3284. (*Mr. T. H. Middleton.*) Was the other superior or inferior?—There was very little difference between them, but in some districts one thrived more than the other.

3285. Could you easily distinguish the two varieties yourself?—Yes, with the assistance that I obtained from the Director of Agriculture originally who pointed out the differences. Then I could recognise them.

3286. In your travels you came across a great many different kinds?—Yes.

3287. Were the varieties which you sampled of a predominant type. Were all the trees in one district of the same type?—No.

3288. Were they much mixed?—I focussed on two because it appeared to me that they represented the bulk and it was more or less freaks or small patches of the other varieties that one got. The king palm I have never seen more than one or two of in a district. Generally you are shown them as a sort of favour.

3289. The growth is a mixed growth?—Yes.

3290. In your experimental extraction plant, what temperature did you work at?—I had a small hydraulic

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plant with which I treated up to about 10 cwts. of fruit per day. I worked cold—at the normal temperature, which was about 85 to 90 in the shade—or I scalded or heated or boiled the fruit and made various tests with it just prior to putting it into the cage for pressing.

3291. What solvent did you use?—Trichlorethylene, ether, and benzine were the principal solvents.

3292. What is the boiling point?—Trichlorethylene is about 88 or 90 centigrade.

3293. Your experience was that the extracted meal kept well?—The extracted meal that I had some experience with was bought in considerable quantities in Hamburg and was the ordinary German trade product. The product with which I fed horses was bought in the ordinary German market.

3294. It was a meal extracted by benzine?—I could not tell what the solvent was. There was no trace of taint. It was presumably benzine.

3295. Extracted at what temperature?—70 or 80? The class of solvent they used in Germany about that time was used at about 90 to 110. Some varieties begin to boil at 90. The bulk of it goes off at 100 and the rest at 110.

3296. There is evidence that the rancidity of the oil may be due to a fat-splitting enzyme which is destroyed at 70?—Yes.

3297. The fact that you extract at over 70 centigrade may account for the keeping qualities?—Quite likely, but that I am not qualified to speak of.

3298. You gave the advantage on extraction as compared with crushing at 7s. 6d.?—Yes.

3299. Does that refer to an extraction plant for kernels pure and simple or to a plant put up for dealing with fruit and kernels?—Kernels pure and simple, not mixed treatment.

3300. The German mills in Togoland and the Cameroons were crushing from 8 to 10 tons daily?—The one at Agu was of that capacity, but it was treating much less. They could not get the fruit. The one at Victoria was treating about 6 tons.

3301. And what is the season? Is it 200 days?—The seasons aggregate less than 200 days. In Agu it is quite a limited season, but in Victoria in the Cameroons, speaking from memory, they were getting sufficient fruit to run that plant over nine months in the year.

3302. Their oil as a competitor with the palm kernel oil in this country, would be a negligible amount?—Yes, but I look to these mills to keep the kernel industry going on the Coast. Otherwise, it may die through what is being done with regard to cocoa.

3303. It would take something like a thousand of such mills to keep the industry going?—These are only experimental plants; they are hardly commercial proportions; they are large scale experimental plants that have been put up to test the various processes available with a view to extension.

3304. Your contention right through is that to get the maximum value from the produce, you must deal first with the pericarp oil and get the full value from that and then deal with the kernels?—Yes. Dealing with the kernels is only to keep the staff together. If you get a lot of natives trained to the various processes, and then let them go away when there is no fruit (and in some places there are four distinct fruiting seasons in the year) it would mean disbanding and training a new lot of men four times a year or having to fill a large number of blanks, and it is largely from that point of view that I want to treat sufficient kernels to keep the plant going.

3305. (Chairman.) To get it clear, if I may interrupt, when you said that the capacity was 6 tons in the Cameroons is that 6 tons of kernels?—No, palm fruit. These are all treating only palm fruit.

3306. (Mr. T. H. Middleton.) You said in your evidence in chief that you could get twice as much oil by extraction as is got by the native process?—That is my experience of solvent extraction.

3307. Have you any idea as to the difference in value between your product and the product got by the native presses?—I could work that out from the fatty acid contents. The oil that I made had about 13 or 14 per cent. of free fatty acids and therefore was not

saleable as an edible product. You want to be below 12 per cent. It would only rank about the same as Lagos oil.

3308. The net value of your product would be double that of what the native produces?—Yes. I would not put it higher than that at the present time.

3309. (Mr. T. Wiles.) When you said that it is 7s. 6d. a ton cheaper to extract than to crush is that German experience?—It is German experience plus my own experience, which has only been on a small scale.

3310. With regard to its being 7s. 6d. cheaper to extract than to crush, was a great change taking place before the war among the German crushing mills from crushing to extraction?—Such extensions as I was aware of were mostly on the solvent principle.

3311. You have said that the tendency was to change from crushing to extracting?—Yes.

3312. All through Germany, north and south?—The only place that I have knowledge of is round about Hamburg.

3313. You have no experience of the southern part of Germany on the Rhine?—They do not treat kernels there to my knowledge.

3314. Would the value of the oil extracted be equal to the value of the oil crushed?—I believe there is a slight disadvantage against the extracted oil, but that is disappearing now.

3315. You have considered that where you say it is 7s. 6d. a ton cheaper to extract than to crush?—Yes.

3316. It is your view that in the future few crushing plants will be put up, but more extracting plants?—Yes, for the kernels, but for many other substances. no.

3317. Of course we are only dealing with kernels now. Were there any extracting plants in German West Africa?—Only one, and that I was privileged to make tests with.

3318. What size was that—what tonnage?—It had a capacity of about 2 tons, and it could work two charges in the twenty-four hours.

3319. Two tons an hour?—No. The extractor held about 2 tons; it meant 4 tons per twenty-four hours.

3320. But you consider that as only experimental?—Yes, you must consider them all as experimental.

3321. Have you seen the meal made from the plant in German West Africa?—It was for treating palm fruit, not for operating on kernels.

3322. You have not seen any meal made in West Africa?—No, not beyond the small quantities I have made myself.

3323. Do you consider as an engineer that it would be very profitable to put up large extraction plant in West Africa?—That is a very big question. You must first of all be assured of the fruit, and of the fruit coming in fresh and in regular supplies. With that yes, but if there is any doubt as to that, then I should say no. You must have the fruit and have it fresh and regularly.

3324. (Mr. J. Couper.) From your knowledge of German Colonies in West Africa you would say, as I understand it, that in the matter of handling kernels locally, they have nothing to teach us?—No. They have the same arrangements as we have very largely.

3325. Have you heard that they were discussing the possibility of dealing with kernels by crushing or extraction in the colonies?—I have discussed that with the man who makes most of the machinery for the Harburg works and I can only say that he approved the idea.

3326. So far as the system of treating palm fruit generally is concerned, apart from the German mills in West Africa, the system is just as it has been for perhaps centuries?—Yes; so far as one knows there has been no material improvement or alteration in the native process or processes.

3327. But the Germans have got ahead of us in that respect?—In the matter of power-driven plant?

3328. Yes, in West Africa.—Yes; so also have the French.

3329. Something was said to you about an export duty, but you very properly have made a good case for not reducing the income of the native. Would such an export duty, by limiting the market for kernels to

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England, not have the effect of reducing the price obtained by the native? I mean, if we knock out Germany as a market for kernels, surely the native must suffer?—I would not like to answer that question without thinking it out, Mr. Couper, because you have to get the kernels to keep the mill going and there are prices below which the natives will not sell. They hold back and turn to something else like cocoa. All these things have a habit of righting themselves.

3330. On one other point—I think it was Sir Frederick Lugard who asked you some questions on the subject of the compulsion of natives imposed by concessions which granted a right for the collection of fruit. Would you consider that a central palm-oil factory established and owned by the Government would be more approved by the native and induce a larger collection than if the factories or mills were owned by merchants?—I should think if there was any preference, that the Government would have it, since they could afford to pay higher prices than a trader could, of course. It would be in the nature of pioneer work to do permanent good to the colony.

3331. Were the mills in German West Africa owned by private individuals?—With the exception of one, which I have not mentioned, because I have not tested it, though I have seen it. It is the one belonging to the North West Cameroons Company. That was a concessionaire company administering a huge territory. About two years ago I think they split it up into two distinct bodies. The one at Bremen is the trading company and the other at Berlin is the administrative one. With that exception, all the other plants were run by private enterprise. The one at Victoria, however, was, I think I am correct in saying, the original plant that was set down by the German Colonial Office after they had offered a reward to any man who could make machinery for treating palm fruit. That was made by Ilaake. It was put down and used for demonstration purposes.

3332. Was it entirely optional for the natives to bring in their fruit?—The fruit treated at the Victoria plant is all off the Victoria company's own plantations.

3333. In your précis you refer to an agricultural society for West Africa. Did you, when in the Cameroons, see anything of the operations of a German agricultural bank?—Yes, but not sufficiently to speak regarding it.

3334. It was only established in 1912 or early in 1913?—Yes.

3335. The Bank of British West Africa has over a period of ten years made inquiry as to the establishment of an agricultural bank for British West Africa, and I would rather like to refer to the reasons or some of them which have been urged on the part of the Government against such a bank. We were told that an agricultural bank would only encourage the inherent extravagance of the natives and lead to endless litigation and hopelessly wreck the finances of small chiefdoms. Reference was also made to the rooted dislike of the native to the use of European agricultural implements and it was suggested that very few natives entrusted with loans would utilise the loans for the purposes for which they were intended. These reasons have been given over a period of many years by more than one administrator. Have you any reason to suppose that they are adequate reasons for not proceeding with such an institution?—I am afraid that I am not qualified to express an opinion, but I think you might inquire into the work that is being done by Indian co-operative credit societies to which I drew attention in my précis. It appears to me at the first blush that if the system of lending money was based more on the system that has been found workable in India, the essential of which appears to be that the communities borrow, and that each member of the community is jointly responsible and therefore will see that other members of the community do not waste the money, and that they pay the interest when it is due, and repay the principal when it is due and so forth, it might be introduced. In other words, every member of the community is jointly responsible and acts as a policeman somewhat, to see that the borrower does not waste the funds.

3336. The probability is that in West Africa the state of development of collective responsibility is much behind what it is in India?—Speaking generally yes, though the family system is strongly developed.

3337. (Professor W. R. Dunstan.) I think your view is that the Government, speaking quite roughly and generally, should encourage the palm-oil industry and somewhat discourage the cocoa industry?—I think that the palm-oil industry is on the downward grade in the Gold Coast, and there is the possibility of it following suit to a greater or less extent in Southern Nigeria, and I think that it should receive some friendly assistance to enable it to compete with cocoa. I think that with assistance in the form of mills that could pay a fair price for the fruit in some shape or form, then palms could compete with cocoa.

3338. Does not that mean that you look to an increase in the value of palm-oil in the future?—Rather that I look to an increased output from a given amount of labour.

3339. But surely, at present at all events, the remuneration to be got from the palm-oil industry by the native on the Gold Coast is very much less than he would get from the cocoa industry?—Yes.

3340. And that looks as if it would remain so for a very long time, does it not?—Yes, unless steps are taken to counteract it.

3341. It would really involve, would it not, an increase in the value of palm-oil as compared with cocoa?—I do not follow your argument.

3342. The value of the two materials is very different, and it pays the native at present very much better to cultivate cocoa than to collect palm-oil.—Yes, by reason of the waste of his energy in the working of the palm-oil; but do away with the waste of energy and then the same energy will bring the native as much money as he now gets from cocoa.

3343. That is very much more than one can foresee within a short time?—Not if you have power mills.

3344. You also suggest that owing to over-production, the value of cocoa may decline?—Yes.

3345. May not the value of palm oil decline? We are now speaking of possibilities only, of course.—I should think that it is much less probable. The exports of cocoa from West Africa must be somewhere about a fifth of the world's output.

3346. (Sir Hugh Clifford.) From the Gold Coast alone, more than a fifth—not from West Africa?—Quite so. It is a very large amount, whereas palm oil is only a drop in the oil bucket. You have cotton-seed oil and rapeseed oil and linseed oil and many others, and the price of the oil market is ruled almost entirely by the price of animal fats.

3347. (Professor Dunstan.) May I suggest that in the future the hydrogenation of oils, especially of cheap oils leading to the production of solid fat, may have considerable effect on the value of palm oil in the future?—Yes, and for that reason, if anything is to be done in the way of encouraging palm-oil mills, it ought to be done soon, because if hydrogenation comes along and you have to start against that, it is a very uphill fight—whereas if you start now and hydrogenation comes along, it will only give healthy competition to make you push along and do good work.

3348. I do not suggest for a moment that I do not agree that everything should be done to encourage the palm-oil industry, but I am not quite clear that anything should be done to discourage the cocoa industry, but I will not go into that further.—If I may say so, I was rather careful to draw a line. I want to encourage one and not necessarily discourage the others.

3349. But will you have sufficient labour on the Gold Coast?—Yes; suitably organised you will get at least six times the output of palm oil—probably a great deal more. The figures used by the Germans in the Berlin Report put it at about 20 times. I believe that a very conservative figure is six times the amount of oil from the same amount of labour.

3350. You think then that both industries could be carried on?—Yes, they could co-exist, and I think it would be a very good thing so that all the eggs are not in one basket.

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3351. With regard to the amount of oil that you yourself obtained by a small scale experiment, and the amount of oil obtained by the native, the figures have surprised me and other members of the Committee. There is a bigger difference than one supposed existed. Now is it not rather difficult in the bush to make an accurate experiment?—Not at all.
3352. What sort of apparatus did you use?—An ordinary Loxhlet extractor which goes into a wood box packed in cotton wadding. The rest of the apparatus was very meagre—a kerosene tin, top and bottom, a piece of glass tube and a rubber tube for circulation. I stuck that up wherever I made my test.
3353. What was your solvent?—Benzine. I have tried probably half a dozen others, and benzine gave the best all-round results.
3354. There may be confusion in the use of the term benzine, as you know; which do you mean?—Benzine, spelt with an "i."
3355. Now, with regard to the native method, there might have been difficulty in getting an exact comparison. You could not say that the natives used the same heads as you used?—I have done it so often and got such consistent results that I have no doubt in my own mind on the subject.
3356. You think that you can get twice as much oil?—Approximately twice as much oil. The native method of extraction varies enormously in the different districts. At the back of Saltpond, for instance, I have known them bury fruit for twelve months. In other places, they treat it a day or two old and so on. In some places they beat it out. In Southern Nigeria it is nearly all trodden out. And these processes among themselves differ. With the process worked at the back of Saltpond, I had difficulty in getting accurate results. With the processes worked in the Krobo country, which is generally acknowledged as the best palm-oil district in the Gold Coast Colony, I got double what the natives got.
3357. You think that in West Africa there should be extracting mills?—Yes, for extracting palm oil.
3358. You look to sending to this country such a kind of palm oil as will be suitable for edible purposes?—Yes, I should aim at that.
3359. Not merely for soap?—I should be quite content with soap oil to get going, which is the great thing to my mind.
3360. You are looking to preparing palm oil of the kind that can be used for edible purposes?—Yes.
3361. It would be on a par commercially with palm-kernel oil?—Yes, but in the first instance, I should be quite satisfied with a good soap oil. I have dealt with the necessity for technical skill, and so forth. That would gradually work up to a better and better oil. I hope to produce one with a free fatty acid content of about 7 or 8 per cent., and therefore of value direct to the margarine manufacturers.
3362. Apart from technical difficulties, all that you have asked for would lead to the introduction of a very fine quality of oil suitable for edible purposes?—Yes, all with a view to helping the industry in this country.
3363. I am coming to that in a moment. Now the solvent would have to be shipped from this country?—Or the United States of America.
3364. You have taken into account the difficulty of transporting?—Yes.
3365. And probably the extra freight involved?—Yes, and also the possibility of having to dry the material before treating it with trichlorethylene, because if there is a lot of moisture present you are apt to get hydrochloric acid formed and the chlorinating of your fats.
3366. You would agree that it is a rather more delicate operation to have to supervise in West Africa if you use the solvent extraction method instead of the crushing method?—No. I should put it the other way about.
3367. Have you had any experience?—The chemical part of it is the more difficult, but instead of having a lot of mechanical parts wearing out and wanting constant repairing, titivating and so on, you have only to tip the stuff into a vat, leave it so long, operate so many valves and at the end of the time clean it out.
3368. You have not made a big experiment in West Africa with the solvent process?—No.
3369. You would produce the oil and meal in West Africa and both would be exported to this country?—Only to such an extent as you use kernels to keep the mill going when there is no fruit there.
3370. The whole of the oil produced will be exported?—Yes, I think so.
3371. That is what you look for?—I have not thought of the market that you would cater for, but I anticipate so.
3372. You would expect to export the whole of the meal?—Very much depends on the price at home here. I have done some experiments out there which indicate to me that tests ought to be made to test its manurial value.
3373. The money you would get for it as manure would be very small?—Yes, but if the price of meal at home here is 4l. 10s. a ton (and we have known prices so low that that would be likely) then if you take the cost of sacking and freight and insurance off it might be better to let it go at 30s. or 2l. a ton or use it on your own estate.
3374. In West Africa?—Yes, for manure.
3375. If it was required, but at present in West Africa very little manure is used, and you would not get a large market for the meal for that purpose?—Yes, but on your own plantation it would pay you to use a considerable quantity. I have formed that opinion on somewhat insufficient data, but the data points in that direction.
3376. Palm-kernel cake in this country we have been told would be more useful than palm-kernel meal, and there would probably be considerable difficulty in disposing of palm-kernel meal in this country?—Except at a price.
3377. Except at a price?—The compound cake makers would always take it from you, I should think.
3378. You propose to use the pericarp and the shells partly for fuel?—Yes.
3379. Have you ever tried running an engine on a mixture of pericarp and shells?—Yes.
3380. Is that successful?—Yes.
3381. Without any other kind of fuel?—The longest I have worked like that is four or five days. One difficulty I had was caused by the salt in the shells. I have stacked them outside and let the salt wash out. Personally, I have in view a market for the shells for quite a different purpose and I anticipate using very largely plantation clearing stuff for fuel. I do not rely on the shells and the pericarp for fuel at all.
3382. You propose to use wood?—If you make a proper plantation there will be cuttings and trimmings and branches and so forth for 10 or 15 years to come, and that is quite far enough ahead for present consideration.
3383. (Sir Hugh Clifford.) You said just now, I think, that you foresee a time when the prices that natives will receive for work put into their palm plantation will compare with those that they at present receive from cocoa?—From existing trees?
3384. Yes.—Not having regard to the fact that it has taken 15 years to bring these trees to maturity?
3385. When you say that, do you suggest that the majority of these trees are planted by the native?—No. You know the ordinary system. When natives make a bush clearing they preserve the palms and do not destroy them, and they come up and the next time the ground is cleared they are perhaps too thick and they take a few out. The trees are self-sown originally.
3386. The vast majority of them are?—The vast majority of them are.
3387. To get back to what I started with, the question of the relative financial advantage to the native, can you favour the Committee with the calculation on which you base the suggestion that the two prices are likely to become comparable?—Yes, I should be happy to do so. I may say that I went into this with the Akropong people. I said, "Show me what you make from cocoa, and I will give you the same from palm fruit." I satisfied them on that matter. That is how I came by the figures, and I will look up the original figures.

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3388. If you would let us have those, they would be very interesting. You are aware, no doubt, that the preference which the native shows for cocoa is not purely a financial question?—There are many considerations. Have you any special one in view?

3389. For instance, it does not cause him as much work.—Exactly.

3390. Among other things it enables him to pay for the labour of carrying. In the Eastern Province hardly any of the cocoa is carried down to the buying centres by the owners.—That is so.

3391. They hire Hausa labour almost entirely.—And even to pluck the cocoa.

3392. In many cases they give a contract out to pluck it. From what you know of the West African do you not think that saving of labour is almost as valuable to him as an increase of financial advantage?—Yes.

3393. And though you may make the two things equal in price (I do not admit that you can) how do you propose to equalise the labour on the working of palms as opposed to cocoa?—The beating out of the palm oil the native finds most onerous at present. That will be done by machinery. That leaves him only with the climbing of the trees and the cutting of the fruit and the taking of the fruit to the oil mill or tramway. You would relieve him of the more onerous part of the work.

3394. Quite so. Now in your memorandum you say that it is going to minimise labour enormously and set free a very large amount of labour for other valuable work?—Yes.

3395. What sort of work have you in your mind?—Extensions of plantations, and one thing for which labour is very much wanted is for taking better care of the existing cocoa plantations, which are far larger than the staff of native labour available can take charge of.

3396. For instance, we require a good deal of labour from time to time for mines?—Yes.

3397. And work on roads, and other public works?—Yes.

3398. Do you think that the erection of these mills would sensibly relieve the pressure on the labour market in those directions?—For the same output of palm oil, certainly, but if the palm-oil output is extended it will necessarily encroach on the available labour.

3399. Given the existing areas of palm oil, you think that a great deal of labour will be set free for other work?—Yes. The palms are not all at present worked.

3400. Is not the work you contemplate being done by machinery at present done by women and children?—The beating out of the palm oil I have never seen done by women and children.

3401. They do the cracking?—Yes, but that is not the laborious work.

3402. Have you ever seen the treading out by women and children?—Not in the Gold Coast.

3403. I am talking of West Africa.—I have seen it in Southern Nigeria, but very rarely.

3404. You have never seen the Krobo women do it?—No.

3405. Never once?—No. They don't tread out the oil.

3406. You have never seen them do it in the Central Province?—I have seen them help at flogging-out with flails at the back of Saltpond but not taking a leading part in it.

3407. You admit that the hardest part of the work which is at present done by the men is climbing?—No; I think the flogging-out of the oil is the hardest.

3408. You do not know that women have been employed for climbing?—No. In the districts where good oil is made the hardest part of the work is the flogging-out of the oil.

3409. You have said a good deal in your précis on the subject of the Ceylon Agricultural Society. Do you know the Ceylon Agricultural Society, and its record of practical work very intimately?—Only by reading its journal, and occasionally I have stayed with different people connected with it when passing through Ceylon perhaps for a fortnight or something like that.

3410. You are aware, I suppose, that the Ceylon Agricultural Society is primarily a debating society?—Yes.

3411. It is a society that meets and reads papers and so on?—Yes.

3412. It has a very energetic secretary who does a great deal of work in close conjunction with the Peradeniya Station and Agricultural Department?—Yes.

3413. As a society can you say that it has ever done anything particular?—Its members have done very excellent work in the way of research work, and they are encouraged to do that, I may mention, by the society. They have told me personally that they have benefited greatly by the discussions and the criticism of other planters of the tests that they are proposing to carry out or of the interpretation of data from tests that they have made.

3414. Are you aware that hardly any planter belongs to that association?—That has changed; it was the case, I know.

3415. I was vice-president and president of it alternatively for five and a half years ending less than three years ago, and the number of planters attending the meetings of that society were certainly not more than one per cent., I should say, of the members of the society. I daresay you are aware that there is a Planters' Association which is much more business like?—Yes.

3416. And also a Low Country Products Association?—Yes.

3417. Given the proposition, which I am unable to admit, that the Ceylon Agricultural Society has done all that you suggest, what elements are there in West Africa, as you and I know it, which would be likely to produce a society similar to the one which is in existence in Ceylon?—Well, if you take the Gold Coast there are Apol and their staff and Levers and their staff, and the people that I represent out there?—Goff has died recently, I think.

3418. Which Gough, not the judge?—No, the man who ran the Prestea Plantations.

3419. Is he dead?—Yes, I think so. Then there are five or six plantations at Obnasi, and five or six at Axim.

3420. Up near Dunkwa, you mean?—Yes.

3421. And the Offin River and that part?—Yes. There is quite a number opening up at the back of Cape Coast, Winneboh, and Accra.

3422. You have had considerable difficulties, as you know, on the Gold Coast?—Yes.

3423. At the present moment Elder Dempster are sending a ship about once in ten days, but even in favourable circumstances communication between different parts of the Gold Coast is very difficult?—Yes.

3424. Can you see in your mind or imagination Apol's representative and Levers' representative, if there was one, and all these different gentlemen gathering together for the purpose of debating once a week or once a month at Accra or Sekondi?—It would do an enormous amount of good if they would.

3425. I am not talking of that at the moment. That is debatable. I am talking of the practical possibility?—Well, I should hope so. It is done elsewhere.

3426. I think that you would be very sanguine. Now with regard to a Government central factory I understood you to say that one of the advantages of it would be that the Government would be able to afford to pay higher prices to the native than the merchant could pay?—Yes.

3427. Do you think that that would be advisable or useful?—If they found it inadvisable they would cease to do it.

3428. I will put it in another way: if they could pay a higher price to the native than the merchant could afford, it would mean that they were not running the thing as a business concern?—Yes, but merchants might not pay all they could afford.

3429. Is it at all advisable that the Government should run it not as a business concern, and should give to the natives fictitious prices in competition with people who have to make their living?—I have curtailed

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what I said to the Lands Committee. There are many districts where at the present time there is hardly enough fruit to warrant a plant, but where there are many good palms and other districts may be opened up comparatively easily. These areas might be saved by such Government installation; otherwise no commercial firm would take them on. It appears to me that Government might wait a little longer for their return. They might lay out their money for four or five years knowing that they would get a return and a handsome return later on. In that way they could save districts that could not be saved otherwise.

3430. You would restrict the Government central factory to some corner where there were not so many palms and such good prospects as would be presented in other parts of the colony?—There are parts of the Gold Coast where I think they might consider saving the industry, and there is Nigeria.

3431. You would put it as a sort of pioneer concern in places where private enterprise could not look at it?—On the contrary, I should wait for private firms to snatch the chestnuts out of the fire, and then I would save the industry in districts that are so cut up, the palms so reduced, that it would not pay private enterprise at the present time. It is too long a shot.

3432. (Chairman.) Does it not really mean that instead of the chestnuts being pulled out of the fire by the Government, you suggest that the Government should run a factory or plantation in places where no private individual would look at it?—No.

3433. (Sir Hugh Clifford.) That is what it sounds like.—I mean that once private firms have proved the possibility there are many places where the Government who can wait longer for their money, can step in and save the industry.

3434. You are acquainted with three portly volumes which contain the laws of the Gold Coast or some of them?—Yes.

3435. Superficially, at any rate?—Yes.

3436. Have you ever looked through them at all?—Those that I have been interested in.

3437. Forty-five or fifty per cent., putting it roughly, are ordinances which are inoperative?—Yes.

3438. They presupposed machinery which does not exist, for carrying out laws which look excellent on paper, but have no practical effect from year's end to year's end?—Yes.

3439. In many cases they presuppose the appointment of a dozen or two officials none of whom have ever been appointed?—Yes.

3440. You suggested that legislation to prevent the felling of palm trees should be added to that list of ordinances?—No; I think it already exists.

3441. Then the addition is not even necessary, but as you know and I know (we have both travelled through the colony pretty widely), the palm trees grow in enormously scattered areas and in very vast numbers?—Yes.

3442. It is not an exaggeration to say that only one in a thousand is seen by any official of the Government from year's end to year's end?—Quite possibly.

3443. You might make as much legislation as you liked to prevent the felling of palm trees, but how would you put it into operation?—I should not like to offer any suggestion, Sir Hugh, on that point.

3444. That is our difficulty all the time.—Yes.

3445. It is quite easy to legislate for this, that, and the other. It may look all right on the Statute Book. It is like the curse in the Jackdaw of Rheims, you are not a penny the worse.—You are referring to outlying districts?

3446. To the country generally.—Between Nsuam and Aburi I have watched them cutting the trees down right and left, and I have taken the liberty to mention it to different officials, but nothing has been done.

3447. Now you speak of collecting rights being given to the owner of the oil palm with full control. You also say that collecting rights should be acquired by absolutely free negotiations with the natives?—Yes.

3448. You have had a good deal of experience of free negotiation with the natives. Would you tell the Committee what those experiences have been?—In one

particular district that I have in view I should think I visited and negotiated with every man that had any right or interest that I could ascertain on the piece of land.

3449. What was the size of the area?—2½ square miles. I spent about six weeks doing that, and they had many meetings and sub-meetings amongst themselves and ultimately they agreed to do the business. I have approached head chiefs, and they worked down through their sub-chiefs. How far down they went I do not know. I formed the impression that in many districts everybody necessary was consulted and everybody who had created any of the value of what was about to be leased would receive remuneration.

3450. Excuse me for interrupting. It is not so much a question of whether he has created the value as whether he has been accustomed to make use of the property in question.—Quite so. I formed the impression that in many instances all such people would receive their fair share. On the other hand there is no doubt that in other districts they would not and in some districts I found that the land belonged to different people from the owners of the farms and the collecting rights were again sub-divided. I formed the opinion that in such cases it would be very difficult to see that everybody was treated fairly.

3451. You have had occasions when you have found that the native compact has been gone back upon by the people who made it?—Yes.

3452. The real difficulty is, is it not, that the land in question belongs to the native population and not to the Government of the colony?—There are no Crown lands in the colony.

3453. There being no Crown land, how do you propose that the Government should legislate in such a way as to ensure complete control for the owner of the mill?—Assuming that the Government is satisfied that all parties interested have agreed to the lease then let the Government endorse that lease.

3454. But I think you will find that the terms of the Concession Ordinance are "provided that the Governor" is satisfied that the chiefs have approved, and that "the owners or a majority of them have given their consent."—Are you talking of the Palm-Oil Ordinance now?

3455. Yes.—I am very strongly of opinion that that is an unworkable ordinance.

3456. For what reason?—Because you have no collecting rights. You have only the exclusive right to put up a mill in a certain area, and as you have no collecting rights or cultivation rights, you are entirely in the hands of the natives as to whether or not they will improve the areas. It takes about 15 years for farms to come into full bearing and the maximum period that can be granted under the palm-oil ordinance is 21 years. So that if the grantee under the ordinance starts paying premiums to the natives to encourage them to open up the area it will only come into full bearing at the time when it is thrown open to the public. In other words, he would improve the area and it would only be approaching completion when it was thrown open.

3457. You agree that collecting rights can only be given by the native himself?—Yes.

3458. Not by the Government, to whom the land does not belong?—No.

3459. And no legislation can ever properly be introduced that assumes the right of the Government to the land?—Would you refer me to the reference to that in my précis. I thought I had struck out all reference to that.

(Chairman.) We are getting into concessions.

(Witness.) I am only too pleased to go into the matter fully.

3460. (Sir Hugh Clifford.) It is as follows: "The laws of the various colonies should be so drafted as to encourage the complete control of areas round the oil mills being vested in the oil-mill owners, as this, in my opinion, is a *sine qua non* of success"—That referred specially to Southern Nigeria.

3461. (Sir F. Lugard.) One or two supplementary questions. You say that without a collecting right over 14 square miles for 16 years, when the plantation

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comes into full bearing and $5\frac{1}{2}$ square miles after that date, you would consider the erection of mills in Africa would not be a paying proposition?—That is so. It would depend entirely on the number of palms and the yield of the area in the first instance. The $1\frac{1}{2}$ square miles might only yield 3,000 or 4,000 tons, in which case it would have to be enlarged.

3462. Then again you do not consider that a mill separated from a plantation and located at a port, such as Levers at Lagos and Opobo, would be a paying proposition?—They were kernel mills; they were not treating fruit.

3463. A mill for treating both, such as you describe, would not be a paying proposition?—There would come in the question of treating the fruit fresh. If you could give us sufficiently rapid transit which would permit of treating the fruit the same day as it was collected, there would be many advantages in having it at the port, but if it reached us a week after it was cut then it would mean making a poor oil.

3464. Looking at the great distance of the ground-nut producing areas from a waterway or railway, do you know of any kind of press or machine which could be used by the natives themselves?—I had a little one in West Africa last year (it is now at Koko Beach or Sapele) which could be made of use. That treated about 56 pounds weight of material per hour.

3465. That was for expressing the oil?—Yes.

3466. Do you know of any kind of machine that could be used by natives for decortication?—Yes. You would require grinding. Probably a set of stones driven by ox power would be most useful. The oil could be expressed by hand presses and that system could be tested easily.

3467. One of the reasons why you consider that the palm-oil industry should be preserved and encouraged is that the tree is more free from disease than cocoa?—Much more—immeasurably so.

The witness withdrew.

Adjourned for a short time.

Mr. FRANK B. SANDERSON examined.

3478. (Chairman.) You are chairman of Messrs. Wray, Sanderson and Co., I believe?—Yes.

3479. And also chairman of the Seed Crushers' Committee of the Hull Chamber of Commerce?—Yes.

3480. In the first place, I hope that the Hull committee will recognise quite clearly that we should have been very glad if the Secretary of State had seen fit to have had a member of that body on this Committee, and we very sincerely trust that if at any time you have any views on the questions before us you will not hesitate to communicate them freely to us.—I shall be very happy to do that.

3481. We shall be only too glad to consider anything that you put forward.—If you would like me to reply as you go along I will do so.

3482. Certainly.—I may say, bearing on that point, that when we first saw the announcement in the paper that a committee had been formed I do not think we quite realised for what purpose it was formed, otherwise the Chamber of Commerce probably would not have pressed that a member should be placed on this Committee.

3483. It deals really and principally with the question of crushing as connected with the West African trade.—Yes.

3484. So far as Hull is concerned, I know that it is a great crushing centre for other seeds generally, but how far has it had connection with palm kernels?—Well, we had had practically no experience in palm kernels until the outbreak of the war. Since then we have had, I think, something like 25,000 tons dealt with locally.

3485. You say "deal" with locally. Some have been dealt with at Selby, I know.—And Hull.

3486. Yes, and at Hull, too.—About 25,000 tons at Hull.

3487. As apart from Selby?—Yes.

3488. Are preparations made, or machinery adapted, for dealing with larger quantities now? I do not want

3468. Is not the palm threatened by the tapping for wine?—Yes.

3469. It is in as much danger as cocoa if stringent measures are taken against the liquor traffic?—You mean that if you raise spirit duties, you may send the people back to palm wine?

3470. Yes.—You will increase the consumption of palm wine if you increase the spirit duties.

3471. If the liquor traffic is dealt with the palm will be interfered with?—Yes, but probably only useless trees.

3472. (Chairman.) You said that the factories which treated only 10 tons of fruit were purely experimental?—Yes.

3473. You said that a proper factory as a business proposition would be one which would deal with a minimum of 10,000 tons a year?—Yes.

3474. Roughly, that means 1,000 tons of kernels a year. As a rule, they are not more than 10 per cent. of the total fruit. Now, if you only run four or five months, it means 50 to 60 tons of kernels a week.—I accept your figures.

3475. About that. Do you think that that is a real business proposition up against the big mills in Germany or here?—My idea of crushing the kernels on the coast was merely to keep my staff together. I thought that I had made that point quite clear. There is no question of competing. You must save the palm-oil industry as a whole and that necessitates palm-oil plant, and it would be a great drawback in operating a plant to have to get and train labour three or four times a year. If you can make ends meet, when treating kernels, well and good. I should not mind if I made a small loss so long as I kept my men together.

3476. You could sell your palm kernels?—Yes.

3477. This is a little extra which might be made by treating the palm kernels in the way that you suggest?—Yes.

to ask you to tell us any secrets.—I think that I can reply to that. The major portion of the seed-crushing machinery in Hull is not adaptable for the crushing of palm kernels and all classes of seeds containing a very high percentage of oil; that is to say, seeds containing from 35 to 55 per cent. of oil require a rather different class of machinery from that required by what we term the low oil-bearing seed such as cotton seed and linseed. At the present time, practically the whole of our machinery for the first series is not adaptable for the low oil-bearing series with the exception of two mills which probably are capable of dealing with palm kernels and copra. The extracting works in Hull are all quite capable of dealing with the high oil-yielding seeds. We have three extracting works in Hull. They are all quite modern and of considerable importance and capable of dealing with very large quantities. I think that I am safe in saying that those works are being extended at the present time and, apart from those, large additional works are, at the present time being erected.

3489. Just to get exactly at the scope of what you can ask you about, I know that you do crushing. You do not represent anyone who does the actual importing as a merchant?—No.

3490. Let me go on beyond crushing. No margarine, for example, is made in Hull?—No.

3491. Therefore practically the interests are crushing interests almost purely and simply?—Crushing and extracting.

3492. You buy seeds and you sell oil or cake?—Yes.

3493. You do not yourselves use them. Now comparing Hull with Liverpool or Hamburg, for the moment, the charges at Hamburg are quite low—say, 7d. a ton landing charges, discharging into lighters and so on. What are the exact charges at Hull?—The arrangement is that the seed arrives, in dock, it is placed over side into lighters and the lighters then are

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taken down the river by the action of the tide. They are propelled by the tide and there is no cost whatsoever. The cost is, of course, in the working charges—that is to say the cost of weighing and putting over side.

3494. About how much should you say they would come to for kernels?—About 1s. 10d. a last, which is roughly about two tons

(Chairman.) 10d. or 11d. a ton.

3495. (Sir Hugh Clifford.) Is a last a local measure?—I do not think so. It is a term known generally in the trade. I would rather not go too closely into this before I confirm it.

3496. (Chairman.) We can ask you to confirm it and not hold you to it exactly. Now in asking you questions I am always bearing in mind what you now realise is the main object of this Committee's enquiry—namely, the transfer of this country of the oil industry which is at present situated in Germany.—Exactly.

3497. In the oil industry I include crushing and refining and manufacturing into margarine. Landing charges represent one item. Now as regards shipping facilities, you have had a certain number of boats running to Hull since the war began?—Yes.

3498. Supposing that the firm go on with palm kernels, are they content with the existing shipping facilities or are they apprehensive with regard to shipping facilities?—Our experience is essentially very limited. We feel that it is necessary to have a regular line of steamers so as to be able to rely on a minimum amount of tonnage. At the same time it would be better to have also, if possible, a certain number of tramp steamers calling, because it would help us to secure parcels which is very very useful particularly having regard to the West African trade, and again it would prevent any undue fixing of freights.

3499. Of course, if you want to have line steamers and also tramp steamers it means getting the best of both worlds, does it not?—I can fully appreciate the difficulties.

3500. Now to come to the actual crushing, your own firm began crushing in September of last year?—You are referring to palm kernels.

3501. Yes, palm kernels in particular.—Yes.

3502. As regards machinery, could you say how it compares with German machinery? Is it up to the standard of the best German machinery?—The machinery which we are using at the present time for crushing palm kernels, is not to be compared with the best German crushing machinery; but the machinery in Hull and other centres, which is suitable for the purpose of crushing palm kernels is fully equal to the German, if not superior.

3503. Is that the ordinary American press?—No. It is known as the cage press.

3504. (Mr. C. C. Knowles.) Movable boxes?—Yes. We have a small number of those presses at the British Oil and Cake Mills and another firm also have a certain number of them. Palm kernels are being principally extracted in Hull and not crushed, and there, as I have already stated, we are in a better position, I believe, than the German mills.

3505. (Chairman.) Taking the best mills in Hull, with the cage presses, how much oil should you say they would get the cake down to after pressing? Would they get an average of 6 per cent.?—We get it down to from 5 to 6 per cent.

3506. You would not average 5 per cent., would you?—We should average from 5 to 6 per cent. With the Anglo-American presses you would average about 10 per cent. The Anglo-press system is being adopted at the present time at certain mills.

3507. You have extraction plant at Hull?—Yes.

3508. Has your firm or the trade compared the two at all—crushing and extraction?—Yes.

3509. Have you any opinion to express as to the comparative merits of the two systems?—Yes, I could give you a little information on the point.

3510. Speaking broadly, which would pay you best from a business point of view—extraction or crushing?—Broadly speaking, extraction is far ahead of crushing in fact, so much so, that, in my opinion, the day is not

far distant when all high oil-bearing seeds will be extracted only.

3511. When you say "all seeds" do you mean including linseed, or are you referring now to palm kernels only?—I mean all seeds with a very high percentage of oil.

3512. That would include copra?—Yes, quite so.

3513. Now you sell the cake that you make from crushing?—Yes.

3514. Do you think that you could sell the meal that you get from extraction?—The amount of cake being sold is comparatively insignificant.

3515. How do you use your residue?—The residue is used in the process of manufacture of compound feeding cake.

3516. You do not sell any wholly palm kernel cake?—Practically none. The British farmer is so conservative, as no-doubt you know, that it takes years before we can really interest him in a new article.

3517. I hear that at the present moment some mills cannot make palm kernel cake fast enough as farmers are getting accustomed to it. Apparently that is not your experience?—I rather think that if you enquired you would find that the cake is ground into meal and sold in the form of pig food.

3518. No, I have enquired. It is sold in the form of actual cake.—May I ask you a question?

3519. Yes, certainly.—Are you quite sure that it is not for export?

(Chairman.) It is used by farmers here. I do not know whether any other member of the committee knows.

3520. (Mr. C. C. Knowles.) There is no question about it that it is being sold very freely in the form of cake.—To the English farmer in the form of cake?

3521. Yes, in very large quantities.—That is not the experience in Hull.

3522. Do you know Mr. Watson's experience? Do you know the experience in Selby?—I know what I thought was his experience.

3523. But do you know what his experience actually is?—Evidently not.

3524. If he said that he was selling large quantities of cake to English farmers would it surprise you?—No. It would surprise me if he said that he was selling it in the form of cake for feeding cattle in this country.

(Mr. C. C. Knowles.) He will tell you that he is.

3525. (Chairman.) Would it surprise you to learn that at the Selby mills they were selling not compound cake but palm kernel cake in the form of cake for feeding cattle?—Do you mean going direct to farmers for consumption in this country? I know that Watson's are selling large quantities for cattle feeding because we ourselves have purchased through brokers from them, but the cakes have been ground into meal and made into pig meal and they are an ingredient in the manufacture of compound feeding cake.

3526. Do you find any difficulty in making extracted meal into compound cake?—No, we have no serious difficulty.

3527. You do not find that it is too fluffy and rather difficult?—No, we have had a certain amount of difficulty in working it, but it was only a technical difficulty, which we have overcome.

3528. When it comes to refining, do you refine as well?—I am not able to give any information at all with regard to refining. There is only one firm in Hull that has any experience, and I spoke to them yesterday and they said that they felt that they had quite overcome the initial difficulties now, and that the oil they were making at the present time compared favourably with the oil made in the German mills.

3529. In quality and in price?—In quality.

3530. Then, if I may say so, the Hull trade, so far, has not wholly, so to speak, gone in for crushing palm kernels as a definite subject. Are they committed to it?—No, I do not think so, with the exception probably of one mill. At the outbreak of the war many oil seeds were shipped to Hull which would otherwise have found their way to the Continent with the result that the trade, generally speaking, has had a surplus of oil seeds to deal with, and they have been able therefore to be

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in the happy position of picking and choosing, consequently the whole of the available machinery has been fully employed, and it has only been with the greatest difficulty that any machinery at all has been able to be put aside for the working of palm kernels.

3531. Supposing that the war were to end to-morrow (but of course it cannot) would the probable result then be, as far as Hull is concerned, that you would cease working palm kernels?—Not at all. If the war were to end to-morrow the position rather would be that seeds which at the present time are coming to Hull would probably be diverted to the Continent, with the result that we should only have cotton seed and linseed, which we crush principally in Hull, to rely upon. The Committee will know that the Egyptian seed crop is poor, being about 30 per cent. below an average crop in yield, and the available supply of seed from India is small, we would have considerably more plant than we have to-day to deal with palm kernels. My feeling would be that you would find that we should be almost dependent on a supply of palm kernels in order to keep our plant fully employed.

3532. I see, but let me put it in this way: You have one specialised plant, the cage press, which is the up-to-date plant especially for kernels. You think that after the war other seeds may go to Germany and elsewhere, so that you will not have such a glut as at present?—Yes.

3533. But before the war other seeds went to Germany and to you, whereas palm kernels went almost wholly to Germany?—Yes.

3534. It is natural to think that the Germans after the war, while they take other seeds as before, will naturally ask for palm kernels as before. Therefore will you not have German competition after the war even more keenly with regard to palm kernels?—We shall.

3535. You will go back to the things you were mostly crushing before the war and they will mostly go back to the things that they were crushing before the war?—That is entirely a question of what protection our trade receives. If we are placed on anything approaching the same terms as Germany we can unquestionably hold the major portion of the palm kernel industry.

3536. Supposing that you were asked to advise a friend whether he should go into the business, and put up mills, you would say it would depend on whether he was put on equal terms with Germany?—Yes.

3537. Or if one had to put one's own money in one would be even more careful?—That is exactly the position.

3538. Now what do you mean by being put on equal terms with Germany? I do not want to try to drive you in any direction at all. With regard to Germany the oil is largely used for edible purposes either in Germany for home consumption or goes across the canal so to speak to Holland partly for home consumption and partly for export?—Yes.

3539. How would you meet that kind of competition? I only want to know what you mean by being put on equal terms with Germany.—Well, the growth of the palm kernel industry on the Continent is due to a great extent to economic developments. The inhabitants of the Continent are to a very great extent consumers of edible oils—to a very much greater extent than we are in this country—with the result that they have had immediately a market for their edible oils. Again, the German farmer is more scientific in his methods of feeding than the British farmer, and he considers the value of feeding stuffs and their food value, whereas the farmer here is more inclined to gauge the value by considering whether the cattle like the cake or not, with the result that Germany has an immediate demand for the meal and the cake. Then again in Germany, the recognised German protective methods were adopted with regard to palm kernels to foster the industry, in the same way as they have been to protect other industries, without going into exact detail, I mean that as you know they have subsidies on their oil. They have a tax on imports of oil into Germany with the result that they can hold up the price of the oil in Germany, and send the surplus to

this country. That is a point which it will be most difficult for us to overcome—most difficult.

3540. I can well understand that, given equal conditions in all ways, we should want no help or favour of any kind, but under the conditions which you mention we have to consider what may happen at the end of the war. The object of the Committee is to see how far the industry with regard to oil and its manufacture subsequently can be kept here after the war.—Yes.

3541. I ask you what measures would you propose to equalise the conditions. You say given equal conditions. We want your perfectly candid opinion.—If you want my candid opinion I do not want to raise any point of a controversial nature. Take the shipping facilities.

3542. We are not going to have controversy. We have had lots of opinions which might conceivably raise controversy.—The Germans have a very great advantage in regard to shipping. They have a system of rebates, so I am given to understand. Unless that were dispensed with or unless there were equally favourable terms in the United Kingdom with regard to shipping, it would be almost impossible for us to import the kernels with a higher freight against us at the outset.

3543. There may be great searchings of heart one way or the other about shipping freights and rebates, that we all know. I will not go into that question at the moment, but so far as the Woermann Line and Elder Dempster were concerned the published rebates and the primage system were the same in each case. Do you think that there were additional rebates which were not published given to Hamburg?—That always has been the opinion of the trade.

3544. You have no proof?—I have no proof.

3545. Supposing that that was the fact and that they were abolished that abolition would counteract entirely the disadvantages that you enumerated a moment or two ago?—To a great extent.

3546. It would counteract the openness of mind of the German farmer as to cake?—Yes, I think so.

3547. And the higher price received in Germany for the oil, so that the surplus could be shipped abroad?—I think that that could be overcome. They have certain advantage which would make it possible for us to capture the whole of the palm kernel industry. We should certainly be able to hold that portion of the industry which would supply our own market with the requirements of oil. The requirement is unlimited, I was going to say, and certainly it is increasing to such an extent in this country that it is reasonable to assume that we could take 50 or 75 per cent. of the West African kernels.

3548. To whom would you sell the oil?—To the margarine manufacturers of the country.

3549. How would you get a market? Half the margarine is at present home-made margarine and half is Dutch margarine?—Yes.

3550. If our oil capacity was equivalent to the whole of the margarine trade, what would happen?—Do you mean our present oil capacity?

3551. Yes. You say we could probably hold it if freight were equal. Take shipment to Holland.—We might be able to compete. It is quite possible.

3552. To Holland it would be in drums?—Yes.

3553. From Hamburg it goes up in tank barges. It would mean larger freight by over 1*l.* a ton?—It is only a question of hiring the drums.

3554. I am thinking of the actual charge for freight. It would be 1*l.* a ton more?—I do not know; about 1*l.* a ton more.

3555. (*Sir. W. G. Watson.*) There is the return of the drums. In my experience it is 30*s.*—In war time?

3556. Before the war.—It has all stopped since the war. Our freight to and from Holland is about 7*s.* a ton normally.

3557. (*Professor W. R. Dunstan.*) One question with regard to compound cake. In your experience is it true that farmers in this country are not very large consumers of compound cake?—The compound cake industry in this country is increasing yearly. It has materially increased during the past five years.

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3558. That is because the farmer is taking to the compound cake, whereas a few years ago he was not inclined to take to it?—I would be inclined to say that the principal reason is that the compound feeding cakes made to-day are made more scientifically altogether than they were a few years ago. Up to ten years ago, apart from Liverpool, the feeding cake was of a more or less inferior quality. To-day it is cake of a very high standard. The British farmer does like a cake which is palatable. He considers a cake which his cattle will readily eat even more than he will consider its intrinsic feeding value, and on that account, and that already referred to, the trade in this country has materially increased and I think will continue to increase.

3559. The meal resulting from the extraction of oil by chemical solvents is quite suitable for the manufacture of compound cake?—Yes.

3560. In the event of extraction taking the place of expression of the oil, you would anticipate no difficulty in finding a market for your meal, because you would look to an increased use of compound cake?—Certainly. We should be able to deal better with the meal than we should with the cake, I think.

3561. That is a very important point. Now, you commented on the English farmer and said that he was not so disposed to accept scientific evidence as the German farmer, but you would agree that matters have mended in recent years to some extent. Does not the British farmer now buy his cake on the results of chemical analyses?—It is quite true that he buys his cake on the results of chemical analyses, but it is only on account of the Board of Agriculture, which is endeavouring to educate him up to a higher standard of thought with regard to feeding. I must confess that my experience still is that the average British farmer thinks very, very little of the scientific side of feeding. I have had a fair experience with regard to this. On the Continent I have visited large numbers of farms expressly to see exactly the way in which they feed and as to whether they work on scientific lines. My experience is that there is no question about it that they thoroughly understand feeding; they feed on the most scientific lines, and the man who actually feeds the cattle knows something about the feeding stuffs, whereas in this country all they know is that they are feeding with cake or meal, and they consider it good cake if the cattle eat it readily, and if they do not eat it readily they say it is poor cake. The question of analysis is quite of minor importance to them.

3562. But still the price is based on the results of analysis in England now and they buy on that?—The price is based on the cost of production.

3563. Partly, but the value of the cake as feeding material as determined by chemical analysis is also taken into account?—I am afraid not. To a certain extent that is inevitably so, but primarily no. The English farmer would feed on linseed cake, even though the price intrinsically was higher than the price of other feeding stuffs.

3564. You think that that is the case?—I am quite sure that is the case.

3565. Is your experience in Germany or in Denmark?—In Denmark particularly.

3566. And in this country in Yorkshire?—I was referring to Yorkshire in particular.

3567. (Mr. L. Couper.) Have you any experience of the ground nut?—None whatever.

3568. You have told us that you only started crushing kernels in September of last year?—Yes.

3569. What induced you to go in for kernels?—We were induced to go in for kernels because for the first time in my own experience, which extends over 19 years, they showed a margin for extracting.

3570. In the matter of price?—In the matter of price—that is, the difference between the price of palm kernels and the amount received for the oil and the meal.

3571. Mainly, perhaps, due to an increase in the price of the oil, rather than a fall in the price of the kernel?—I am afraid that in this case it was on account of a fall in the price of the kernel. The principal outlet

for kernels, namely, Germany, was for the time being cut off.

3572. Did you buy kernels from a broker or merchant?—From a broker.

3573. In Liverpool, presumably?—In Liverpool.

3574. Were you brought into contact with the merchant at all?—We have been brought into contact with the merchant.

3575. You are quite satisfied that the merchants, as a body have as far as you know, treated the Hull people quite fairly?—It is rather difficult to answer that question.

3576. Have you heard that the case is otherwise?—Probably not so far as the merchant is concerned. Hull has been always handicapped with regard to palm kernels. Until the outbreak of the war we never had an offer made to us direct, although Hull is the largest centre in the United Kingdom for seed crushing and oil extracting, and I believe I am right in saying the largest in the world.

3577. Did you buy at the same price as the Liverpool price? Is that a fair question?—We have bought at the same price, and we have had to pay more.

3578. Would it be possible to enter into any co-operative arrangement with the merchants, under which you took palm kernels over a period of years on some basis of price to be arranged?—I think that that would be quite impossible.

(Chairman.) You mean on some sliding scale?

(Mr. L. Couper.) I should, perhaps, make it clear that I mean on a sliding scale price, relating, perhaps, to the price of oil.

(Witness.) Some scheme on such terms might be possible, but if such a scheme was considered, I do not quite see why it should not be done with the shipper direct.

3579. (Chairman.) That, I think, is what Mr. Couper means. Would it be possible for you as a crusher to have an arrangement with the shipper, taking as your basis the market price of oil. I do not know whether there can be such a basis?—I think that such a scheme is practicable. The question would require very careful consideration.

3580. (Mr. L. Couper.) You do not insist that your hands must be left absolutely free as to the particular class of seed to be bought in the future?—No, I do not think so.

3581. You would be prepared to consider some proposal which would help West Africa?—Yes.

3582. Even if it involved some partnership arrangement between you and the merchant?—I think it quite possible that we could agree to some such scheme.

3583. (Mr. T. Walkden.) You are naturally wanting a direct line of steamers to Hull from the West Coast of Africa?—Yes.

3584. You have never thought of any difficulties arising out of that, have you?—Yes. We have realised that there would probably be many difficulties, but our feeling was that that was for shippers and exporters to deal with.

3585. I am speaking from the importers' and exporters' point of view.—Naturally the steamer to Hull would want an outward freight.

3586. And the bulk of the goods range from Liverpool, Manchester, and that district, and even so far as Birmingham.—Yes.

3587. If they were sent to Hull, we should naturally have to pay a much higher freight.—Yes; I quite realise the difficulties.

3588. Messrs. Elder Dempster and Company, I may say, were rather anxious to help Hull, and they asked the merchants on the coast if they would ship a portion of their kernels to Hull. One or two steamers did arrive at Hull, and some of the importers and merchants had a difficulty in disposing of the kernels; do you remember that?—I can quite understand that; it is quite natural.

3589. You see the difficulty of merchants sending to a port in which there is not a market?—I fully appreciate that difficulty, but at the same time, you must also appreciate the difficulty of the manufacturer. If when we are engaged in an entirely new industry and our machinery is working at its maximum capacity,

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arrivals of palm kernels come to Hull quite unexpectedly, the exporter or shipper is surprised to find no market for them. My comment would be that I should be extremely surprised if he could find it in such circumstances. Surely it would not be a very serious matter to place the palm kernels in a public warehouse at a maximum cost of 5s. a ton and hold them until there is a market. If there was not to-day there might be a suitable market to-morrow.

3590. Take prior to the war, when a Lagos merchant was quite content to clear half-a-crown a ton on his kernels. Five shillings a ton would make a difference, would it not?—Yes, but I was referring to the exceptional case mentioned where the kernels arrived unsold.

3591. Contracts made by the merchants with the buyers are placed ahead, probably, running for three or six months?—Yes.

3592. On the spot in West Africa a man has to know beforehand where the contracts are placed, and before the war Hamburg was the market for kernels. I would like to point that out?—Yes.

3593. All contracts had to go through Hamburg, and Hamburg ruled Liverpool or any other market?—Yes.

3594. Since the war these kernels have come to Liverpool and formed a market here?—A small percentage have gone to Hull.

3595. A very, very small percentage have gone to Hull through Elder Dempster trying to arrange a direct line there. You could not possibly have a market in Hull and a market in Liverpool to help the merchant?—I do not know of any occasion to have a market in Hull and Liverpool.

3596. It must be in Liverpool?—A free market in Liverpool would be quite sufficient.

3597. They are bound to come to Liverpool if you have no freight to take the steamer out again?—If you have import into Liverpool only, it will be quite impossible for Hull to hold its own after the war. We must be able to purchase in Liverpool at practically the same price as in Hull, and that must be arranged between the shippers.

3598. You are a free port and cheaper than Liverpool?—Our working costs are cheaper.

3599. (Chairman.) Do you quite agree with regard to the market in Liverpool?—Yes.

3600. On the whole, you want the shipping to be alternately at the same price either to Hull or to Liverpool?—Yes. Hull is the most important centre in the world, and not Liverpool. I wish to impress on you that this point is of importance. If you really desire to increase and maintain the trade you must give facilities to Hull.

3601. (Mr. T. Walkden.) But a steamer cannot run out empty; it has to come to Liverpool to load?—If the matter is of importance to the colonies, and our own country, as I presume it is, surely the difficulty can be overcome by some means.

3602. If they can take cotton goods at 60s. per ton, as against kernels at 25s., they much prefer it. The outward freight is much more valuable than the homeward freight?—Say 7s. a ton in normal times for bringing the kernels from Liverpool to Hull. It is only a question of getting over the difficulty of the 7s. Probably the Hull manufacturers might be able to meet that to the extent of 2s. a ton, because we are a cheaper port than Liverpool. If the 5s. balance could be spread over the shipper and the Government in one way or another the difficulty would be met, would it not?

3603. Previous to the war a steamship company would give transit rates. If they would give the same to Hull as to Liverpool, that would help?—Yes.

3604. They have done so previously?—Yes. I believe that that is the position in Germany.

3605. The Germans said that the rebates were the same by the Woermann line as by Elder Dempster. We have heard that German firms had a preference, but I have never heard it mentioned that English importers had any special rebate from the German lines. Take the surplus oil that came over here from Germany previous to the war. It was suggested by

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some of the witnesses that that was dumped?—I think there is every reason to believe that.

3606. Therefore you would want some protection. It has been suggested here that if you erect mills for crushing or extracting you will want assistance. Would you suggest any way in which it could be protected?—I did not want to suggest anything of the kind.

Sir FREDERICK LUGARD in the chair.

3607. (Mr. T. Walkden.) The Chairman asked you to be outspoken.—If I make a statement, I should say that it would be possible for a tax on kernels exported from West Africa to be put on all exports to foreign countries.

3608. Would that be better than an import duty on the crushed oil coming here?—Personally, I prefer the latter, but the whole matter necessarily requires the most careful consideration.

3609. (Mr. G. A. Moore.) Can you give us the relative cost of crushing and extracting?—On my notes I state that I am not prepared to give any costs. It is a technical question, but just for your purpose it will suit probably to give you, roughly, two costs.

3610. Yes.—Take the cost of crushing as from 15s. to 17. That is after taking the raw material into the mill from the time it leaves the silo to the time it is manufactured. To the 15s. or the 20s. you must add the cost of taking the goods to the mills and the cost of delivering them from the mills when manufactured. They vary considerably according to the different parts of the country and the respective mills.

3611. Those would be the same for crushing and extracting?—Yes. Take the cost of extracting at 25s. to 30s. per ton. I think it important, in considering the question of costs, to point out to you that really the question of costs is of very minor importance. It is not so much the question of costs, which is of importance, but the question of the result—whether the work is done efficiently or otherwise. The whole point is whether the work is efficient or otherwise. Whereas the difference between the cost of extracting and the cost of crushing is probably not 10s. a ton, yet the difference to an extractor in the case of palm kernels would quite conceivably be 30s. or 27. per ton. In the process of extracting one takes out the major portion of the oil. In the case of palm kernels we should leave in probably 2 per cent., whereas in the case of crushing with Anglo-American machinery, we should leave 10 per cent., and in the case of cage presses, 5 or 6 per cent. Each further one per cent. of oil extracted from the seed is equal practically to about 6s. a ton. The difference between crushing with Anglo-American machinery with 10 per cent. of oil in the cake and the cost of extracting, leaving 2 per cent. of oil in the cake, would leave so much in favour of the extractor, that the 10s. is of minor importance. You seem to press the question of cost. My whole point is that it is not a question of cost so much as it is a question of efficiency. That is what I want to make clear.

3612. When you have extracted oil, you do not get quite the same price for the oil as the crushers get, do you, according to the prices I have seen?—So far as my own experience is concerned, they command practically the same price.

3613. Liverpool lists generally put a difference of 17. a ton between them. Is not that correct?—I should say that it is not correct. There are times when extracted oil is at a premium and other times when it is at a discount. Even 17. a ton difference between the value of extracted and crushed oil, if in favour of the latter, is compensated several times over by the efficiency of the former process, on account of the increased yield of oil.

3614. Have you extracted palm kernels yourself?—Yes.

3615. What solvents have you used?—That is a technical question which I am not prepared to reply to.

3616. Is there any practical difference in the results from the point of view of efficiency between trichloroethylene and benzine?—Yes.

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3617. Which is supposed to be the better?—Our experience is that the former is the better for certain purposes, and under special conditions.

3618. Trichlorethylene?—Yes, but given normal conditions benzine is the better.

3619. Was there any inclination on the part of crushers before the war to ask for palm kernels at Hull?—I do not know that there was. My point is that we have never been asked to buy. We never asked for soya beans. Immediately they were offered to us, we interested ourselves in them, and, as you probably know, became the pioneers of this industry.

3620. Would there be any difficulty from the point of view of the Hull crusher in buying the palm kernels before they were shipped?—Not the slightest.

3621. There would be no difficulty in dealing with 3,000 or 4,000 tons at a time?—No difficulty. We should prefer to buy on those terms.

3622. That would get over the difficulty that the importer has with regard to finding a market at Hull much better than your suggestion of warehousing?—I was only referring to a parcel already in passage and finding no market in Hull.

3623. There is indisposition on the part of shippers to ship any goods to Hull unsold?—I do not suppose that there is a worse market than London for shipping linseed unsold. If linseed is shipped to London unsold it comes, I believe, to one of the worst markets in the United Kingdom, but if it is shipped to Hull unsold, there is no difficulty in disposing of it at prevailing market values.

3624. (Sir W. G. Watson.) You said you thought that in the near future all seeds and nuts containing a large percentage of oil would probably be extracted rather than crushed?—Yes.

3625. Have you ever had any experience of crushing copra and extracting copra?—I have crushed copra but I have not extracted copra, I know that the only means of crushing copra and seeds bearing a high percentage of oil is with the cage presses, the heavier presses with large cylinders, and then the cake cannot be brought down to less than 5 or 6 per cent., whereas with extraction we can bring it down practically to any figure we desire.

3626. You have had no experience of extracted copra?—No.

3627. When you have, you will find that there are things which rather interfere with its quality for edible purposes, such as slime?—That may be.

3628. You agree, I suppose, that it is a good thing for a mill to have a market for its products in the very near vicinity?—Yes.

3629. The German mills sometimes have a very great advantage in the fact that they can transport their oil to the Dutch margarine manufacturers, who make margarine that comes to England?—Yes.

3630. There would be difficulty in beating the German oil people in that trade, because of having to pay the cost of carriage across the sea and the cost of the drum?—I do not think that there will be great difficulty if Germany is not subsidising its manufacturers.

3631. There is the fact that the English miller has to pay 30s. a ton to Holland as against 5s. You think that we could overcome the difficulty of the 25s.?—I cannot agree that there is a difference of 25s. We have held our own in the soya bean industry and we shipped meal and oil and cake not only to Denmark and Scandinavian countries but also to Germany up to the outbreak of the war.

3632. You said that you had been very much struck with the particular knowledge that farmers in Denmark have as to the feeding properties of the cake. Was any palm-kernel cake used in Denmark, did you notice?—I could not say that I did. I was there some five years ago, and I was there for some time. My reason for going at that time was that we were the largest importers of soya beans, and I wanted to ascertain why we were not able to find as ready a market in this country as in Denmark for soya cakes and meal, where we had a ready market. I wanted to ascertain whether their means of feeding compared favourably with, or were entirely different from, the means adopted in this

country. At that time they were feeding principally with soya bean cakes.

3633. Up to that time palm kernel cake was not generally used?—No.

3634. (Sir Owen Philipps.) You have told us that it costs in Hull 1s. 10d. per last or 11d. per ton for delivery into barges and weighing?—Yes.

3635. That does not include the cost of bringing it alongside the mill, does it?—The cost of placing over-side in Hull is nothing; there is no cost whatever. The cost per last is for weighing really—bringing the goods out of the hold of the ship and weighing. There are no quay charges.

3636. Mr. Watson of Selby told us that it cost him 1s. 3d. to get it alongside his works. What does it cost you to get it alongside your works?—About 10d. to 1s.

3637. Over and above the 11d.?—That is for lighterage.

3638. Elevenpence for weighing and 10d. to 1s. lighterage?—Yes; that is if the goods are bought on a c.i.f. basis. In Hull they are bought principally on a delivered basis and then we have no other cost whatever. We pay simply the cost of lighterage. We send our lighters to the steamer. The goods are weighed on the steamer and delivered to our craft free. We have to pay the cost of lightering from the steamer down the river to our mills.

3639. You do not pay the cost of weighing?—We do not, as a rule, pay the cost of weighing.

3640. The importer pays that?—Yes. The 1s. 3d. that you refer to is the cost of lighterage as compared with the cost in Hull of 10d. to 1s.

3641. Because it is a little further off?—Because it is a little further off.

3642. A previous witness told us that the tariff rate of the British and the German lines prior to the war to Liverpool and to Germany were equal; you said that you believed that German shipowners gave some advantage in reduction of freight or otherwise to German importers?—Yes.

3643. Are you aware that, prior to the war, the British lines also had a direct regular service from West Africa to Germany running alongside the German steamers?—I am afraid that I am not very well up in the question of freight.

3644. I would like to ask you one more question, as you have mentioned the point of the Germans giving a preference. Seeing that the English lines had published tariffs the same as the German lines, and were running a service to German ports from West Africa alongside the German lines, and carried a portion of the cargo, is it likely that any shippers would ship by English lines to Germany if the German lines were giving a rebate on the tariff. From your knowledge of business is that probable?—Not at all probable, but we do not know whether the German Government paid a subsidy. My point rather was that the German Government paid the subsidy.

3645. I wanted to clear that up. Then I think you said that you had had 19 years' experience of crushing?—Yes.

3646. During that 19 years, up to the time of the war, there had never been a really workable profit on crushing palm kernels, taking the price of kernels and the price of oil, had there?—It is not quite fair for me to say that. Going back 19 years takes me to the time when I was quite young, but during all my knowledge I never remember a time when there was a profit. I have worked this out a very considerable number of times. I have taken the price of palm kernels and of oil, and I have never seen a profit in it at any time.

3647. The Hull crushers you will agree, I think, have no grievance in not having dealt with palm kernels previously to the war?—Certainly not; they have no grievance.

3648. After the war I hope they will deal with them?—I think we shall continue to do so.

3649. Do you think that you will be able to deal in them after the war without some Government assistance?—I think that we shall be able to maintain a certain percentage of the trade without any assistance, or probably very little, but if we received Government

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assistance, I confidently believe that we can capture practically the whole of the trade.

3650. (Mr. C. C. Knowles.) I think you replied to Professor Dunstan that you think there will be no difficulty in marketing meal. Supposing that we were able to extract in this country, say, 200,000 tons of kernels (I am rather exaggerating it), that would give, roughly, 100,000 tons of meal. You do not think there would be the slightest difficulty in disposing of all the meal, and you also told Professor Dunstan that it could be made principally, as I understood you, into compound cake?—Yes.

3651. Now you make compound cakes?—Yes.

3652. Have you made compound cakes and palm kernel meal of extracted palm kernel meal?—Yes.

3653. All palm kernel meal?—Certainly not.

3654. What proportion—only a small proportion, I suppose?—A comparatively small proportion—about 10 per cent.

3655. A cake that thickness (referring to *Colonial Office List*) weighs a certain amount. If you put a large proportion of palm-kernel meal in, will it not make the cake very much thicker, though it weighs the same?—I do not think that there is any appreciable difference in the thickness of our cake.

3656. The largest compound makers in this country are Bibby and Silcock?—Yes.

3657. It is no secret to tell you that I had a chat with them yesterday, and they told me that the largest quantity of extracted meal that they estimated could possibly be used in this country, was something like 1,000 tons per month, and they thought that it would be quite impossible to use a larger quantity. One reason they gave was that it could not be used to any very great extent in compound cake; that it could be used to the extent of 10 per cent. in compound, but not more, and 10 per cent. would be very little. It would not take off the whole of the extracted meal from, say, 200,000 tons of palm kernels.—When I made my remarks with regard to the palm kernel meal, I said that I did not think we should have any difficulty in disposing of that meal. I was not assuming that we were going to extract the whole of the palm kernels exported from West Africa.

3658. What meal do you think we could dispose of in this country?—There is an export demand for the meal.

3659. Without an export demand I mean. Can you give a rough figure?—I would not like to give a round figure. I am scarcely in a position and have no right to criticise the figures you receive from Bibby and Silcock, who are in a better position than myself to judge, but at the same time I really think that they have very considerably underestimated the figures.

3660. I rather press the point, because it is a very important one. It might decide us with regard to recommending that extracting is superior to crushing.—I can speak with regard to the percentage from my own experience. At the present time we are placing 10 per cent., or 2 cwts. to the ton, in our cake, and I do not think that we could increase it much.

3661. It depends on competing meals?—Yes.

3662. You will be able to get rice and other meals after the war, in normal times?—Yes.

3663. Which are much cheaper, as you know?—Yes.

3664. That might put palm kernel meal out altogether?—Yes, possibly.

3665. If we could get farmers to feed it as a cake there would be a great chance of its being taken off, would there not?—I think it necessary to educate the farmer up to the value of palm kernel cake.

3666. Have you had any experience in refining palm kernel oil?—No experience whatever.

3667. You cannot say whether it is easier to refine crushed oil than it is extracted oil?—I am not able to say. In Hull the oil is always sold in the crude form.

3668. You have said that you consider Hull the most important crushing centre in the world.—Excuse

me, I said the largest centre in the United Kingdom. I believe I am safe in saying that is the largest centre in the world.

3669. You include Selby in Hull?—I was not doing so, but it would improve the position if we did. You could safely say then that it was the largest in the world.

3670. Do you not think it a good thing for the crusher to be as near the consuming centre of the oil as possible?—It must be an advantage.

3671. It is no good crushing or extracting oil unless you sell it?—No.

3672. The consuming centres of palm kernel oil that we deal with in this country are practically Liverpool and London to-day?—Yes.

3673. Would it not be more economical to crush the kernels in one or both centres—Liverpool and London?—I do not think so. I think that the general cost, compared with the cost of freightage of the oil to the consuming districts, would not recompense the total extra cost incurred.

3674. Take soap for instance: practically the only consuming centre of oil is Liverpool for soap making?—Yes.

3675. Large quantities of palm kernel and copra oil are used for soap making. With regard to margarine, practically the only consuming centre is London?—Yes.

3676. The freight on barrels, loan of drums, returned freight, and so on, comes to what would you say per ton, taking either Liverpool or London?—There is the cost of freight on the oil and on the returned drums.

3677. Yes, and the loan of the drums.—15s. a ton about.

3678. Then in regard to Hull there would be a disadvantage to the extent of so much a ton on the oil?—Yes, on that portion of the oil shipped to Liverpool or London. Hull is a very large exporting centre.

3679. Yes, but you have to get the trade before you can export. We want to bring the demand for the oil to this country if we bring the crushing trade from Germany. You, I take it, go down the list of seeds and do the same as all other crushers. You say, "Linseed so much, oil so much, cake so much," and you make up your mind which pays the best?—Yes.

3680. And whether you put up cage presses or anything else you would always do that?—We should always do that.

3681. You would not wed yourselves to kernels or any seeds?—No, except in the special circumstances already referred to.

3682. It depends on what you can make the most out of?—If one seed showed a larger margin than another we should think nothing of altering our plant or putting down different plant to deal with the fresh seed as it came along.

3683. You have given us the cost of crushing and the cost of extracting. Do you know what they have been calculating in Germany?—I could not tell; I have not the slightest idea.

3684. The figure given to me, and it has been investigated, is round about 12s. 6d. a ton for crushing and about 22s. for extracting. Notwithstanding that they can work at that figure do you think we can compete with them?—I certainly think that we can crush or extract as cheaply or cheaper than Germany. It depends on how you calculate the figures. I remember a crusher telling me at one time that he could crush for 10s. a ton. It is entirely a question of what costs are included.

3685. Could Anglo presses that leave 13 per cent. of oil in the cake compete with the presses that leave only 5 or 6 per cent.?—No. In Hull very little is being crushed, and when we have to meet the competition of Germany again, it will be quite impossible to crush in Anglo-American presses, but in cage presses only, but it is reasonable to assume that by that time the plant available will have materially improved.

The witness withdrew.

Adjourned to Wednesday next at 11 o'clock.

EIGHTH DAY.

Wednesday, 6th October 1915.

Colonial Office, Downing Street.

MEMBERS PRESENT:

MR. A. D. STEEL-MAITLAND, M.P., Under-Secretary of State for the Colonies (<i>Chairman</i>).	
Sir G. FIDDES, K.C.M.G., C.B. (Assistant Under-Secretary of State, Colonial Office).	Professor WYNDHAM R. DUNSTAN, C.M.G.
Sir WILLIAM G. WATSON, Bart.	Mr. C. C. KNOWLES.
Sir F. LUGARD, G.C.M.G., C.B., D.S.O.	Mr. T. H. MIDDLETON, C.B.
Sir HUGH CLIFFORD, K.C.M.G.	Mr. G. A. MOORE.
Sir OWEN PHILIPPS, K.C.M.G.	Mr. T. WALKDEN.
Mr. L. COUPER.	Mr. T. WILES, M.P.
	Mr. T. WORTHINGTON.
	Mr. J. E. W. FLOOD (<i>Secretary</i>).

In the absence of Mr. STEEL-MAITLAND at the morning sitting, the Chair was occupied by Sir G. FIDDES.

Mr. J. W. PEARSON called and examined.

(*The witness put in the following letter and memorandum.*)

The British Oil and Cake Mills, Ltd.
29, Gt. St. Helens, London, E.C.

DEAR SIR, 1st October 1915.
I HAVE pleasure in reverting to your letter of the 13th ultimo, and, following on the lines therein indicated, I should propose to invite the attention of your committee to the following main points from the aspect of the British crusher of to-day.

I have further the pleasure to enclose a note of the general answers I would give to the memorandum of points which you have since submitted to me.

(a) *The present position of the trade in nuts, &c., and of the oil-crushing industry in this country.*

The oil mill machinery as at present erected in England may be regarded as reasonably up-to-date; a large proportion of it being the most modern type of plant known for the purpose. The machinery is, however, of a type particularly adapted to the treatment of linseed, cotton-seed, rape-seed, &c., i.e., the group of oil-bearing materials only moderately rich in oil. The capacity of the existing plant is probably sufficient to deal with an approximate quantity of 1½ million to 1¾ million tons of oilseeds per annum. Practically the whole of this plant is fully engaged during the winter season on the regular class of trade. This machinery is not suitable for dealing with the other group of oil-bearing seeds, such as palm kernels, copra, ground nuts, &c., which are particularly rich in oil and require a slightly different method of treatment. The machinery generally utilised for these seeds is of a different pattern and has been specially designed. The existing English machinery can be made to handle these other oil-seeds fairly satisfactorily with certain alterations, but not in the most effective manner. There are only about half a dozen firms in England employing the proper type of machinery and this has for the most part been engaged in dealing with copra. There are in addition about eight firms with factories erected on the chemical extraction principle, in which the oil is removed by means of a solvent instead of by expression. No very large quantity of palm kernels, &c. could be dealt with by the existing machinery in England without displacing a large proportion of the trade in other oil-seeds upon which the machinery is at present engaged. The handling of a quantity of palm kernels in England would necessitate the erection of suitable factories.

(b) *The position before the outbreak of War.*

It is difficult to assign a definite reason to account for the fact that in the very early stages of the industry the particular trade of palm kernel crushing appears to have been developed in North Europe rather than in

England, seeing that the bulk of the raw material was the produce of English colonies. Probably the fact that the oil-consuming propensities of the peoples of Europe induced the general development of seed crushing on the lines of heavy oil production, as against the fact that the development of seed crushing in Great Britain was on the lines of cake production, accounts for the difference in the type of machinery usually employed. That in Europe was more generally of the description suitable for dealing with rich oil-seeds and that in England almost entirely of the opposite class. The trade appears to have gradually drifted into German hands and then afterwards become the subject of the well recognised German protective methods. It certainly is the fact that during recent years there was never apparently a favourable opportunity for the intervention of English competition. Prices obtainable for cakes and oil in England as against the cost of palm kernels showed no profit to the manufacturer. There appear to be three main reasons effecting this result:—

- (1) The protective duty upon oil in Germany, which enabled the German manufacturer to obtain a higher price for his oil for German consumption than that obtained for export.
- (2) The subvention system for the encouragement of the German shipping lines, which enabled low rates of freight to be accepted and special facilities to be offered.
- (3) The action of the shipping companies themselves. The transit system adopted for Germany whereunder goods shipped to Hamburg can be transhipped to other ports for little or no extra cost, even after a lapse of six months from landing, undoubtedly facilitated the creation of a fairly wide market with Hamburg as its distributing centre. The marked effect of such facilities was particularly noticeable in the case of palm oil. The business was originally centred in London but was entirely lost to Liverpool when the similar transit system from Liverpool was brought into force. The absence of such facilities made it almost impossible for the English crusher to buy palm kernels to, say, Hull, London, Bristol, or other ports except at prices so much higher than those ruling for Hamburg as put them out of competition. The rebate system adopted by the leading shipping companies effectively prevented competition from outside carriers.

This form of protection warranted the investment of substantial capital in Germany and large and efficient mills sprung up. A fine consumptive oil trade was at their door at a time when the introduction of edible fats into England was difficult. English capital was

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[Continued.]

shy of investment in the face of this competition, and consequently the development of seed-crushing machinery in England has been in connection with the other classes of oil-seeds.

English requirements in palm-kernel oil, coconut oil, &c. were filled by imports from Germany and Marseilles, and nearly always at prices lower than English manufacturers could have afforded to accept. I believe it is admitted that the only mills engaged in this particular industry failed to make money out of it. This may be partly owing to the fact that they were located at an unsuitable centre and that, as there was never any direct connection with the ordinary cake-consuming trade, unusual difficulties were probably found in the disposal of the cake produce. This would not have applied to the same extent if the business had been in the hands of ordinary cake manufacturers and if several centres had at the same time been pushing the goods on the market.

(c) *The probable position when the war is over and the prospects of retaining the trade in this country.*

There is no doubt that at the conclusion of the war Germany will make a violent effort to recapture the trade she has hitherto possessed. Given reasonable facilities for competition, however, there is no reason why England should not retain a very considerable proportion of the industry. I would not suggest that it would ever be possible for England to do that portion of the trade which is represented by Germany's own internal requirements. Their tariff arrangements could be made to secure that that portion should be handled in Germany. There is no reason, however, why England should not continue to crush kernels representing the palm-kernel oil requirements for English consumption and also to do the bulk of the export business to Holland, Belgium, and America, which Germany has hitherto done. Roughly, it might be estimated that at least half the total palm kernel crop of West Africa could be permanently retained for English crushers.

Given a reasonable security as to the continuity of the trade against German competition and fair shipping facilities to all the principal United Kingdom outports, I am confident that English crushers would be prepared to adapt existing machinery and erect new machinery of a proper type to deal with the supply of kernels. A market for the oil produce already exists at their doors and a market for the cake produce would be most conveniently worked up by the crushers whose business is already to supply farmers with foodstuffs.

(d) *The extent to which the demand for vegetable oils is likely to increase or decrease.*

I should have no hesitation in expressing the opinion that the demand for vegetable oil of this type is bound to show a steady increase for many years to come. During recent years the market price for goods of this description has shown a constant tendency to advance owing to the increased consumption of margarine and edible compound fats. The consumption of these grows rapidly year by year in all parts of the world and the supply of suitable fats has not hitherto increased as much as the demand. Up to comparatively recent years the soap makers were practically the only buyers of palm-kernel oil and it is only recently that improvements in refining processes have enabled palm-kernel oil to be made suitable for margarine purposes.

(e) *Other West African products.*

Palm Oil.—This article is only a small export and is the product of the pericarp or covering of the palm fruit. It has hitherto only been regarded as a soap-making oil.

Ground Nuts.—The principal market is Marseilles, and there an enormous industry exists in edible oil. Its principal use is in the manufacture of salad oils and olive oil substitutes. The West African nuts would have to compete with very large crops of ground nuts grown in other parts of the world, notably, Bombay and the Coromandel Coast of India, and in China. The general tenour of previous remarks may be applied to the question of ground nuts, but I think

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the cakes would find a more ready sale than palm-nut cakes.

Shea Nuts.—This industry has practically been confined to Belgium. The crop is only a small one and there is no reason why it should not be efficiently handled in England. The oil product of the shea nut has peculiar properties and could find an outlet quite outside the ordinary margarine trade and in directions less liable to competition. On account of the fact that the nut is very difficult to work, only small quantities have hitherto been dealt with. There are understood to be very large supplies available in Nigeria and the Cameroons. There is no reason why, efficiently handled, the industry should not develop into a very large volume.

Benniseed.—This has never been crushed in England. It has apparently been a continental trade entirely and has developed very largely owing to local regulations in connection with the margarine trade insisting upon the introduction of certain quantities of sesame oil in all margarine, consequently, it has commanded an artificial price inflated beyond intrinsic value. It is unlikely that this trade could be successfully handled in England unless similar conditions were imposed at home.

(f) *Disposal of residual products.*

It is very difficult to persuade the British farmer to try a new article, and as a rule it can only be introduced on any substantial scale by offering at prices considerably below its intrinsic value. There are certain difficulties connected with palm-kernel cake owing to the way it has to be fed, and the farmer requires some education on the point. Hitherto it has been difficult to find a direct market and most of the cake made in England has been either sold to compound cake manufacturers or shipped abroad. North European feeders are generally broader minded in their opinion than the British farmer, and at the same time they pay more attention to the actual chemical analysis of the materials fed—the British farmer goes more by direct personal experience. At the same time, in England palm-kernel cake has to compete with an enormous volume of undecorticated cotton cake, a food of very similar character, and which does not usually enter into competition in continental markets. There is no doubt that this trade could be best handled by the country merchants at present engaged in supplying the farmer, but it requires to be pushed all over different parts of the country at the same time. A single centre introducing a new article is always at a disadvantage. There is no reason why this cake should not gradually come into favour and become one of the regular staple foods. The present moment is favourable for its introduction on account of the great scarcity of all foodstuffs. Another outlet is in the form of pig meal, which forms an enormous trade in this country—palm-kernel cake is a particularly suitable ingredient. At first, however, the main consumption would probably be through the intervention of compound cake manufacturers. A considerable quantity is already used in this way and it might be substantially increased. I do not anticipate any serious difficulty in disposing at a fair market price of the whole of the cake product from the quantity of kernels likely to come to England.

I shall be glad to amplify my remarks before the Committee in any direction desired.

I am, yours faithfully,
J. W. PEARSON.

MEMORANDUM.

(1) *Business as Merchants.*

We do not trade as merchants but as manufacturers, purchasing raw material and turning out our own produce, viz., cake and oil.

A regular line of steamer service has many advantages over a tramp steamer service. It would appear to be a question of the facilities at the ports and the possibility of inducing other steamers to call. It is doubtful whether tramp steamers in sufficient quantity could be induced to take up the trade owing to the

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difficulty with outward cargo. Homeward liners from South Africa might be induced to call if port expenses are not heavy. As a matter of comparison with crops from other parts of the world, the bulk of the Indian crop is carried by regular liners and a considerable proportion by tramp steamers; practically the whole of the Egyptian crop of cotton seed is carried by tramp steamers; practically the whole of the Argentine crop of wheat and linseed is carried in tramp steamers.

I would not suggest that Liverpool is in any different position to Hull, London, Bristol, Aberdeen, Leith, Glasgow, &c. Generally speaking, I consider there would be a substantial advantage in enabling cargoes to be delivered at any United Kingdom port, inasmuch as this would facilitate the distribution of the cake produce direct to the consumer from the nearest available point. It is also more convenient to have oil supplies at several centres. The position of the merchant and the position of the manufacturer appears to be identical. The business of purchasing would probably be done in either Liverpool or London as in the case of other oil-seeds, and the point of distribution would be generally arranged at the time of making the contracts for sale. The larger the number of points at which discharge can be obtained the wider the market, and the better the opportunity for the intermediary merchant.

With regard to landing charges, Liverpool is one of the most expensive ports in the United Kingdom and Hull the cheapest. We have no particulars available of landing charges in Hamburg, but understand they are practically on a similar basis to most United Kingdom ports.

The process of discharge varies at different ports. In London and Hull discharge is entirely to lighters or barges. In Aberdeen, Leith, Liverpool, and Glasgow, discharge is entirely over the quay. At Ipswich, Bristol, Sharpness, Manchester, and Greenock, discharge is partly over the quay but mostly to craft. The method is entirely a matter of circumstance governed by the fact of mills being placed inland or on the water side,—the advantage in cost being invariably in favour of waterside mills.

(2) *The Market.*

As between England and Hamburg it is difficult to make a comparison under present conditions. There is a free market in Hamburg—there is no market in England. It was a practical impossibility, rather than a question of price, to buy cargoes of palm kernels to any English outports.

(3) *Crushing.*

(a) We only commenced to crush palm kernels since the outbreak of war.

(b) Oil contents of kernels are tested on arrival of every parcel and of cake every day. One hundred tons average quality kernels with ordinary crushing machinery should produce an average of 47 tons oil and 53 tons cake. There is usually no loss in crushing. The proportion of oil yield varies according to the quality of the kernels. Parcels have been known to produce as high as 50 tons oil and 50 tons cake.

(c) It is an economically better proposition to extract as much oil as possible from the kernels. There is only a slight diminution of cake value even if the oil percentage were reduced to a minimum. In any case the value of the extra quantity of oil extracted far outweighs any possible loss in cake value.

(d) The best English machinery is fully as good as, if not better than, the best in Germany. I would not care to make a definite statement of crushing cost, but estimate it at about 20s. to 25s. per ton—that is, for milling costs only. The machinery generally employed in the trade is not suitable for kernel crushing. The handling of a large quantity of kernels in England would necessitate the erection of new factories. The difference in the cost of manufacture as between the worst machinery that can at present be utilised and the most up-to-date machinery is more a matter of oil yield than manipulative costs. A mill able to produce a cake with 6 per cent. oil contents would have an

advantage equal to 35s. per ton on the kernels as compared with a mill producing a cake with 12 per cent. oil contents.

(4) *Extraction.*

The cost of working with extraction plant would be about 25s. to 30s. per ton. There is no difficulty in making extracted meal into cake if required, but it would hardly appear to be either necessary or desirable. The extracted meal would have to sell at a slight discount on price of cakes.

(5) *Refining.*

The ordinary prices of palm-kernel oil quoted are for crude oils, subject to 2½ per cent. discount and inclusive of packages and delivery. On refined oil selling at 8l. per ton premium the cost of refining should not have been more than 5l. per ton at the outside, inclusive of waste, cost of refining materials, use of plant, labour, coal, &c. It is impossible to state a definite figure because the exact waste is dependent upon the chemical analysis of the oil. Oil containing 4 per cent. free fatty acids may be refined for a waste of 8 per cent. to 9 per cent. Oil containing 10 per cent. free fatty acids will probably cost 25 per cent. in waste. The actual cost of manipulation, apart from waste, should not exceed 2l. per ton. There is, in addition, the cost of intake and output, the charges for delivery, and the cost of special packages suitable for finished oil. All up-to-date crushers now keep a staff of chemists and good laboratories. This is essential whatever goods are being treated. German refined oils generally are in no way superior to English oils—they are probably indistinguishable. German oil has always been sold f.o.b. Hamburg for export at a substantially lower price than that obtained for internal consumption in Germany, and the export contracts are made on terms prohibiting the sale in Germany.

(6) *Internal Communication.*

So far as this question may relate to the costs of transit between the mill and the margarine factories on the one hand or farmers' stations on the other hand, I think there is very little in favour of German rates. The Liverpool port is not in a good position for competition, but the United Kingdom ports generally can compete favourably with Germany to most of the cake and oil-importing countries. Thus England already competes successfully in the Norwegian, Swedish and Danish cake markets, and the various English outports already export large quantities of oils to Holland and Belgium. If, however, the question relates to the facilities provided for transhipping kernels to other markets such as Flensburg, Petrograd, and Rotterdam, then there is an enormous advantage in favour of the German merchant. Kernels bought to Hamburg can be delivered to those and other ports at a minimum extra charge, probably in no case more than 2s. 6d. per ton. Kernels bought to Liverpool can only be delivered to Bristol or Hull at an extra charge of from 10s. to 15s. per ton. This constitutes a serious handicap.

(7) *Cake.*

At the present moment there is not very great difficulty in absorbing the cake on the market, but this is owing to the scarcity of feeding stuffs under the present abnormal conditions. In the ordinary course it would be a matter of considerable difficulty and time to establish palm-kernel cake as a regular market article. A ready trade of fair size exists through the medium of compound cake manufacturers.

The methods employed by my Company are—

- (1) Partly to sell to merchant dealers throughout the country, who distribute to farmers, frequently taking their farm produce in exchange.
- (2) Ourselves to sell direct to the consuming farmer.

For these purposes a large staff of travellers is kept all over the country.

- (3) As an ingredient in compound cakes and meals, of which we are large makers.

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[Continued.]

With regard to the position after the war, I am doubtful whether the farmer will during the war period obtain a sufficient knowledge of the cake to establish it at its full intrinsic competitive value after the war is over. The tendency will be to revert to the older well-known materials. I think, however, it will always be possible to obtain a fair price for the cake. The assistance of the various agricultural associations over the country should be called in to make the cake well known among the farmers, and it is essential that practical feeding tests made in England should be circulated. The British farmer pays little attention to German statistics. The tendency is rather to regard palm-kernel cake as an article overrated in continental countries. This is possibly the case in view of the enormous quantities of cheap undecorticated cotton-seed cake with which the British farmer is familiar.

3686. (*Sir G. Fiddes.*) You are Chairman of the British Oil and Cake Mills?—Yes.

3687. You have various mills. Will you say where they are?—We have the largest number in Hull; about half our entire plant is there. We have mills in London, Rochester, Ipswich, Gainsborough, Leith, Burntisland, Glasgow, Liverpool, Manchester, Gloucester, and Bridgwater.

3688. Of course those mills are for all kinds of oil-bearing seeds?—Yes; mainly linseed and cotton seed.

3689. What proportion is devoted specifically to palm kernels, if any?—In the past, none.

3690. But since when?—Only since the outbreak of the war. We only touched palm kernels as an industry since the outbreak of the war.

3691. What is your milling capacity now devoted to palm kernels?—It is not very large. I have not more than an equivalent to 1,000 tons a week employed on palm kernels. It is not turning out 1,000 tons a week of kernels, because it does not crush as much kernels as linseed.

3692. You have been good enough to put in two memoranda which we propose to prefix to your evidence as if it was your evidence in chief. You will have an opportunity of seeing it. It appears to cover so much ground that I propose to reserve my few general questions until the other members have asked you what they wish.—Thank you. I put the memoranda in that form in answer to the Secretary's letter.

3693. (*Mr. C. C. Knowles.*) With the present cotton and linseed machinery, how much oil must you leave in the palm-kernel cake?—Do you mean without any alteration?

3694. Yes.—It is not possible to crush at all without a little alteration. With a little alteration I am not at present finding it possible to get a consistent return of under 10 per cent. of oil in the cake; but with a little further alteration it would be possible to get it down to 7 per cent. I have had an odd analysis or two in the last week with 6 per cent. of oil, and just a fraction under. But with the present machinery, even if it were altered to the best possible advantage, it would not be possible to get the oil in the cake consistently below an average of 6 per cent.

3695. With the proper machinery for crushing palm kernels you think you could get down to 6 per cent.?—With the present machinery, with the proper alterations I can, and I think it will do just as good work as would be got from what you term the proper machinery. There is no very vital principle of difference between the present machinery and the proper palm-kernel machinery—that is crushing machinery, not extracting machinery.

3696. I was under the impression that the pressure is very much greater on the up-to-date machinery for palm kernels.—That is so, but you can obtain the same pressure per square inch of cake surface with the existing machinery that you can with the best type of press. It is more a question of output than of efficiency.

3697. Would the output be as good as it would be with up-to-date machinery?—No, that would react on the crushing expenses of course. The crushing costs of manipulating the present machinery to the

best advantage would be more than the cost of manipulating the proper machinery, if installed in the first place.

3698. What difference would it make in the cost by utilising the present machinery when altered, as compared with up-to-date machinery?—It would be anything between 5s. and 10s. per ton of kernels.

3699. That is a very important difference.—Yes.

3700. In normal times we were quite pleased to make 5s. or 10s. a ton profit.—Yes; I think you are entitled to suggest that 5s. a ton is the average net profit a seed crusher does make.

3701. Then I do not see how the present linseed and cotton-seed machinery, if it were altered, as you suggest, could possibly compete with up-to-date machinery.—No, and I do not think I would suggest it could. I rather endeavoured to indicate that in my précis. The present machinery is already engaged on a trade to which it is practically compromised. Were I to turn one of my big linseed mills on to palm kernels, I could only do it at the sacrifice of a portion of my linseed trade, which I should not be prepared to do. I think you may take that as representing the views of the entire crushing interest of the country. All the outport mills have a definite trade attached to them, and a certain connection, and they would not be prepared to sacrifice that connection merely for turning off their machinery from one class of seed to another. I look upon this problem as entirely a problem of erecting new factories, and, when doing so, you would erect the factories with the best-known plant.

3702. Have you had any difficulty in getting rid of palm-kernel cake?—Not so far. There is a certain amount of difficulty. It is not fed regularly by farmers because they do not like trying a new thing, and the cattle do not eat it very readily—they have to be tempted. In the ordinary way cattle will not eat it, if it is put before them like linseed or cotton cake, but you must put some sweetening with it, either treacle or locust beans.

3703. Do you consider that it is as valuable as linseed cake?—No, not nearly.

3704. What difference would you say there was in the value?—I should put a linseed cake as being worth 40 or 50 per cent. more money than a palm-kernel cake, which has only an analysis approximately equivalent to an ordinary undecorticated cotton cake. I do not think in this country a palm-kernel cake will ever command a premium on an undecorticated cotton cake.

3705. Do you think it will always command a premium in Germany over undecorticated cotton cake?—Yes, I think it probably will, because the general conditions of feeding in Germany are quite different from those ruling in this country. In this country cotton seed is essentially a sheep food; that is an industry almost non-existent in Germany. Consequently the farmer here who is feeding sheep has a big market in front of him with this undecorticated cotton cake, and perhaps it commands a little more than its intrinsic value as a dairy food. Palm-kernel cake has peculiar qualities as a dairy food; it is a better milk producer; and therefore probably in Germany it would continue to command a trifle extra premium in comparison with what it does in this country.

3706. I think the premium throughout has been round about 2l. a ton in Germany. You know that they have sent us large quantities of undecorticated cotton cake?—Yes. They have to send it out of the country because they have not the trade in the country for it.

3707. Exactly; and at the time they have sent this undecorticated cotton cake into this country they have at the same time brought from this country palm-kernel cake.—Yes.

3708. Which proves that they consider it of considerably more value to them for feeding than the undecorticated cotton cake.—I do not think that is quite a fair deduction, because in the case of Germany you have a demand for one class of article and no demand for the other class of article.

3709. But why is there not a demand for undecorticated cotton cake?—Because they do not feed sheep, I suggest.

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[Continued.]

3710. What do they feed on the palm-kernel cake?—Mostly cattle.

3711. On what do we feed cattle in this country?—Linseed cake, decorticated meal, grain, of course, very largely, and a little cotton cake.

3712. Can you suggest anything that might be done so as to popularise this palm-kernel cake as a food for cattle in this country?—I think it will require a campaign of pressure. The farmer will require to be educated up to it, and I think it will go more in the direction of dairy feeding than ordinary fat cattle feeding.

3713. Do you suggest the Government or the Board of Agriculture could do it in any way?—The Board of Agriculture and various agricultural associations, who from time to time make tests of the relative values of feeding stuffs, and make them very often upon the suggestion of manufacturers who want to push a certain article, I think, would all be prepared to lend their assistance in the direction of making careful tests and publishing the results broadcast. Such results are obtainable, and have been published many times in Germany, but the English cattle-feeder does not pay any attention to German statistics; he pays more attention to his own colleges of education in England. The merchant himself would also be able to do a great deal. We and you and other manufacturers circularise all our own farmer connection, pointing out particularly any special merits of the goods we want to push; therefore I suggest that in order to push a trade of this sort it would be better done in the hands of the people who already have the farmers' connection.

3714. Better than by the Board of Agriculture?—In unison with them; I think both elements are necessary.

3715. You cannot suggest any particular way of helping the demand for palm-kernel cake?—Not other than that. It is difficult to see any other way of bringing it specifically to the attention of the farmer, because he does not appreciate its full value just now, and, when feeding it, he does not get the best results; it is stuff which does not keep very well, and he does not like that.

3716. You do not consider that it will keep well?—No.

3717. How long will it keep in a properly ventilated warehouse?—On the basis of ordinary cotton cake, we tell farmers not to keep it more than three or four weeks, and then to get a fresh supply. There are complaints generally throughout the country, even with the small farmers, that it goes a little rancid on their hands.

3718. We have found it keep quite fresh for six months.—Yes, but you cannot keep it in general practice.

3719. Have you seen a pamphlet written by two Scotch professors just lately, where they state that, in their opinion, having made some experiments on feeding cattle for some time, palm-kernel cake is equal to linseed cake?—I think I heard about that within the last two days. I have not seen the pamphlet, and it would be rather difficult to form an opinion on it without seeing the details of the tests they made. They do not, as a rule, make those tests by feeding alone.

3720. You do not agree with that opinion?—No, not offhand. I do not think it can possibly be of the value of linseed cake.

3721. One of the objects of this Committee is to retain the trade of crushing palm kernels after the termination of the war and take it out of the hands of the Germans.—Yes.

3722. How do you suggest we could retain it?—I do not know how far one may trounce upon that very difficult question of a tariff, but I have been a party to a suggestion, which I think has come before you already, that a duty should be put on the export of palm kernels in order to afford some form of protection to the English crusher.

3723. What duty do you suggest?—I suggest 2*l.* a ton on the kernels in favour of England against foreign countries.

3724. (*Sir G. Fiddes.*) Export duty, where?—An export duty from the colony.

3725. With, of course, a rebate if exported to be crushed here?—In favour of England, yes. I suggest that the African colonies should put an export duty of 2*l.* a ton on the export of kernels, with a freedom of rebate to England. The net effect of that would be that to the German crusher his kernels in the mill would begin by costing him 2*l.* a ton more than they would cost the English crusher.

3726. (*Mr. C. C. Knowles.*) You think that would be sufficient to bring the trade here?—A very considerable proportion of it. I do not think it will ever be possible to bring to England that proportion of the trade which Germany has done for her own requirements. I do not think any tariff or other protective method will ever effect that.

3727. And probably the same with regard to Austria?—Yes, because most of that trade is done through the German ports or the Belgium clearance ports.

3728. Germany has hitherto exported a considerable quantity of palm-kernel oil.—Yes, probably half her make.

3729. I do not think it is quite so much, but probably 40,000 or 50,000 tons a year, and a great deal of their make has been sent to Holland for margarine making. Supposing this export duty is put on and we force the crushing here, it will be necessary to get rid of the product?—Yes.

3730. I think you know that the present demand in this country is not sufficient to take half the product?—No, not a product of anything like 50 per cent. of the total export of kernels, but there is a considerable consumption.

3731. How would you suggest we are to get the trade for the oil, because it is no use crushing kernels unless we can sell the oil?—That portion of the oil that can be consumed in England, and which, I think, will be a very greatly increasing quantity, will answer itself—it will come naturally. You are thinking more of the proportion of oil we require to export to Holland to take off our surplus manufacture?

3732. That is so.—I do not think we shall be in a bad position to compete with Germany in supplying Holland. As a manufacturer I should expect to be able to compete with Germany for Holland's requirements.

3733. Having due regard to the cost of barrels?—Yes; that works both ways.

3734. (*Sir G. Fiddes.*) Do you suggest that independently of your tariff theory?—No. I am following on my own suggestion, because Germany then has a disadvantage of 2*l.* a ton on kernels to begin with. At the present moment we cannot compete in our own country, much less for export. I do not think there has ever been a time within the last six or eight years when there has been a proper profit for the English manufacturer on the current market price. I have a little table prepared on that point.

3735. (*Mr. C. C. Knowles.*) The Dutchman hitherto has been supplied partly by mills crushing palm kernels in Holland and very largely by the German crushers?—Yes.

3736. The German crushers are able to send the oil in barrels straight to the margarine manufacturer in Holland?—Yes.

3737. How can we compete against that, if we have to buy barrels at about 2*l.* a ton, and we have the freight from here to Holland to pay?—There is the freight and the difference on the cooerage value of the barrels. They are worth something at the other end; it is a little less because of the cost of cooerage them up again. I do not think there is a great difference in the freight from the German mills to the Holland mills. We can compete in other articles.

3738. I thought they only paid a few shillings a ton for barging the stuff to Holland?—I have not got a note of the exact freights; I should think the figure is a good deal more than a few shillings a ton. There are other costs besides the actual barging; there is

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something to be put on in respect of loading and unloading.

3739. If we can find a way of inducing the Dutchman to manufacture here the margarine that is consumed in this country, that would help us more?—Yes; that would follow any increase in the crushing in this country because there would be an obvious inducement to extend margarine works. I do not think the present margarine manufacturers would be backward in putting down plant to increase the English manufacture, if they saw sufficient inducement to do so.

3740. How would you give them an inducement?—The fact that there is a fairly ready market for certain essential oils in this country would in itself be an inducement. Up to comparatively recent years, when all the margarine manufacture was carried on in northern Europe, and little or none in England, I think one main reason was because there was no supply of the raw material in England—no coco-nut oil or palm-kernel oil—so it was rather a bold step for a man to put up a factory in a country where there was no raw material; he would rather manufacture on the spot where the material was, and freight his finished article over.

3741. But they could get the raw material here as well as in Germany. A very large proportion of it comes from our colonies.—By raw material for the margarine manufactures I meant oil. There was no production of the essential edible oils in this country.

3742. Would you support an import duty on margarine coming here from Holland in order to encourage the margarine manufacturers in England?—That is a little bit outside this general direction. I am not, on the whole, inclined to think it necessary, but I should be more inclined to take the view of the margarine manufacturers as to how far that was essential—except that I am in favour of a small duty on everything coming into the country, more for revenue than protection purposes. On the whole, I would not describe myself as a protectionist.

3743. You have referred to an export duty being put on palm kernels in West Africa. A duty is already put on the export of copra from Ceylon.—Yes, but that is quite new.

3744. (*Sir Hugh Clifford.*) It is only for revenue purposes during the war.—It is 10s. a ton on copra, 1l. a ton on oil, and a farthing on tea.

3745. (*Mr. C. C. Knowles.*) If that export duty is put on, you think we have a very good chance of securing the crushing trade in palm kernels after the war terminates?—Yes, I think with that protection it will warrant the investment of capital. My firm are erecting fairly large mills to work on the most up-to-date principle, and we hope to handle palm kernels and produce of that class. But I should hesitate before going into it on a very big scale unless I saw the way clear for some years to come. At present I am only seeing my way and preparing to deal with other articles than palm kernels if they should fail me after the war. There is a substantial advantage, I think, in having an export duty at the source of origin as against an import duty in the country of consumption; the one raises the home price, and the other does not necessarily do so.

3746. No, though it may mean taking something out of the pocket of the native?—It might, but I doubt it. I think the net result would be a revenue for the colony, because other countries must buy what they require for their own needs.

3747. (*Sir J. Lugard.*) You say that there are two groups of oil-bearing seeds, one more particularly rich in oil and the other less particularly rich?—Yes.

3748. If we were to put an export duty or any form of protection on palm kernels, the object would be to starve the German market?—Yes.

3749. Would not the German market be able to recony itself in the other classes, such as copra and ground nuts and so on, unless the whole of the colonies applied a similar export duty?—I think the other articles are sufficiently large to stand the competition. This palm kernel market is, comparatively speaking, a small total, and as it stands Germany is quite capable

of handling the entire crop from a machinery point of view. That is what makes the competition of the free outsider so difficult. Where you deal with an article which is so large that you cannot possibly handle the entire crop, but must leave something over for other people, the circumstances seem to me to be a little different.

3750. We have had it in evidence that Germany was able to dump her excess of oil in this country at rates which were cheaper than those at which she sold it for internal consumption.—Yes, palm-kernel oil.

3751. Palm-kernel oil only?—I would not apply that generally, I think, to all oils. It is certainly so in the case of palm-kernel oil, but I do not recall any other particular oil in which Germany is a difficult competitor of mine at all.

3752. But there is no particular virtue in palm-kernel oil. If she could supply other classes of refined oils adaptable to the manufacture of margarine or any other edible purpose, would not she still be able to dump oil here?—I think not, because the surplus of the crop would have to be dealt with by other countries and they would be in the market as reasonable competitors. Take the linseed crop: Germany may take all she likes of the linseed crop; there is plenty left for us to be an efficient competitor in the matter of the price she takes for her oil. But in palm-kernel oil she puts us out of court to start with by buying the entire crop. She cannot buy the entire crop of linseed.

3753. If she did buy the entire crop, would not there be competing oils, by refinery, and so forth, including even animal fats, which would take the place of it? I mean, supposing we secure the entire palm-kernel crop, could not Germany compete in the edible oil business by substituting copra or refined whale oil, or any other oil?—I do not think so, because she would not be in a position to sell them below the cost of production. In the past the position of Germany has been that she has always sold her palm-kernel oil on the open market below the cost of production. I do not think she could do that with any other oil product that I know of, because the quantity is too large for her to control the price. It can only be done by a country controlling practically the entire output.

3754. We can never control the entire palm-kernel crop. There is the Congo with a very large and increasing crop.—Yes. The larger the total available quantity of palm kernels in the world, the less the possibility of preventing an efficient competition. If the kernel crop had been three times its present size we should have been able in England to be in it long ago. It is the small size of the crop which has enabled Germany to control it up to the present.

3755. If the Congo output increased enormously in the next few years, you still think we should hold our own if we had established in this country, for the sake of argument, the consumption of all the British grown product?—Yes, and I think there would come a time when we should be able to do without the protective duty if the crop were large enough.

3756. You think this protection by an export duty from the colonies or otherwise could be effectively placed on kernels from British colonies without extending it to copra, ground nuts, or other oil-producing seeds which come from a different group of colonies?—Yes, I think it could, because the main bulk of the crop does come from the British colonies. There is no serious competition at present in the raw material from anywhere else.

3757. And when competition did come we should have already established the market?—We should; and if it did not come in sufficient size it would not matter.

3758. I am not quite clear how we should stand a reasonable chance of capturing the Dutch market. Do you say that we should capture it for other oils than palm-kernel oil?—We do that now. For instance, we send a large quantity of cotton oil into Holland, and Germany cannot touch that trade at all.

3759. For what particular reason?—I think there may be the reason that I have assigned, namely, that there is sufficient seed left over beyond what Germany can crush for us to be able to buy on reasonable market

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terms, and we can put out our oil at a competitive price in Holland instead of Germany's surplus being offered at a little under the cost of production. I think that the same would apply to palm-kernel oil.

3760. (*Mr. C. C. Knowles.*) Germany has a better market for cotton-seed oil in Germany. That is what it comes to?—Yes.

3761. And there is none for export?—There is none for export, and that would be the case with palm kernels if you limited her supply. It is only because we let her now have more than she needs that she has a surplus to dump.

3762. (*Sir P. Lugard.*) You say in your *prices*: "I believe it is admitted that the only mills engaged in this particular industry failed to make money out of it"; and you go on to explain the reason. It has been advocated by some previous witnesses that the mills should be owned by the importers because, controlling the West African market and being the original collectors, they would be able to handle the imports better than the crushers, whose interests are concentrated in crushing alone. Do you support that view?—I do not see from the broad economical basis that it would make any difference. It does not much matter who is the actual owner of the mill.

3763. The importers are more closely in touch with the source of collection?—There would be this possible advantage that if a man owns the collecting station and also the crushing mill, he would not mind very much if higher prices were bid for this raw material by some outsider; he would send it to his own mill. That would go on only so long as he could effectively compete in the buying market; but unless he can ensure being the only purchaser in the country of origin, I think it would only transfer the competition back to there instead of at the crushing point. Taking Great Britain against Germany: supposing the English companies said, "We will sell no kernels to Germany at all, but put up mills to crush the oil ourselves," then if Germany in spite of bidding 5s. or 10s. a ton more for the kernels than they were being made worth in the mills in England, still could not get them, she would go out to Nigeria and buy kernels for herself, which I suppose she would be able to do. I do not see that in the main there is any difference as far as the ownership of the mill is concerned between it being owned by a separate working company and being owned by the exporter himself.

3764. Turning to your notes on ground nuts, I see you say that the West African ground nut would have to compete with very large crops from India and elsewhere. Would not they always have the advantage of shorter sea-freight?—Yes, but I think the competition is more a matter of quality than anything else. The market for ground nuts is a very big market. The world's crop of ground nuts is something like 1,000,000 tons. With a 1,000,000 ton market there is an all-round level of price fixed merely by quantity. Each individual country takes its place on that level according to the exact quality of goods it is sending. China sends a large quantity of ground nuts and they command probably the highest price of any description that comes forward, because it is the finest article put on the market. Next to that is Bombay and next the Coromandel Coast. Probably the Nigerian ground nut is the lowest quality that comes. On the other hand the finest quality in the shell comes from the Gambia and Senegal.

3765. (*Sir G. Fiddes.*) What is the difference exactly between those in the shell and the others?—You know the appearance of the nut in the shell commonly called monkey-nut. The decorticated nut has that shell removed. The kernel is a long-shaped hard kernel about the length of a finger nail. When the nut is imported in the shell it comes in the finest condition, and can be used for making the finest quality of oil. India removes the shell, and the nut does not arrive in such good condition.

3766. Yet the Gambia nut commands a lower price than the Chinese nut?—The Chinese nut in the shell commands the higher price, and is a bigger, finer, nut, and richer in oil. It has to be decorticated before it is crushed anyhow.

3767. (*Sir Owen Philipps.*) You mentioned the advantage the Germans have in connection with transit options on shipping?—Yes.

3768. Are you aware that prior to the war the transit options granted by the German companies were exactly the same as those granted by the English companies running to Germany?—Yes, but only for Germany. Those transit options did not apply to English ports. If I had been buying to Hamburg, I had transit options to half-a-dozen or more ports from Hamburg, but if I bought to Liverpool I had no transit option to Bristol or Hull.

3769. Did you ever ask the merchants for transit options to Hull or Bristol?—No, I cannot say that I did.

3770. Would you be surprised to know that before the war you could have had transit options from the merchants from Liverpool to Hull or Bristol at 6s. 3d. per ton?—That represents very nearly the cost of the freight.

3771. That would have surprised you?—No, I do not think that would have surprised me, but it would have surprised me to know that I could have a transit option free.

3772. Would it have surprised you to know that before the war the German merchants regularly paid a transit option both to English and to German shipping lines to Flensburg of 6s. a ton from Sierra Leone and 6s. 3d. a ton from the rivers; or in other words Flensburg was in exactly the same position as Hull and Bristol? I do not want to ask you conundrums, but you have stated certain facts; are these from your own practical experience? because, to put it quite frankly, the thing is quite easy to prove. You have made certain statements which I do not think are accurate, and I want to know where they come from.—I have a table of the options here.

3773. Will you look at Flensburg? To Flensburg what would you have to pay extra from Germany?—I think it was 1s. 3d. These freights are things that we do not personally have anything to do with direct, so that one only comes across them in the competition of the raw material in general discussion.

3774. You would be rather surprised to learn that the transit option from Hamburg to Flensburg was exactly the same as the transit option from Liverpool to Hull or Bristol?—But I am not quite sure it worked out on that line.

3775. But you have quoted it.—In the net result I never could buy kernels to Hull or Bristol at anything like the price I could have got them to Flensburg. Exactly the working of the option may be a little different. There is a difference between buying to a direct port, say, Hamburg, and buying with transit options. You mean they have to pay a premium to have a transit option, but they have got that option when the goods get to Hamburg and they then declare it on half-a-dozen other ports to which they will send the kernels for 1s. 3d. extra.

3776. Whilst the transit option both from Liverpool to Hull or Bristol is 6s. 3d., and from Hamburg it is 6s. 3d., may I suggest that the difference you find in buying kernels in Hamburg is the fact that Hamburg has, as other witnesses have pointed out to us, a very open market—the open market in the world for palm kernels—and therefore you can buy cheaper in Hamburg than in Liverpool?—Perhaps I am wrong about it, but I want to suggest that the Hamburg market bases its normal price on the option figure—on the price of the kernels including the option rate, whether it is 6s. 3d., or what; consequently at that option price in Hamburg the goods get there and it only costs a further 1s. 3d. or 1s. 6d. to send them to any one of half-a-dozen other ports, whereas in Liverpool the market price is based on Liverpool only.

3777. Are not you getting a little confused between places like Flensburg, where the option was 6s. 3d. extra, and places like Rotterdam and Bremen, where the transit option was no extra charge? The transit option from Hamburg to Bremen or Rotterdam was free, but to the other ports like Flensburg, was it not 6s. 3d. extra, exactly the same as Hull compared with

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Liverpool?—On my table Flensburg is one of the free options, and so is Rotterdam.

3778. Will you look into that?—If you will permit me I would prefer to accept your statement of what it is, because, except second-hand through merchants dealing in the produce, I have no opportunity of verifying the figures. I have had the table of transit options given to me as being the regular table in the trade. From Benin or Old Calabar the general transit option was 6s. 3d. extra, and that covered any port; having paid that 6s. 3d. option price, transhipment from Hamburg to Flensburg and Rotterdam would be free, but to Lubeck it would be 1s. 3d. more.

3779. Whereas to Rotterdam and Bremen it is free, for a different reason, yet whatever the price may have been to a place like Petrograd, no palm kernels went there, or practically none?—Very little, I agree.

3780. So whether it was free or 100l. a ton did not matter?—The main ports were Bremen, Rotterdam, and Flensburg, and very little beyond that, so that there is not very much in it. As a matter of interest, may I ask: Is it, that beyond the 6s. 3d. option price there was a further charge for transhipment from Hamburg to Flensburg? I think not, because the 6s. 3d. applies just as well if the man kept his kernels in Hamburg. If a man bought kernels to Hamburg with his transit options, 6s. 3d., was probably included in the original freight, and if his price for palm kernels on that date in Hamburg was 19l. he could send them to Flensburg or keep them in Hamburg at the 19l.

3781. So, having paid the 6s. 3d. option, he could be in exactly the same position whether he kept them at Liverpool or sent them to Hull?—No. I want to suggest that the market price in Hamburg of 19l. included the options whenever I came across it, and the price to Liverpool alone was 19l.

3782. Are you speaking from actual knowledge in this case? because I think your evidence is a little misleading.—Perhaps I am wrong; I am anxious it should not be misleading. I only put it to you in the way it struck the English crusher who dealt in the raw material market. My impression is that at any time before the war I could have bought palm kernels to Hamburg at 19l. a ton, with certain options which included free transmission to Flensburg, to Rotterdam or Bremen, and I should at the same time have bought kernels at Liverpool at 19l. a ton—the same price. You tell me there was a 6s. 3d. option to Liverpool; I do not know it, but, if so, I had to pay it extra on the 19l. to Liverpool. That was the market price I was asked as a manufacturer. I may be wrong in the arrangement of it as to whether it comes in in your freight, but if I wanted to avail myself of the option for 6s. 3d. extra to Bristol, I suggest the kernels would have cost me 19l. 6s. 3d.

3783. But you never actually bought kernels with those options?—No, I have never bought kernels at all before the war. I have asked the price many times and I never could see a profit in it.

3784. Will you clear up the point about Flensburg and see if it was not in exactly the same position as Hull as compared with Liverpool, and send it in afterwards to the Committee?—I might find that out, but I start out by saying that I was not aware there were ever any Liverpool options. Probably some witness in the shipping industry will be able to give that information. In whatever way the freight was arranged, in the case of goods coming to Liverpool, I knew the market price at Liverpool and I did not know there was an option on it. I do not know if the freight fixed to Liverpool was inclusive of the 6s. 3d. option; I am under the impression it was not, but that it had to be arranged. I do not think I could ascertain definitely without asking somebody with whom you are probably better able to communicate. I do suggest that if we could buy to the United Kingdom with the option of taking our kernels to any of the outports, there would be a very material advantage, but whether it is done on the option system or by direct freight I do not think is a matter of very great importance.

3785. You are erecting a new mill at Hull, and you want at Hull or Bristol, as the case may be, to be able

to get kernels at exactly the same price as the mill in Hamburg or Rotterdam or Liverpool?—That is all I care about. As long as the kernels in the mill cost me the same price I do not think it makes much difference whether it is done by direct freight specially arranged or on an option. The only advantage of a transit option system is that it gives the intermediate merchant a speculative market, because if he can buy 1,000 tons to Bristol, not knowing whether I want them or not, when they get on the way and he finds that I do not want them, he can exercise his option to send them on to Hull, where he can get a better market. That is to the advantage of the merchant.

3786. (Sir William G. Watson.) I understand from what you have said to Mr. Knowles that you were rather more in favour of protecting the British oil miller than the British margarine maker?—I did not quite intend that. I was dealing with the oil miller to show how he required some protection. If the margarine maker can show that he requires some protection, I should probably come round to his view.

3787. Do you think it fair to tax the native to bring any industry to Great Britain? If you put an export tax on, in my opinion you are taxing the native. If we in England hesitate to tax ourselves, we should also very much hesitate before we talk about taxing the native.—That is a perfectly good argument, but perhaps we are wrong on both grounds and ought to tax ourselves. I do not think it would take the line of a tax on the native; I do not see quite why it should. I rather suggest that England would be able to provide a market at the existing general level of prices for kernels, at any rate for the bulk of the crop, and then what Germany wanted she would have to pay a bit more for. I think the buyer would pay the tax there, and it would prove a revenue rather than a tax.

3788. I am sorry I cannot agree with you.—Do not you think so?

3789. No.—Do you think the native would sell to England his kernels at less than he has been in the habit of taking for them?

3790. He gets as high a price as he can, but when there is a 2l. a ton tax he has to take a lower price than he would otherwise get, in my opinion. Speaking generally, I think your mills have dealt with oils more particularly for soap making rather than for edible purposes?—Linseed oil never is used for edible purposes.

3791. I think you are wrong there.—Of cotton oil, considerably more than half goes for edible purposes.

3792. Even linseed is gradually being used for edible purposes.—A very small proportion since the introduction of the hydrogenising process.

3793. I think you said the normal profits of the mills ran from 5s. to 10s. a ton?—Yes.

3794. When you said you thought you could compete for the trade of the Dutch margarine makers against the Germans, you took into consideration the fact that you would get this 2l. a ton export duty?—Yes.

3795. Otherwise I think you will agree that you cannot compete in England for the trade of the Dutch margarine makers, because the Germans can get their oil from the mills in Germany to the Dutch margarine makers at an average cost of 5s. a ton?—Yes. At present the Dutch margarine maker can buy his oil from Germany at less than the cost to me of its production.

3796. But if you were going to supply the Dutch margarine manufacturer, you would have to pay the freight and the cost of the barrels to get it across to Holland, and that would average, after allowing for the price the barrels realised when sold, a cost of 30s. a ton?—Oh, no.

3797. In the case of a firm with which I am connected, which has imported immense quantities of oil from Germany, that has been the net cost.—From Germany?

3798. We buy new barrels there, and sell the old barrels in England, and there is a big loss on that, or we put the oil in drums and have to pay the freight

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back on the drums. The net cost of freight, plus loss on package, comes out at 30s. a ton.—I would undertake to do it for 1l. from England.

3799. It may be that second-hand barrels sell better in Germany than in England?—Probably the German has to pay a great deal more for his barrel than we do to start with. The initial cost and the final cost on our barrel shows very little difference. At present the cost of barrels for filling with oil will be practically 2l. a ton in England, and when empty the barrels are worth 35s. You can allow 5s. or perhaps 7s. 6d. as the difference between the cost of the barrel and its value to the receiver, or the freight and hire of package, whichever way you prefer to put it.

3800. If you are buying barrels through me, some time after to-day, I can sell you a very large quantity at a very much lower price.—That is raw barrels.

3801. Yes.—Then I have to cooper them and lift them.

3802. All those expenses are included in the 30s. You must make your barrel into a saleable thing before you can sell it again.—Yes, but I am quite sure English oil could be delivered to the Dutch margarine manufacturer from England at 1l. per ton over the naked cost in England in normal times.

3803. That is not my experience. Do not you think in the past the Dutch margarine makers have greatly encouraged the German oil millers to cultivate the edible trade, in view of the fact that they could get the oil much cheaper as regards freight, and cheaper as regards everything?—Yes, I think that is so, and I must admit my proposition might result in the Dutch manufacturer having to pay a little more for his oil than in the past.

3804. If he had to do that it would have the effect we want to achieve, because if the Dutch margarine manufacturer had to pay more for his oil in Holland he would have to bring his factory to England—which is what we wish.—It would have that result. The oil for the Dutch manufacturer would undoubtedly cost him more.

3805. With this 2l. a ton export tax?—Yes.

3806. But I would rather tax myself than the native.—The Dutch margarine maker is buying at less than the cost of production, and I do not think that is good for any trade.

3807. (Mr. G. A. Moore.) Have you ever endeavoured to follow out exactly what the effect of this proposed export duty from the West African colonies would be upon the market in the first instance?—I am rather inclined to suggest that the exact effect would be that the main buyer of palm kernels from West Africa would be England, and that Germany would have to pay 2l. a ton extra for the kernels she required for her own consumption, and then the German trade would be confined to her own consumption.

3808. Why must Germany have any kernels at all, seeing that all other seeds would be open to her without any such difficulty?—I think she must have a certain quantity of palm-kernel oil for her own manufactures.

3809. Will not copra do as well?—I think not entirely. I am not posing as a margarine manufacturer, but I think they must have a certain quantity of palm-kernel oil.

3810. Is there any difference worth speaking about either in soap making or in margarine making between palm-kernel oil and copra oil?—Not very much.

3811. Copra oil commands a premium always?—Yes, a fairly substantial premium as a rule.

3812. So far as adaptability is concerned they are both practically identical for both purposes?—Yes, at a given difference in price.

3813. Consequently, without any 2l. against them, the Germans would naturally turn to copra?—Yes, they probably would crush more copra.

3814. And leave the kernels to this market as much as possible?—Yes.

3815. That would rob, to a certain extent, the Marseilles market of a certain amount of copra?—Yes, they would compete.

3816. It would be competition between Germany and Marseilles?—Yes, in the copra market.

3817. Then the effect of palm kernels finding their best market in England would be in the first instance that we should be able to make palm-kernel oil cheaper than anybody else?—Yes; but I do not think the argument as far as we have gone is quite sound because we are only discussing removing from Germany that proportion of the palm kernel trade which she already exports and does not use, so that to deprive her of that would not increase her own requirements.

3818. No, but I am going a little further. I do not consider that part of the argument sound, because I do not believe myself that if there was anything like 2l. a ton difference between the English market and the German market the Germans would pay that difference as long as they could get copra. That is my point of view.—I see—for that portion of their requirements.

3819. Consequently the copra would have to be forced up by competition between Marseilles and Germany to such a height that it would pay them to pay the extra for the palm kernels before they would do that?—Yes, it might tend a little to raise the price of copra in competition between Germany and Marseilles. That is what you suggest.

3820. I want to suggest that until that price is raised beyond a certain point they would not look at palm kernels?—Yes, that might follow.

3821. Is not that a reasonable deduction to make from the effect of the duty?—I do not take that view. It might happen, but my view is that Germany would do much less work. I think after the war her position will be such that she will have to do less trade. Her trade is very largely carried on through the financial assistance she gets from her bankers in many directions. I think this is a trade she will be forced to sacrifice and will not substitute anything for it.

3822. Is not her export of oil the result of her having to make more oil than she wants in order to supply her own demand for cake?—No, I do not think I should agree to that.

3823. She does not export palm-kernel cake?—Yes, to a certain extent. She sends it to Denmark.

3824. But that is a very small quantity?—The entire production is very small. It is such a small element that I do not think the cake production enters into consideration.

3825. My point is that she requires the kernels in order to provide the cake for her own consumption?—The proportion of cake she so provides is such a small proportion of the entire feeding-stuff trade that I do not think it is a serious element, and I do not think it would make any difference to the general feeding-stuff level in Germany if she had no palm-kernel cake at all.

3826. What do you consider at the present market price a fair parity between copra and palm kernel?—I am afraid I have not worked it out. There is a substantial difference in the oil contents. Palm kernels contain about 49 to 50 per cent. and copra from 65 to 75 per cent.

3827. You do not know the comparative price between copra and palm kernels?—Not without working it out.

3828. A witness told us that it was about 5l. a ton on the present price. Is that somewhere about it?—Shall I work it out?

3829. If you do not know it, it does not matter. To-day there is nearly 7l. 10s. a ton difference, and I would ask whether under the circumstances palm kernels are not very cheap to-day?—At present it does not make much difference to the crusher which he gets, taking copra at 22l. or 23l. a ton and palm kernels at 16l. a ton.

3830. That is 7l. a ton difference?—The kernels are probably a trifle cheaper.

3831. We were told the other day that 5l. a ton difference was a reasonable parity.—At 5l. a ton difference there would be a scramble for copra. At the present levels the difference is something between 6l. and 7l. a ton.

3832. The great difficulty we have had before the war in crushing palm kernels in this country has been, I think, to get rid of the cake.—Yes.

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3833. I believe you could always realise from 1l. to 25s. a ton more for palm-kernel cake by shipping it abroad than you could get for it in this country?—Yes, I daresay that is possible.

3834. Most compound cake makers have stated that, for mixing purposes at all events, it would never exceed the value of undecorticated cotton cake owing to the analysis.—That I agree with.

3835. Is there anything you know of which is likely to reverse that state of things? Do you think the better results from feeding cattle in any way will justify us in getting a higher price for that cake than for undecorticated cotton cake, or do you think that when undecorticated cotton cake becomes a plentiful supply again the farmers will turn back to it?—I think they will. I do not think there is anything to justify the idea that palm-kernel cake in this country will command the same price as undecorticated cotton cake. I think it will always have to sell at a discount.

3836. Mr. Knowles referred to some experiments made by two Scotch professors, which you have only just heard of. They give a very convincing experiment, so far as an outsider can read it, of the use of palm-kernel cake for fattening purposes in the case of heifers and bullocks, as compared with linseed cake, showing that palm-kernel cake gave slightly better results.—At the difference in price.

3837. No.—They generally work them out on a price basis.

3838. Here is the pamphlet for you to look at (*pamphlet handed to witness*)?—Yes, I see they give the values; linseed cake is 9l. 17s. 6d. a ton and palm-kernel cake is 6l. 10s.

3839. Do not you think if we had this export duty on palm kernels the first result would be, presuming there was anything like 2l. a ton difference, that we should be able to make palm-kernel oil and oil for margarine cheaper than we could import it?—From Germany?

3840. Or from anywhere?—Yes, I think so. That is what I should hope would be the result.

3841. Would not the net result of that be that we should almost certainly have the margarine manufacture in this country?—I should hope that result would follow.

3842. Do you think there would be anything like the difference of 2l. a ton maintained as between this country and other countries, or would the competition between the crushers push up the price of palm kernels until it was something near the export margin?—I think you may take it the competition between crushers in this country would be quite sufficient to keep the general crushers' profit low enough to warrant the margarine manufacturer in feeling that he was buying his oil as cheaply as he could reasonably expect.

3843. If that result did not come about, would not it follow that we should have such a demand for the export of the very cheap oil you would be able to make that it would very quickly upset the whole of the palm-kernel crop, and in that way bring about considerable competition?—I think that would reasonably follow, but I am quite sure that we cannot take from Germany the portion of the trade she wants for her own requirements.

3844. You do not agree at all that she would take copra instead?—I do not think it would have a material effect. I think Germany will reduce her own palm-kernel crushing to her own needs in oil only.

3845. If she had to pay 2l. a ton more for palm kernels the difference would be 5l. on the present market price instead of 7l. Do you think she would do that? Do not you think she would take the copra?—The price of palm-kernel oil in Germany is practically 2l. higher than the price she takes for export of it to England. The ordinary market level in Germany is 2l. higher for consumption there than for export, and according to the contract the English importer must not sell it in Germany. You have that premium paid in Germany now, and it would not make the palm-kernel oil cost them any more.

3846. (*Mr. T. Walkden.*) With respect to the export duty, it has been your opinion and the opinion of several of our witnesses, that to retain this crushing

trade, palm kernels must be protected until such time as they have got on their feet—say, for several years?—Yes.

3847. You seem to think that the natives would not lose anything by palm kernels being taxed 2l. a ton. It has been suggested that the tax might be even 3l. or 4l. to prevent it going to Germany?—Yes.

3848. I think you have already said that our machinery here would not take the whole of the palm kernel crop. The mills could crush it, but could they find a market for the oil?—Not in England at first.

3849. Then the native would be at a disadvantage, because there would not be competition?—I do not think it would make any difference to the native, whether the oil market in Holland was supplied from England or from Germany.

3850. Practically all the kernels come from our colonies, but from the German colonies there were largely increasing quantities.—They are ours now.

3851. We do not know what the arrangement will be after the war. From the French colonies a very considerable quantity comes, and we understand that shortly a big quantity will be coming from the Congo. May not that quantity be bought up by the Germans after the war?—Yes, in so far as the duty which we are suggesting is to be applied to the British colonies I think it would leave Germany open to compete for palm kernels in any other country where she could find them, or for other goods of the same description.

3852. I was reading in a book that palm kernels could probably be grown in other tropical countries in the world.—Yes, but I should think it would be fairly limited.

3853. We must consider the natives of our colonies. Do you think it very wise to tax the product of their soil?—It would tax it in one particular direction only.

3854. To suit England and not to suit the native?—You bring me back to this point; you will have it that it is a tax on the natives, but I do not think it will make any difference to the price the native gets, because I think that England will be able to pay the same price for palm kernels as Germany has been paying.

3855. Take it from the importer's point of view. We want to make a contract to sell these palm kernels. You have your crushing mills stopped, and other people have theirs stopped, and are hanging back, and we want to sell those kernels; we are bound to make forward contracts, and therefore, with 2l. a ton difference, we might drop 4l., 5l., or 6l. a ton. If there is no demand here you cannot sell them.—You are getting on to the ordinary rules of supply and demand.

3856. There is to be a market here. Previously it was in Hamburg, and we are going to have it in Liverpool.—No, you are not going to alter the consuming market for oil, but only the working centre.

3857. For the importation of the kernels.—At present the oil is used in Hamburg, in Holland, and to a certain extent in England and in America. Those are the consuming centres, and the price they are able to pay in relation to other competing centres fixes the price given to the natives for palm kernels.

3858. Has it always been so, and has the price for palm kernels been regulated in that way?—Yes, by the selling value of the oil.

3859. If you did not want those palm kernels, and could go on crushing something else, would not that bring down the price of palm kernels?—I do not think that is sound.

3860. Do not you think the better way would be to put an import duty on the oil coming from Germany? because there might be not only this palm-kernel oil but some cheaper seeds that Germany wanted to crush.—I am a little shy in offering an opinion on the effect of an import duty. In the first place, if you put an import duty in the country of consumption, you must certainly raise the price of the article in that country.

3861. The same with the exportation of these kernels. You tax them in the first place before the kernels are sold?—No, that is only to Germany: The kernels would come to England at the same price as

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the native gets now, and the oil sold in England will be at the same price.

3862. And if England could not take the palm kernels, what arises then?—If England really cannot take the palm kernels, I agree that some entirely different scheme would have to be thought out.

3863. You said we could not take the palm kernels unless we found an export trade for them?—Certainly, at first.

3864. During that time, which may be some years, the price of palm kernels may drop 5*l.* or 10*l.* a ton?—I do not think so, because the export trade has to be done. Holland must have oil, whether she gets it from Germany or elsewhere. I do not think England herself would be able to consume the product of the kernels. But the demand is there; the export trade would be found.

3865. (Mr. T. Worthington.) I have one question to ask, in order to elucidate one of the paragraphs in your letter on page 4, about this question of the transit system. You say: "The action of the shipping companies themselves. The transit system adopted for Germany, whereunder goods shipped to Hamburg can be transhipped to other ports for little or no extra cost, even after a lapse of six months from landing, undoubtedly facilitated the creation of a fairly wide market, with Hamburg as its distributing centre. The marked effect of such facilities was particularly noticeable in the case of palm oil. The business was originally centred in London." Is that so?—Yes.

3866. "But was entirely lost to Liverpool"—did it go from London to Liverpool, or was it originally in both places?—"when the similar transit system from Liverpool was brought into force." I do not quite understand that statement.—Before the transit system for palm oil was adopted in Liverpool the whole of the oil used to go to London, or the bulk of it did, and it was done by London merchants.

3867. I thought the West African trade always came to Liverpool.—I do not think so. In the early days I understand the whole of it came to London. This is a groan of the brokers in London as to the palm oil market—that they have lost their business to Liverpool. I could not put a date on it, but the bulk goes to Liverpool now.

3868. It certainly began in Liverpool many years ago.

(Mr. T. Walkden.) I should have thought Bristol was the earliest place in the days of the old sailing ships.

3869. (Mr. T. Worthington.) You say the business was originally centred in London, but was lost to Liverpool when Liverpool began to give this system of transits?—Yes. It has been some time in force in Liverpool.

3870. It was when they began to give those facilities for transit to Hull and Bristol?—Yes, for oil.

3871. It was then lost to Liverpool?—That is the suggestion, and that the oil has gone to Liverpool for distribution instead of to London.

3872. (Mr. T. Wiles.) I think it means it was lost by London to Liverpool.—The oil used to go to London and used to be transhipped to Liverpool, Leith and other ports. Now it goes to Liverpool instead, and gets shipped to Glasgow, Manchester, and so on.

3873. (Mr. T. Worthington.) The statement reads: "The business was originally centred in London, but was entirely lost to Liverpool"?—That means "in favour of Liverpool." It was transferred from London to Liverpool.

3874. (Mr. T. H. Middleton.) You have remarked on the difficulty of introducing palm-kernel cake to British farmers. Has your experience been that the demand has increased very much recently?—It is only quite recently that the cake has been put on the market, so that I think it would be rather early to talk about an increase in the demand.

3875. I mean, as compared with the spring of the present year, is there any marked development in the demand?—I do not think I would suggest any noticeable demand. It is being more generally introduced; several firms in the last two or three months have been

offering and pressing palm-kernel cake who did not offer it before, so no doubt the offerings are wider and more general.

3876. One witness informed us that he had no difficulty in disposing of palm-kernel cake in Scotland. Is that the general experience?—I do not suppose he has had any big quantity to handle. Up to the present there has been no great difficulty in disposing of the cake available, because the production has been comparatively small.

3877. What is the difficulty you anticipate in the event of a much larger supply becoming available?—Sales would have to be on a much bigger scale. At present all feeding stuffs are very scarce and the farmer has such difficulty in getting supplies that he will try anything you offer him. If he comes to me and says he wants a 4-ton wagon of cotton cake my traveller says, "I cannot give it to you. Try palm-kernel cake instead," and he takes it; but if he could get cotton cake he would not look at it. Therefore, the present moment is favourable to dispose of palm-kernel cake.

3878. Do you think that the palm-kernel cake will not be likely to satisfy him? If he tries palm-kernel cake will he come back for it?—He will come back and say, "I will have more if it is cheap," but he would prefer cotton cake at the price.

3879. What is the objection to it?—Cattle do not eat it so readily. It has to have a little more care in its preparation and feeding; also the British farmer is very conservative, and it is very difficult to turn him on to anything new. We had the greatest difficulty when introducing soya-bean cake four or five years back. The bulk of it had to go to export although the cake was offered to the British farmer at least 1*l.* or 30*s.* a ton below its value. They all tried it but went back to linseed and cotton cake. We have only a small sale for soya cake in England. The farmer is too conservative.

3880. Have you had any complaints about the keeping quality of palm-kernel cake?—Yes. It does not keep as well as other cakes. It is on a parity with cotton cake, and has to be supplied fresh.

3881. Does it keep as well as Bombay cotton cake?—I think so. One has complaints here and there. A cotton cake if stored in a reasonably good store with plenty of ventilation can be kept three or four months, but if kept in a bad place I have known it go mouldy in a week. Palm-kernel cake if kept in a bad place will go rancid in a week, but if kept in a well-ventilated store it will keep three or four months.

3882. Does it vary very much?—Very much. If you have a lot of oil in the cake it will not keep at all.

3883. The circumstance that it does not keep well might be due to the fact that the crushing is in the experimental stage?—That is quite true.

3884. That is a difficulty which can be got over very quickly?—Yes, and it will improve with experience.

3885. It is not altogether conservatism on the part of the British farmer then, but a want of experience on the part of the British crusher?—Oh, no. Now you are working in two points. The conservatism of the British farmer is a difficulty in introducing a cake and getting him to stick to it. The difficulty of the British crusher and his short experience accounts for many of the complaints from farmers as to its keeping qualities. The bulk of the cake being made in this country is being made badly, and I say it, speaking as a crusher.

3886. I cannot quite dissociate your points.—I am not speaking of the experience of palm-kernel cake. At present there may be a certain amount of prejudice with individual farmers who have had a bad lot of cake and will not have more. But I am speaking generally of the difficulty of introducing the cake to the farmer; I do not tie myself to palm-kernel cake, but from my general knowledge of the farmer and of new foodstuffs, I say he does not like them.

3887. That I follow, but at the present time there is an exceptional opportunity of introducing this new cake to the British farmer. If he gets a good sample and he likes it he will buy again?—Yes.

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3888. If it goes rancid, he will not.—That is true.

3889. That is one of our chief difficulties in introducing the cake.—Yes, but I do not think that particular one is a very serious difficulty.

3890. I should think it a very serious one. If crushing is in an experimental stage, and the farmer does not get cake of uniform quality which satisfies him, since he depends upon his personal experience he is not likely to repeat his order.—I do not think the complaints as to the keeping quality can be taken to be quite as general as that. There is a large number of cases of complaint, but generally speaking the farmer is reasonably satisfied with what he gets.

3891. You agree, however, that with a little experience on the part of the crusher and a little pushing, and education for the farmer, there might be a very large market for this feeding stuff in the country?—Yes, I have very little fear about that myself, speaking as a large crusher.

3892. You have pointed out another direction in which it has a future; that is as pig meal?—It is very good stuff as pig meal, and that is a very big trade.

3893. And it does not come into competition with undecorticated cotton cake?—No, undecorticated cotton cake is not used for pigs at all. The main basis of pig meal is barley meal and a few other ingredients mixed in with it, according to the methods of different manufacturers.

3894. So palm-kernel cake is freed from its chief competitor in the pig-meal trade?—Yes; that is a separate outlet altogether. I think it always will be a large pig-meal feed, and is quite likely to develop in that direction more largely than for the ordinary farmer for feeding purposes. Then there is the compound cake direction; there is a great deal more used to-day in that direction than some of our friends admit, and they do not like to tell you their ingredients in all cakes.

3895. If we wished to develop a large trade in palm-kernel cake, do we want to develop it through the compound cake or as a pure cake?—I do not think the direction matters a bit, as long as you get rid of it at full market price. I am one of the largest compound cake manufacturers in England, and the bulk of mine goes in that way at present. I do not care whether I sell the cake direct to the farmer or mix two or three sorts together and sell it to him. We try to make everything he can possibly want.

3896. Is the demand for a pure cake not much greater than for a compound cake? Take Bombay cotton cake and linseed cake, for example, they are recognised brands for which there is a very much larger demand than for compound cakes?—Yes. The total quantity of linseed cake and cotton cake delivered pure to the farmer is very much greater than the total quantity of compound cakes. But a very large number of farmers will not buy them at all. Linseed cake and cotton cake cannot be fed indiscriminately. A big farmer buying those cakes gives them in certain proportions to suit his requirements, and he can buy the pure article, because he believes that the cheapest thing to do. The compound cake manufacturer caters for the small farmer, who buys a compound food in a given proportion already mixed to feed direct to his animals. There is a very big and greatly growing trade in that.

3897. I appreciate that point, but my own view is that if we wish to create a large market for palm-kernel cake we ought to bring in the cake as a pure cake.—I think so, too, because then you reach the biggest market; but the others should not be ignored. At present they are the largest market; but the compound cake people are using more palm-kernel cake than the farmer is to-day.

3898. Not perhaps to the advantage of the palm-kernel cake trade?—I should not like to say. I should have a good deal more difficulty in disposing of my output of palm-kernel cake to-day unless I worked up a considerable proportion of palm-kernel cake into compound cake.

3899. It is still, however, in an experimental stage?—Yes, as far as the cake market is concerned.

3900. (Mr. T. Wiles.) Can you give any figures of the consumption of cake in the United Kingdom?—Of any particular sort?

3901. Of feeding cake. Have you any figures you could put in?—I do not think I have seen them compiled. We reckon that the crush of oil seeds in England approximates to 1½ million tons per annum. That would make roughly three-quarters of a million tons of cake. I should think the production of compound cake will be from 300,000 to 400,000 tons per annum. Probably 1,500,000 tons of cake all told is not far off the figure.

3902. Is that the figure of the manufacture or the consumption?—Both are the same, are they not?

3903. I rather wanted to get the quantity of cake consumed in the country and the quantity exported. Could you give any figures as to that?—The quantity exported is very small. There are a few particular classes of cake exported, but I should not think offhand the total export of cake of all sorts reaches 200,000 tons; probably it is nearer to 100,000 than 200,000 tons.

3904. If palm-kernel crushing machinery is erected in this country, and new machinery is put up for dealing with palm kernels and making fresh cake, what effect will that have on linseed and cotton cake?—I think there is plenty of room for it. I do not think it will have any material effect.

3905. Then will it affect the compound cake?—Only just in so far as another 200,000 tons of a feeding stuff is a competitor in a 1,500,000 ton market.

3906. How would you suggest that this extra 200,000 tons of palm-kernel cake will go?—Probably through the same channels that direct the linseed and cotton cake.

3907. What will it displace? You are not going to have animals made on purpose to eat this cake?—The total quantity of concentrated feeding stuff (which means feeding cake) used in England is only a very small proportion of the total volume of feeding stuff fed to animals. A matter of 200,000 tons or 300,000 tons of cake more or less is hardly noticeable on the market. I do not think it will displace anything.

3908. It must displace something unless you have more animals to eat it?—The production of cake in England might easily vary 300,000 tons year by year. It has an effect to that extent. That 200,000 or 300,000 tons more of cake on the market would have the general effect of very slightly lowering the value of all feeding stuff.

3909. From your evidence I take it that your plant generally does not run so regularly in the summer as in the winter?—No, it runs a very short time in summer.

3910. Would the introduction of these palm kernels enable you to run your plant more regularly?—No, it is governed by the cake consumption. Cake is not wanted in summer because the animals are at grass.

3911. It is not possible to store it long enough?—No, not in sufficient quantity to affect the machinery appreciably.

3912. Do you make soya oil?—Yes.

3913. And soya cake?—Yes.

3914. Will the same plant which you use for the soya beans do for the crushing of palm kernels?—No. We use the same plant for soya beans, linseed, and cotton seed, and none of that plant as it stands is suitable for crushing palm kernels.

3915. And it is not possible with very slight alteration of the soya-bean plant to use it for crushing palm kernels?—Yes, it is possible to alter it. At present I am using the biggest mill of that type for crushing palm kernels, with the necessary alterations, but the net result is not so economical as putting down a new factory; the output is less, and the costs of manufacture are rather more.

3916. Do you extract oil at all?—Not yet. I am building an extracting mill now.

3917. If you extract, do you hope to get a better oil?—No. At the present moment extracted oil is selling at a discount on crushed oil, but I think that is largely due in the early stages to a little lack of experience in manufacture. Generally speaking, I would

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not suggest that extracted oil would sell at a discount or at a premium.

3918. If you put up mills specially to deal with palm kernels, would you be able to do that without a guarantee of proper freight to the port at which you put up the mills?—No, I think we should want to have some reasonable ground for believing that we could buy the kernels to the different ports and at proper prices. I do not think the shipping companies would be backward in offering fair facilities in that way. We have never found a difficulty in other parts of the world once a market is created. If one makes a complaint against the shipping companies at all it is only in the direction that they have not offered any special facilities hitherto to induce the trade to come. I am sure they would if there was a trade.

3919. Have you any facilities for getting palm kernels to London from West Africa? Have any been brought to London?—Yes, several lots have been brought into London, but there has not been much crushed.

3920. Or to Hull?—Yes, lots have gone into Hull.

3921. By what shipping lines have they gone?—I think Elder-Dempster have sent in direct steamers.

3922. That is only since the war began?—Yes.

3923. Before the war there was no line of steamers to Hull from West Africa?—No.

3924. You say that, given reasonable security as to the continuity of the trade against German competition, and fair shipping facilities, you are confident you can compete with the German manufacturer?—Yes.

3925. Can you develop the point as to "the poor shipping facilities" a little?—I should like the shipping lines in conjunction with the main African shippers to give us a sort of general understanding that they will sell us palm kernels to any of the chief ports at the same price on any given day. Given a reasonable chance of a market being found, I do not suppose the shipping companies would offer any objection to put on direct lines of steamers at given intervals to, say, the East and West coast. There should be no difficulty about running a steamer to call at London and Hull one week and at Bristol and Liverpool the next week, to make sure of constant shipments and that the price was always the same. The West African merchants have suggested that they and the shipping companies between them would be able to give us some sort of undertaking that if mills were put up they would keep them supplied. From the other main ports, in the other articles in which we deal there are free trading facilities. We can always regulate our own supplies by chartering our own steamers and sending them to load, but under existing arrangements in West African ports that is not possible.

3926. Without regard to freight, and putting freight on one side, could you tell us which is the best port for dealing with the making of cake or extracting oil or crushing?—The three best ports in the United Kingdom are Hull, Leith, and Bristol, and they are all practically on a par for all purposes. Liverpool is the most expensive port, Manchester is practically the same as Liverpool, and London is next in order after Liverpool.

3927. (*Sir Owen Philipps.*) Is London before or after Liverpool?—London is a better port than Liverpool. I will hand in a table giving all the working costs incurred at the different ports, showing how Liverpool compares. When a steamer gets into Liverpool it costs 5s. 6½d. a ton to get our seed into the mill; at Hull it gets into the mill for 2s., in Manchester for 4s. 6d., in London for 3s. 5d., in Sharpness for 3s. 1d., in Bristol for 1s. 11d. if by water and 2s. 8d. by land, Leith for 2s. 1d., Glasgow 4s. 11d., and Ipswich 2s. 9d. There you have the comparison as to the costs we are put to. In the case of Bristol there are water mills and inland mills; to the inland mill it costs 2s. 8d., but to the water-borne mill it is only 1s. 11d.

3928. (*Mr. T. Wiles.*) Then Liverpool is the dearest port in the country for charges?—Yes, and also for working costs. Everything else is very much on the same basis. My Liverpool mills cost me, in actual

working milling costs, more than double my cheapest mill.

3929. Liverpool is the dearest. What is the next dearest?—You will call Manchester the same as Liverpool. Except for the canal dues Manchester is a cheap port, but it has very heavy dues on goods coming in of 3s. 3d. per ton.

3930. (*Sir G. Fiddes.*) Glasgow seems to come next?—Glasgow is next. That is a case which is comparable with Liverpool; it has fairly high port dues, considerable overside and landing charges, and heavy cartage. In both those cases the mills are inland.

3931. (*Mr. T. Wiles.*) You cannot lighter to your mill from the sea-going steamer in Liverpool?—No.

3932. In London or Hull you lighter straight from the steamer to your mill, and all these incidental charges are done away with?—That is right.

3933. What are the railway charges for cake manufactured at your Liverpool mill and at your London mill? If you are sending from Liverpool, say, to Northamptonshire, or a little further north, where the rate should be about the same, that is, to places about equidistant, how do the railway rates from Liverpool compare with the railway rates from London?—They are very much on the same basis all over the country. On certain lines and in certain directions for a given sum you get a longer carriage from Liverpool than from London; in other directions you get a longer carriage from London. But there is very little in it—only a few pence per ton.

3934. Have you any difficulties with regard to what are known as North London tolls for your London mills, and with regard to charges at the docks?—No, they do not occur. The cake from our mill is carted direct to the railway station, and we get the station-to-station rate. In London there will be an average haulage on the cake of 1s. 6d. or 2s. a ton.

3935. That is to say, unless you lighter it?—It costs more to lighter from, say, Rotherhithe to Nine Elms than to cart it to Nine Elms station. There are so many collecting stations throughout London that there is always one handy to the locality of a particular mill.

3936. Generally the railway rates are equal?—Yes. Naturally a mill on a railway siding has a pull over a mill that has to cart to a station.

3937. You consider that there is no trouble in England as to having machinery which will compete with the German machinery; I mean no trouble in getting it?—We made it first. You mean the class of machinery?

3938. We often hear that Germany is ahead of us in milling machinery, and I have also heard it said that it is the case in regard to cake-crushing machinery. Will you tell us whether you consider that is correct?—In cake-making machinery and seed-crushing machinery it is quite the opposite. The machinery was developed by the inventions made in England, and all the best machinery originated in England. We shipped out our machinery to Germany and she copied it and improved it; but, as a matter of fact, the English machinery maker is ahead of the German machinery maker.

3939. Supposing you were to manufacture a palm-kernel cake at Hull or on the east side of the country, if you had facilities for getting it there from the shipping companies after the war, would you look for a fairly good trade from Sweden and Denmark for this particular cake, of which they use a great deal?—Yes, I might expect to do a certain amount, but I should prefer to rely on the English trade. From Hull and the East Coast ports there is a fairly considerable shipping trade in cakes of different varieties to Sweden, Norway and Denmark.

3940. After the war is over would you look for part of your trade to your product going to those countries?—I do not think so, because I think we should be able to do equally well in England. I do not think we should have to rely upon export.

3941. If an export duty of 2l. a ton were put in West Africa on palm kernels, do not you think there would be a demand from manufacturers in other

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industries to also have a duty put on other seeds?—I suppose that is one of the great difficulties, but they would have to make out a case, would they not? I think palm kernels are in an entirely different position from any other oil seed that I am familiar with, particularly in respect of considerations on the lines of protection.

3942. Could you give us any reasons for that?—As I suggested a little time back, most of the other oil seeds are sufficiently large in volume on their own account to expect a reasonable competition to take place from all countries in the world, and yet to leave something to everybody; it is not possible for one dog to get the whole bone. But the palm-kernel trade is so small in volume that it is quite possible for one nation to take the lot, as in the past has been done by Germany. With certain small exceptions they have been capable of taking the lot and keeping the whole control in their hands. That circumstance does not apply to any other oil seed in the world, because it is too big for them to take the lot, and they must leave something over for other people.

3943. Supposing this trade were to remain here after the war, it would leave a large number of mills in Germany with machinery standing idle?—Yes.

3944. What would be done with that machinery by the enterprising German who is left behind?—I think in the early years it will have to stand because he will not only have the machinery standing idle, but there will be lack of finance to handle the goods. I do not think the German will be able to get the same extent of financial backing from his bankers to enable him to do the trade as in the past. We English crushers have our own money in it and pay for our own goods, but in Germany, if a German crusher wanted to buy off a crop of seed, his banker would give him practically an unlimited advance on the goods, and it was all done on credit. I do not think they will be able to do that after the war.

3945. You were answering questions with reference to the oil being sent to Holland, and as to the difficulty about coöperage and so on. It was also stated by one witness that tank barges were used for the oil taken from the German mills to the Dutch margarine factory. Would not it be possible for you on the East Coast to have a tank steamer which would take the oil over very cheaply straight from Hull to the margarine factory, and almost as cheaply as from Germany, say for a very few shillings a ton?—It should not be very difficult. If it is possible to take oil in tank steamers across from Hamburg, there does not seem to be any reason why it should not be equally done from Hull. I do not know whether it was done in that way; I should not think it possible with an oil which so readily goes solid as palm oil does.

3946. (Mr. C. C. Knowles.) As a matter of fact, we brought a large quantity of palm-kernel oil and also palm oil from West Africa by tank steamer.—I never heard of that being done. Then you had to keep it warm all the way?

3947. It kept warm. We had coils put in the tanks, but we used very little steam. We ran it in liquid and we closed all the hatches tightly up, and it was only just near the water that it solidified. The iron conducted the cold of the water into the oil, and it solidified round the sides of the tanks, but in the centre it kept liquid the whole trip, and we had no difficulty in pumping it out in Liverpool. We warmed it up to a certain extent.

3948. (Mr. T. Wiles.) We may take it that if there were a trade to Holland you think it would not be impossible to do it in tank steamers?—I agree, but I do not think, in any case, that the difference in cost of getting the oil to the factory or the mill in Holland from Germany and from England would be sufficient to constitute any serious drawback.

3949. (Mr. L. Couper.) I remember reading an account of the last general meeting of your company, at which you informed the shareholders that you were about to construct new mills in order, as you hoped, largely to deal with palm kernels.—That is right.

3950. These mills, I take it, are those that you have already stated are being erected in Hull?—Yes.

3951. But, as I understand, you have not yet definitely arranged that they shall be prepared to deal with palm kernels?—Yes, I have definitely arranged that they shall deal with palm kernels, copra, or any other article, and I have particularly arranged so that, in the possible event of the palm kernel and copra trade not proving remunerative, we should be able to put them on the other articles with which I am ordinarily trading. We have put up capacity to the extent to which we think we can reasonably see our way.

3952. Would you be prepared to enter into any contract to buy palm kernels over a period of years?—Yes, I should have no objection at all on terms.

3953. You would want some advantage?—I should want to be assured of my profit.

3954. You could not be assured of your profit in making a purchase of any nuts?—I would not enter into a contract to take so many thousand tons of palm kernels per annum at a price to be fixed without any relation to the selling price of oil. I should regard that as a speculation. As manufacturers we look upon ourselves very much as middlemen; we buy linseed, palm kernels, or cotton seed, and we sell our oil day by day, and we make our purchases according to the volume of our sales and base the price on them.

3955. But you might consider such a purchase ahead in relation to the price of the oil?—Yes. I should feel reasonably safe as regards the cake.

3956. Apart from that, would you feel inclined, if the suggestion were made to you, to enter into some partnership arrangement with West African merchants for a period?—As a group?

3957. Yes, as a group.—That would practically amount to a proposition to crush on their account on terms.

3958. I suggest on partnership terms.—On terms I should see no objection. After all, those things must be very much a matter of terms. If I go in very largely for crushing palm kernels, I shall expect to leave a net profit of anything from 5s. to 10s. a ton as the result of my endeavours. If anyone comes and says he wants to share in it, if he can increase and improve it, and if I am reasonably safe on my 5s. or 10s. a ton, I shall not mind doing something with him as to any balance; but I do not propose to divide that 5s. or 10s. a ton with him.

3959. You do not attach sufficient importance to attracting the kernel trade to this country, from the point of view of profit in the future, to induce you to take a risk which you would not take in connection with an older established product?—No, I do not think I should be prepared to take any very serious risk on that. As a company I would not buy 50,000 tons of palm kernels and leave the produce unsold.

3960. You said something in regard to tramp steamers from West Africa?—Yes.

3961. You state in your memorandum that you think a regular line of steamers has many advantages. With many of the witnesses, you no doubt think you might do better if you had tramp steamers coming from West Africa. Have you considered what the position of the West African merchant would be to-day if he had to depend on tramp steamers?—That touches a rather difficult question, because the Colonies have been very largely developed owing to the influence of the shipping line which has helped to serve them; so I think there is reasonable ground for suggesting that they might have some advantage. Any witness who suggests that there are advantages in throwing open the ports for tramp steamers will have in mind that they will make competition for the regular liners doing the business and ensure that no unduly high rate of freight is charged. We can always charter tramp steamers to go and load at those ports.

3962. There is one instance in West Africa where the colony depends very largely on the tramp steamer, and that is the Gambia.—Yes.

3963. I have been sufficiently interested to get some figures, and I find that Bathurst merchants last season had to pay an average of about 3l. 17s. per ton for their freight on ground nuts since the outbreak of

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war, as against an average of about 23s. a ton previously.—Yes. That seems to be about a proportionate rise to all parts of the world.

3964. No shipper of palm kernels from Nigeria has so far paid more than about 25 per cent. additional freight owing to the war.—Is that the case?

3965. So I understand.—In that particular case I suggest that the line serving the port has treated the trade very handsomely.

(*Sir Hugh Clifford.*) Is not it 33 per cent. additional?

(*Sir Owen Philipps.*) When I give evidence I will put in the actual figures for each article, for the benefit of the Committee.

3966. (*Mr. L. Couper.*) The average price received by the native seller of ground nuts in the Gambia last season was 2l. 16s. per ton as compared with 8l. per ton in the two previous seasons, so I suggest there is little doubt that in this case at all events the producer has been saddled with the additional freight?—I think it is very dangerous to take an analogy in those particular years when you are bringing in war conditions. Probably other influences of much more vital importance have been brought to bear than the mere incidence of freights.

3967. Perhaps this is an illustration of the effect of an export tax on palm kernels?—If you had an export tax on palm kernels generally, I think I would agree that probably the bulk of it would be borne by the native.

3968. In the case of the Gambia we have the chief home market closed during and owing to the war—that is France?—Yes.

3969. You have an additional freight taking the place of the export tax?—Yes, coupled with the entire closing of the market and no buyer left at any price. It is perhaps surprising that the native got even 2l. per ton; I wonder that he got anything. Certain articles which have lost their export market have had to lie and rot because there was no other market for them. I do not think it fair to associate that with the mere incidence of freight. It is the loss of the market which has had the effect on the price. Supposing nobody in the world wanted these Gambia nuts at all, the native would not have got 2l. a ton for them, he would have had to keep them.

3970. But there has been a market for them throughout—for other purposes probably.—Yes, but the main market has been France. This palm kernel industry might easily have found itself in the same condition. Had it proved physically impossible to deal with them at all with our existing machinery, they would have had to be left in the country. We have found it possible, no matter how indifferently, to crush them and make a market for a certain quantity in England; but if that had been a physical impossibility, with Germany closed, there would have been no buyer for palm kernels even at 1l. a ton.

3971. The largest crop ever collected in the Gambia was marketed last year at this very low price, but the fact remains that the native was the person who suffered.—Yes, the native has suffered for the war. It is attributable to the condition of markets rather than to the incidence of freights. You ought to look at the circumstances ruling in other countries. Take the enormous crops that are shipped from the Argentine every year; and they are dependent on tramp steamers for their freights.

3972. (*Sir Owen Philipps.*) By how much have these freights risen?—It is the proportion named just now. The average was 25s. and the war rate 75s., and the price has been paid by the receiver.

3973. (*Mr. G. A. Moore.*) The freight was down below 25s. 18 months ago?—Yes.

3974. (*Professor Wyndham R. Dunstan.*) You have told us that your firm began to crush palm kernels after the war began?—Yes.

3975. Have you ever crushed palm kernels at Hull?—Yes, I am only crushing at Hull, I am not yet crushing at other ports.

3976. You are not crushing at Ipswich or Bristol?—No.

3977. With regard to the question of Hull as a port in the future and direct shipments to Hull and the comparatively low charges at Hull, would not you have a difficulty as an oil producer in getting your oil to the manufacturer? As far as I am aware there is no large margarine manufacturer either on the Yorkshire coast or in Yorkshire.—I think not.

3978. So that as a matter of fact you would have to pay a considerable amount for carrying your oil to the manufacturer?—Yes, you would have to transfer the oil.

3979. Putting the one thing against the other, do you think Hull seems to be a possibly favourable place?—I think so, because we have exactly the same thing in regard to our other goods. Hull has to transfer a very large proportion of her cotton and linseed oil. The main customer for linseed oil manufactured in Hull is Lancaster, and Hull can supply better than Liverpool can supply Lancaster with the oil. I should not like to rely upon Hull only. Within a certain area Hull would be favourable for the supply, but one main reason why I suggest that all outports should be taken into consideration is because in each case you have the advantage of the local cake and oil market. There are margarine factories in Leith and some not far from Bristol which have to be supplied.

3980. (*Mr. C. C. Knowles.*) They are very small ones indeed.—They are small, but growing.

3981. (*Professor Wyndham R. Dunstan.*) You have not done any extraction of oil so far?—No.

3982. I gather from your précis that you anticipate no difficulty in getting rid of the meal?—No. I handle a very large quantity of meal now.

3983. Does that go almost entirely into compound cake?—Yes, and into pig meal.

3984. You were asked some questions about the attitude of the British farmer to compound cakes. Can you tell me whether the real prejudice on the part of the British farmer against compound cakes is due to the fact that he says or feels he does not know what is inside them?—That is quite true where the prejudice exists, but I do not think I should agree to a suggestion that there is a prejudice by the British farmer against the compound cakes.

3985. There is a very much smaller sale of compound cakes than of simple cakes?—Because it is only a recent introduction and manufacture. The original cake manufacturing industry of England devoted itself to pure cake, and the compound cake manufacturer only came in on any scale some 20 years ago. It is quite a young industry, and in those years it has increased enormously by leaps and bounds, and the increase in the compound cake trade has been out of proportion to the increase in the other cake trade.

3986. It is an important point in view of the probability that more extraction than crushing may be done in the future.—Quite so. Generally speaking, the big farmer prefers to buy his pure cakes and make up his own mixture, if he keeps an efficient staff, and he will have so much linseed, so much cotton cake, and so on; but the small farmer prefers to buy a compounded article. I use compound cake on my own farm because it is so small that I cannot afford to pay a man whose intelligence is sufficient to mix the foods.

3987. It has been suggested that cake manufacturers would do well to state the composition of their compound cakes with a view to inducing the farmer to buy them.—The Board of Agriculture are always saying that, but the maker does not care to give away his trade secrets.

3988. In your view it is desirable to put an export duty on palm kernels shipped from West Africa?—Yes.

3989. In that way do you think the United Kingdom might secure the greater part of the crop?—Yes.

3990. Would not the advantage practically be this: that we should in that way secure a very cheap feeding cake as compared with other materials that might be used for making feeding cakes?—I had not quite thought of it in that light.

3991. It is connected with another question put to you as to the value of the cake, as to which I think there was a little confusion. The value of the palm

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kernel cake partly depends upon the satisfactory composition and digestibility of the cake, and partly also on the price of the cake?—Yes, mostly on the price of the cake.

3992. It is because we believe it is relatively a cheap cake that we consider that it has a future.—I do not think I should altogether agree with that; I do not look upon it as a particularly cheap cake.

3993. Comparing the price of palm-kernel cake now or a short time ago with the other cakes continually in use, and having regard to the composition of the one as compared with the other, there was an advantage in favour of palm-kernel cake.—Yes, if you take English prices, but the price ruling for palm-kernel cake or meal in England before the war was undoubtedly too low, because the cake was not properly known and not properly introduced and was not in general use. I would attribute it to the fact of the market more than anything else. The price in Germany, I think, was overstated. The average continental consumer, I think, has paid more than its relative value for palm-kernel cake, and it was not a cheap feed there.

3994. Taking the price after the war and referring to the pamphlet mentioned this morning, you will find it takes the price as between 6*l.* and 7*l.* per ton, and at that price it shows a very distinct advantage in favour of the palm-kernel cake.—Yes, as compared with linseed cake at war prices.

3995. In the comparison there are other cakes, too.—Yes.

3996. So, virtually, the advantage to this country would be that we should get a cheap feeding stuff.—Yes. I do not want to go too far along that line. I have rather held out the suggestion that we should by pushing our farmers and using our influence on the cake market be able to obtain for palm-kernel its full intrinsic value.

3997. That is taking everything into account?—Yes.

3998. The objection raised to an export duty is that the natives would suffer from the imposition of the duty.—Yes.

3999. Would not that only affect the natives selling to foreign agents, because it is intended to discriminate and to allow a rebate on all palm kernels shipped to this country?—Yes.

4000. Inasmuch as the greater part, if not the whole, of the palm kernels would come to this country the natives would not appear to suffer?—That is exactly my view. I should like to make it quite clear. My impression is that the native would not suffer at all in the price obtained for palm kernels by the imposition of this duty.

4001. Unless he sells to foreign agents?—Yes; but even then I am inclined to think the foreigner would pay the duty.

4002. Then he would be paying very much more for his palm kernels than he has been paying hitherto?—Yes, the foreigner would pay the 2*l.* extra.

4003. You referred to the value of palm-kernel cake in connection with milch cows. I think you suggested that in this country we were rather behindhand in realising the importance of this cake in that connection?—Yes. I think, probably, it has a value which is not expressed by the terms of its analysis, and that may eventually redound to its making a higher price than it should when looked at from the chemists' point of view only.

4004. That would be a matter of advertising it or educating people up to it?—Certainly, educating the farmer.

4005. Mr. Wiles asked you some questions as to the place that this cake would occupy in the future, and he suggested that it would have to displace some other cake. Is it not fair to suppose that it might possibly displace some of the imported cakes that we get from abroad, because we bring into this country a very large proportion of cake from abroad?—Yes, but we do not bring in anything of that description.

4006. To some extent palm-kernel cake might take the place of that imported cake?—It might. I look upon the question of this extra 200,000 tons of palm-kernel cake very much, in the same way as I regard the

information that next year's crop of cotton seed is going to be 300,000 tons larger than last year's crop.

4007. I quite see your point of view, but I thought Mr. Wiles's question might have been answered by pointing out that we get a number of cakes from abroad and that if anything were displaced it would be those foreign cakes.—That would be the effect because the larger the English production the less demand there will be for any import.

4008. As to the keeping qualities of palm-kernel cake, your experience has been that it does not keep well, or not quite so well as cotton-seed cake?—Yes. Mine is only a limited experience, so I should not like to be very dogmatic about it, but I do not think the experience of cake manufacturers in England has been sufficiently long to warrant any definite opinion.

4009. We have had evidence to the contrary, that it keeps well. Can you tell me roughly the percentage of oil in the cakes that did not seem to keep well?—I think very few crushers turn out cake with less than 10 per cent. of oil at present.

4010. But with 6 to 7 per cent. of oil there is no reason why the cake should not keep?—No.

4011. That is to say, if properly made?—If properly made and carefully manufactured and properly stored.

4012. A point has been raised here in connection with the enzyme which is known to occur in the palm kernel and keeps on splitting up the oil. That enzyme is destroyed by exposing it to a certain temperature?—Yes.

4013. Would you in your mills expose it to a temperature in which the enzyme would be destroyed?—I have had no experience of that particular enzyme, but we find that exposure to open steam at a particular temperature has had the effect of neutralising it.

4014. What would be about the highest temperature to which it is exposed in your mills?—A little under 200° Fahrenheit.

4015. That ought to be sufficient to destroy it?—It ought.

4016. So it is more a question of storing the cake?—Yes, and efficient manufacture.

4017. Assuming the quantity of oil is low, 6 to 7 per cent. in the cake, if properly stored there is no reason why it should not keep as well as any other cake?—That is so.

4018. (Mr. T. H. Middleton.) Arising out of that last question will you tell me this: Is the cake throughout heated to a temperature of 200 degrees Fahrenheit?—Yes, in the course of preparation. I must not say what other people do, and I do not absolutely bind myself to 200 degrees Fahrenheit. I was asked to say approximately. I am a little shy of giving it because that is one of the things that we regard as a secret of the trade.

4019. You have no doubt that the centre of the cake is heated approximately to that temperature?—Yes, it is all treated equally. No part is left cold and another part hot. Whatever temperature is used has been quite consistent throughout the mass.

4020. (Sir Hugh Clifford.) You are aware that the exports of palm kernels from British West African Colonies represent a very large proportion of the whole trade, but they do not represent the whole trade?—Quite.

4021. Are you of opinion that the proportion that comes from the West African Colonies could be successfully dealt with in this country?—Eventually, Yes.

4022. You do not think it can be dealt with immediately?—I think there would be a little difficulty at first. For one thing, it would take a certain time to get ready the necessary machinery.

4023. Take the duty which you suggest should be imposed in the West African Colonies. You anticipate that for the first year or two a substantial proportion of the output from those Colonies would pay that duty after the conclusion of the war?—Yes, I think so.

4024. In other words, there would be actual payments made?—Yes, I think there would.

4025. And do you think that would be so for a considerable proportion of the total output?—Probably

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not for any very great proportion—certainly less than half.

4026. Then, if you had merchants buying in the same area for two markets, one market in which they had a preference of 2*l.* and the other in which they had not that preference, what do you think the tendency would be with regard to the price that they would pay to the actual producer?—I think the actual effect on the market would be that the man who had not got the duty to pay would be the sole purchaser until his requirements were filled.

4027. In other words, our market in England would have the first call on the local market?—Yes.

4028. Do you not consider that the general effect would be very depressing upon local prices?—I do not think it should be. It might work a little in that way at first.

4029. Put aside what should be and suggest what you think would be.—It depends on the total size of the market. At present the English purchasing power is only small, and therefore any restrictive influences would tend to have a depressing effect on the markets; but as soon as our capacity is large enough to make us big buyers, I think that would disappear very quickly.

4030. In the past, I understand, the Germans have been in the habit of dumping a certain amount of oil in this country?—Yes.

4031. And they have been able to sell it more cheaply in Great Britain than they could afford to sell it in their own country?—That is right.

4032. In other words the British consumer has had palm-kernel oil at a remarkably low price?—Yes.

4033. One of the advantages of putting this export duty on at the place of origin would be that the British consumer would not pay more for his oil. But if that dumping ceased, would it not follow as a corollary that he would pay more for his oil?—Certainly he would pay a little more for his oil because up to the present the British manufacturer has not been able to produce the oil at the price at which it has been sold.

4034. You said that supposing this protective policy was followed for a period of years, when the trade had become well established in this country, you thought it would be possible to do away with the duty?—Yes, I think it should be.

4035. Upon what do you base that opinion?—Upon the expectation that the palm-kernel crop and export will enormously increase. If it only remained about the present size, I think it would be necessary to retain the operation of the duty.

4036. You think the pressure practically put upon the German importer would cause the thing to be stimulated?—Yes, I think he would go and hunt elsewhere. I attach very great importance to the fact I emphasized before, that in the case of this particular crop Germany is capable of handling the entire world's crop.

4037. Making it practically a monopoly?—Yes, it is a case of breaking a monopoly.

4038. (Sir G. Fiddes.) Is this comparison of port costs that you handed in reduced to the cost per ton?—Yes, they are costs per ton in every case.

4039. What is your view as to the relative importance of the cake to a crusher? In other words, would it pay him, if he has a market for his oil, to crush independently of the by-product?—He must have an outlet for his cake.

4040. The cake may be said to represent the profit or more than the profit? Supposing you could not sell your cake at all, would you be crushing at a loss if you had a market for your oil at ordinary prices?—Yes. Perhaps a glance at this other table will show you. I have put down here some figures showing some comparisons that will answer your question (*handing in the table*).

4041. I will not go into it now, but from other sources we have had evidence of a more optimistic character that the cake is a minor matter and that it would pay to crush in any circumstances. That is no your view?—No. I see according to the table made up on to-day's prices the oil would produce 1,598*l.* with 100 tons of kernels costing 1,600*l.*, so there

would be actually a loss of 2*l.* and all the crushing costs if the cake were regarded as valueless.

4042. (Professor Wyndham R. Dunstan.) The crushing costs being 30*s.*?—I have not put them in.

4043. (Sir Hugh Clifford.) You lose 2*l.* on 100 tons?—Yes. On to-day's basis the oil just represents the value of the palm-kernels.

4044. Is an allowance made there for wear and tear of machinery?—I have put in no costs, but I have prepared the table simply on the basis of palm kernels at a certain price in my own mill and the value of the produce when crushed. Where I show a "gross profit," out of that comes all manipulative expenses and all the working expenses. On that table you will see at a glance why there has been no profit in the past. The gross profit during past years only showed 16*s.* 8*d.* a ton by first class crushing methods and 20*s.* 8*d.* by extraction. No crusher could crush palm kernels for 16*s.* 8*d.* per ton, no matter how efficient his machinery was.

4045. (Sir G. Fiddes.) Then, in each case the elimination of the cake would land you in a loss?—Yes, in a loss just about equivalent to the cost of the crushing expenses.

4046. As regards the suggestion of a duty, in your opinion is it the only thing which would induce crushers to extend their plant so as to deal with the West African crop that now goes to Germany, or rather that portion of it which she exports in the form of oil eventually, because I understand you to say that whatever happens she will continue to draw as much palm kernel as she requires for inland consumption?—Yes, we are only concerned with the surplus.

4047. What proportion of the German produce is that surplus?—It is very difficult to say, because I have no definite figures, but I believe Germany exports a little less than half her crush. You may say that she wants approximately half the crop for her own use.

4048. Shall we say that it is 100,000 tons that we have to deal with?—Probably rather more than that, say 100,000 to 150,000 tons. The total crop is under 300,000.

4049. So that Germany took about three-quarters of it before the war?—Germany took a little over 270,000 tons, and probably she used 130,000 or 140,000 tons for her own requirements and exported the surplus.

4050. Therefore the problem before us is how to provide for 100,000 to 150,000 tons?—That is right.

4051. That would mean the setting up of some three or four extra mills of decent size?—I think that would be the immediate result.

4052. As regards the duty, I gather from you that in your opinion in your forecast of the future, at the close of the war, having traded on a faulty financial basis, Germany is going to drop her demand for 100,000 to 150,000 tons of palm kernels no matter whether we do something or nothing. That seems to be the statement in your evidence.—I did not quite intend to go so far as that, because I do not think she would be prepared to drop it altogether if we did nothing.

4053. I understood you to say that she could not do it because of her financial arrangements?—I think she will be crippled and that many things will have to be dropped.

4054. But you are not prepared to say that if we do nothing she will not make an effort to go on?—I think she will make an effort to retain what she has got, but I think she will be crippled in retaining it even then.

4055. Because if she was going to drop it, the absence of a purchaser for 150,000 tons of palm-kernels would affect the native much more profoundly than the imposition of a duty?—Yes. I do not think I would suggest that. I think, if we stand by and do nothing after the war, Germany will start and take the old trade over again, but on rather a different margin.

4056. Would you agree that one of the most effective guarantees for the native getting a good price

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[Continued.]

is the presence of a foreign competitor?—The more buyers there are the better the market.

4057. I emphasize the word "foreign."—No, I do not think so.

4058. You do not think there is enough human nature in British merchants to induce them to make an arrangement so that the price should not be raised against them?—I am quite sure that would not be done.

4059. What is the reason? Is it the beauty of the British character, or what?—I do not think combinations of that sort have ever worked successfully in England.

4060. This is on the coast, not in England. There is a limited number of buyers on the coast?—I thought you meant the price that the crusher would pay.

4061. No. I mean the price paid to the native by the person buying the produce.—I think if there was any suggestion of too big a profit between the price paid by the crusher and the price paid to the native, the crusher would create his own buying organisation.

4062. You would step in to protect the native?—No, to protect our own profit. If we thought the African merchant was buying for 5*l.* what he sold to us at 10*l.*, I think we should go and do it for ourselves.

4063. In the absence of any action by the Government, do you think it likely, as a matter of forecast, that fresh mills will be erected to deal with an increasing crop of palm kernels?—Not on any extensive scale. There will be some addition, possibly.

4064. You do not think the effect of this Committee, and generally ventilating the thing, will lead people to enlarge their plant or cause other people to put up new plant?—Only to a small extent—to the extent that they think they will be justified by the duration of the war, independent of the operations of this Committee. I am already making alterations to

The witness withdrew.

After a short adjournment (Mr. A. D. STEEL-MAITLAND took the Chair).

Mr. FRANCIS H. LODER called and examined.

4073. (Chairman.) You represent Messrs. Loders and Nucoline, Limited, of Crutched Friars?—Yes.

4074. I am going to ask the other members of the Committee to ask you questions first of all, and I will reserve to the end some of the points that I want to put to you.—Yes.

4075. (Mr. C. C. Knowles.) You have had some experience in crushing palm kernels?—Only experimental work.

4076. But you have had a lot of experience in crushing copra?—Yes.

4077. I think you were one of the first refiners of copra oil for edible purposes?—I believe we were absolutely the first.

4078. I have heard that you are now putting up a mill for crushing palm kernels?—That is so.

4079. Will you be able to crush palm kernels and copra with the same machinery?—No; the mill we are erecting now is entirely for palm kernels.

4080. And you will not be able to crush copra in that mill?—No.

4081. Is that because you cannot adapt it to crush both?—We could do so, but we have other mills for copra that are sufficient for our requirements; and as we need more kernel oil, we are putting up a mill specially for that.

4082. But, if necessary, you could adapt a kernel mill to crush copra, and *vice versa*?—Yes, it merely means the addition of one or two more machines in each mill.

4083. I do not want to ask for information that you do not think it advisable to give, but what do you consider is the cost of crushing kernels?—I have had no experience.

4084. What would it be as regards copra?—When you say the cost, how far do you go—after allowing for the by-products, the cake and so on?

4085. I mean everything in.—Roughly, you can say that the cost of the oil is 50 per cent. more than the cost of the copra.

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enable us to handle a greater quantity of palm kernels at different out-ports, but I should not be prepared to spend a large sum of money.

4065. You would not be prepared to put up large additional plant or advise people to do it, in the absence of this protective duty?—I should not.

4066. You think that the imposition of that duty is the only means of meeting the position in future?—I have not been able to see any other scheme. You have to propound some scheme to enable a capitalist to ensure a profit on the output.

4067. You do not think the alternative of being assured of a sufficient supply of nuts would be enough?—I do not think that would do, because there is too much competition for them.

4068. And you do think the end would be accomplished if the duty were imposed for a term of years, say five or seven years?—I think it would, but I think five years would be rather short. If it had a clear five years run, I am inclined to think it might be dispensed with after that.

4069. That would be your minimum?—Quite.

4070. (Sir Hugh Clifford.) Do you mean a total run of five years?—I mean a five years' run after we get fairly started, because it would take two years to start. It would be at least seven years from now.

4071. (Mr. G. A. Moore.) May I point out that in referring to this experiment you said the price was taken into consideration in regard to a comparison of linseed and palm-kernel cake? This experiment shows there was an absolutely greater increase in weight after feeding with palm-kernel cake than after feeding with linseed cake.—That is weight for weight.

4072. (Mr. C. C. Knowles.) Could you favour us with a letter on that pamphlet, after studying it? Will you consider it for that purpose?—With the greatest pleasure.

4086. (Chairman.) Do you mean after allowing for the cake, or what your actual charges would be in your accounting for crushing, leaving you to sell your cake and your oil afterwards?—The charges for labour, maintenance of plant and power?

4087. Yes.—That figure is not in my mind, and I cannot give it.

4088. (Mr. C. C. Knowles.) Your reply is that it costs you about 50 per cent. more than the copra?—Copra at 2*l.* will give you oil at 3*l.* net, naked, without establishment charges.

4089. This Committee is sitting to try to find some means of inducing the crushers here to crush palm kernels and in fact to retain the kernel-crushing trade in this country which, hitherto, the Germans have had. Can you suggest any way to help us to do that?—I am afraid that is rather beyond my province. I have taken steps to secure the manufacture of the oil which we formerly imported from Germany, but I have not gone further than that.

4090. Do you think, if you can buy kernels at the same price as the Harburg mills can buy kernels, that you will be able to produce with your machinery palm-kernel oil at the same cost?—Certainly.

4091. You have no doubt about that?—No.

4092. The machinery that you are now erecting you consider quite equal to any German machinery that exists?—Yes.

4093. I think perhaps you will agree with me that it is no use crushing kernels and producing oil here unless there is a market for it?—Quite.

4094. Hitherto there has been only a very limited market for palm-kernel oil in this country?—Yes, my firm has been one of the largest buyers.

4095. And you have found that there has been a limited demand?—Yes.

4096. Supposing we were to double the crush of palm kernels, where do you expect to get your demand from for the oil?—America and Scandinavia.

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[Continued.]

4097. But Scandinavia has not been a very large buyer hitherto?—They have been fairly large buyers of German copra oil.

4098. But not of palm-kernel oil?—The two are fairly interchangeable.

4099. The demand has been comparatively very small, so far as I know?—Yes.

4100. After the war, why should not Germany continue to supply the export trade to America?—I think they will.

4101. But I understood you to say that you expected to get a demand from the United States for the extra oil that we crush here?—Perhaps I misunderstood your question. You asked where we could find an outlet for increased production. I think the only outlet would be in America or Scandinavia, but of course we shall be in competition with Germany after the war, in my opinion.

4102. Hitherto we have not been able to compete with Germany?—We have not had the mills with which to do so.

4103. Do you think it has been only a question of the mills?—Yes.

4104. But I suppose before you erected this new machinery, you had been making inquiries as to whether the crusher has hitherto been able to make a profit out of crushing palm kernels?—Yes.

4105. From your investigations, have you found out that he has made a profit?—Periodically they made profits, and at other times they have losses.

4106. We have had a number of witnesses here, who have all told us that for many years the crusher of palm kernels in this country has never been able to make a profit, and that Germany, having dumped the oil here, has always been able to supply it cheaper than the crusher could make it.—Yes, I think, allowing for the freight, Germany would perhaps be shipping from Hamburg at a cost equal to that at which it would be produced here in London.

4107. Do you think it necessary for us to have something to help the crusher here, say in the form of an export duty on kernels from West Africa, or some advantage over the German crusher, in order to retain the trade here?—I take it you mean to secure the export trade formerly done by Germany?

4108. That is so.—Certainly I do think that.

4109. How much per ton on the kernels do you think the duty should be?—That would depend on the extent to which the German crushers have the advantage through the internal price being so much higher than the export price.

4110. The Germans have always had an import duty on palm kernel oil?—Yes.

4111. A considerable duty?—I have no actual experience of it, but I believe that to be so.

4112. With regard to refining, do you consider that in this country we can refine oil as well as they can in Germany?—Yes, quite as well.

4113. Do you think we can do it better than they can?—I think some of the German refiners turn out a first-class article. There is a great number of refiners in Germany, some of them good, some bad, and some indifferent.

4114. Do you claim that your refined oil is equal to any that is produced in Germany?—Yes.

4115. I do not know if you agree with me, but I suggest that in order to create a bigger demand for palm-kernel oil in this country we must create a bigger demand for the manufacture of margarine in this country?—Yes, that would bring about that effect.

4116. If we do not do that we shall not have the demand for the oil?—No.

4117. Would you be in favour of trying to bring the Dutch margarine manufacturers to this country to manufacture the margarine here?—Yes.

4118. Do you suggest any way of doing that?—By putting a duty on the importation of margarine.

4119. What amount of duty would you put on? What amount do you think would bring them here?—I am afraid I have not considered that question, but a very small duty ought to bring about the change of location.

4120. Would you suggest 2*l.* a ton?—Yes.

4121. Equal to about a penny a lb., would you suggest?—That would be ample.

4122. (*Sir William G. Watson.*) Do you not think that 1*l.* or 2*l.* a ton would be quite sufficient to bring these large Dutch manufacturers to England in view of the fact that they sell in England over 1,000 tons a week?—I should think 10*s.* a ton would bring them over.

4123. I quite agree with you. You say in your notes, "The demand for vegetable oils in this country" has been growing but, as I have already mentioned, "the capacity of the existing mills is fully equal to" the demand." In other words, you think the mills now in England are equal to the demand of the margarine manufacturers now in England?—Certainly. I made that statement on the Board of Trade returns for the imports and exports. From January to August 1915 the exports have increased over the corresponding period of last year.

4124. Therefore a further increase in the demand is dependent on the importation of margarine from abroad being curtailed?—That is so.

4125. I notice you say that "palm oil is not" suitable to be used alone or in large proportions "owing to the low melting point of the neutral oil" which remains liquid in the warm weather." My experience is that palm-kernel oil and copra oil have a higher melting point than palm oil.—Yes, than neutral palm oil.

4126. Such being the case, palm oil is "most suitable" for making margarine instead of being, as you say, "not suitable." We want a low melting point in making margarine—something that will not become liquid on a hot summer's day.—That would be a high melting point. The palm oil of commerce has a high melting point, but when you neutralise it the melting point goes down very considerably.

4127. That explains the point, and therefore it becomes less suitable for making margarine in that case?—Yes.

4128. With regard to this duty on margarine that you are speaking of, do you not agree that it would be only necessary to put it on for a period of five or seven years at most? That is only a temporary duty. Once the margarine manufacturers have been brought to this country the conditions of manufacture are so good in England that they can compete with any manufacturers in the world.—My experience of the margarine trade is not very great, but from the small knowledge that I have I should agree with you that once established here they would have very little to fear from outside competition.

4129. In other words we want something to induce the Dutch manufacturers to put their works in this country, just as they originally established works in Holland, and then put works in Germany and Belgium as soon as those respective countries put a duty on margarine.—That is so.

4130. (*Mr. G. A. Moore.*) Two suggestions have been made with regard to the question of bringing the trade to this country. One of those suggestions you have been asked about, namely, the idea of putting a duty upon the importation of margarine into this country. The other suggestion is to put an export duty of 2*l.* a ton upon palm kernels shipped from the British Colonies to places other than the United Kingdom. Have you considered the latter suggestion at all? Have you heard it?—The matter was mentioned to me, but the figure was not mentioned.

4131. Do you not think that in many ways there is a great advantage in the idea of an export duty from West Africa seeing that it is not in fact a duty at all but really an inducement to alter the destination of the article?—It is a point that I have not really considered. I look upon the subject from perhaps quite a different standpoint from that of the West African exporter, and what effect it would have has really not entered into my calculations at all.

4132. If you put a duty upon margarine, we might be able to bring over the Dutch manufacturers of margarine, but they might still be induced to buy their oil from Germany, and we have had a good deal of evidence that Germany dumps her surplus palm-kernel

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oil upon this market.—The large Dutch manufacturers make their own palm-kernel oil.

4133. They have made it recently in Holland?—I believe so, but I am not sure.

4134. It is a fact which will have come before you that Germany has been in the habit of dumping palm-kernel oil in this country at a very much less price than she sells it in Germany.—Yes.

4135. If owing to this duty on margarine we induced the manufacturers to manufacture their margarine in this country, they would still very likely use this dumped oil. Is that not so? It would still be produced at something less than the actual cost of manufacture in this country in order to keep up the monopoly that the Germans have in the crushing of palm kernels?—Having regard to the very large proportion of palm-kernel oil used by Dutch manufacturers, they would be obliged to manufacture for themselves a very large proportion of their requirements. If they attempted to obtain their requirements from the German manufacturers it would send the market up to such an extent that it would pay them better to make their own.

4136. Even now do they not obtain a very large proportion of the oil from German crushers?—I have no knowledge on that subject.

4137. Do you not think that if we adopted the idea of putting an export duty upon palm kernels which are shipped elsewhere than to the United Kingdom it would have the double effect of protecting or rather encouraging the trade of crushing the kernels in this country as well as enabling the crushers to produce the kernel oil at a price which would compete with anything that could be imported from Germany, and therefore it would have the effect also of bringing the Dutch manufacturers over here?—Undoubtedly it would.

4138. If that is the case, and if I am right in that suggestion, the export duty, which is really not a duty at all but only a fine if you ship it elsewhere, is the course which is to be preferred?—Yes.

4139. There are other factors in favour of the export duty: for instance, it does not necessitate an appeal to the English Parliament. You will appreciate that point too.—Yes.

4140. Can you tell me, from the point of view of a refiner, if there is any difference between extracted oil and crushed oil?—Yes. The extracted oil is not quite as good as the expressed palm-kernel oil. There is generally a little higher free fatty acid in the extracted oil.

4141. Is there any difference between oil extracted by benzine and that which is extracted by tri-chloroethylene?—I do not think so, but they have only experimented a little way with extraction.

4142. There is a general impression that tri-chloroethylene has certain advantages. Do you know what they are?—Non-inflammability is the main one.

4143. There is no question of taint afterwards?—No.

4144. In one portion of your précis you speak of the addition of some substance containing a high percentage of oil to extracted meal. Is there any substance you can suggest that is suitable for that purpose and yet cheap enough?—Ground linseed is the most suitable.

4145. (Mr. T. Walkden.) In your précis you mention that you prefer regular shipping lines running through to Liverpool and to London, and I presume you would also include Bristol and Hull?—Yes.

4146. We understand from other witnesses that Hull is a very cheap port at which to import any produce?—Yes.

4147. How will you manage about the return cargoes?—I am afraid that has not entered into my mind at all.

4148. I am looking at it here from the point of view of the export of merchandise. The steamers that bring cargo home have to take cargo out?—Yes.

4149. If the steamship lines would do as you suggest, that is give optional ports or transit facilities, that might help you?—It would be a great help in the copra trade.

4150. In order to retain the trade after the war you suggest an export duty being put on kernels leaving

the colonies?—It was not my suggestion, but I think it is a good one.

4151. Have you considered whether it would be to the benefit of the colonies if that export duty were put on?—I am speaking from an importer's point of view.—No, I cannot say that I have thought of it.

4152. It would not be beneficial to them?—I have not thought as to whether it would or would not be.

4153. As I put it to a previous witness, we like to sell our kernels to arrive, and to make the contracts ahead. Naturally if this country could not take all the palm kernels or could not sell the oil from the palm kernels, there would be a tendency for the price of palm kernels in the colonies to drop?—Yes.

4154. That would not be very beneficial to the natives or to the colonies?—No.

4155. Do you not think a better way would be to put an import duty on the oil coming from Germany or Holland after the palm kernel is crushed?—That would not affect the position as regards America and Germany. I believe the bulk of the German palm-kernel oil that is exported goes to America.

4156. Therefore you really would prefer the export duty being put on the kernels?—That would assist this country more, because it would bring the American trade to Great Britain instead of to Germany.

4157. If you could not find sufficient market for the oil in this country, would you want an export trade?—Yes, certainly.

4158. Therefore you want to put on an export duty and take it out of the native?—Yes.

4159. Naturally if Germany could not pay this 2s. a ton she would want to crush other seeds of a cheaper nature?—That I could not say.

4160. (Mr. T. H. Middleton.) Do you crush or extract or both?—We crush.

4161. Do you analyse the parcels of copra as they come in?—Yes.

4162. What is the general variation in the percentage of oil? Is it a wide variation or a narrow one?—Fairly wide. It is from 62 to 70 per cent of oil.

4163. What is the expected yield of cake from, say, 100 tons of copra?—That will depend upon the description of copra you are crushing. If you take parcels of all descriptions, in a year's run it would come out at about 37 per cent.

4164. Could you give us, roughly, the variations? Would you expect a variation of from 35 to 39 per cent?—Yes that is just about the figure.

4165. Do you regularly analyse the cake as it is crushed?—Yes every day's output from every mill is analysed.

4166. What does the percentage of oil in cake usually amount to?—We guarantee 6 per cent., but it runs out at a little over that in copra.

4167. I have noticed in published analyses that the variation in the percentage of oil is very wide indeed. I fancy that is due to different methods of extraction?—Yes.

4168. Is your percentage from 6 to 8 per cent.?—It is never so high as 8 per cent.

4169. Is it 6 to 7 per cent.?—Yes.

4170. Can you give me any idea of the total output of coconut cake in this country?—Do you mean at the present time, or before the war?

4171. At the present time or recently?—No, I do not think I can. One of the principal mills works alternately on copra and palm kernel; I do not know how much of each they work.

4172. Could you give the Committee some idea of the total output before the war? Was it a large quantity?—Before the war we had one of the biggest mills in Liverpool shut down for about a year. They had a dispute with the manufacturers of the machinery and they would not work the mill. The output just depended upon whether that mill was working or not.

4173. I do not know the volume of the trade; I am trying to get at that.—I can only speak for my own firm. I do not mind telling you that our present consumption of copra is 35,000 tons a year.

4174. And the cake would be 37 per cent. of that. Is it your experience that the cake meets with a ready market in this country?—Yes; we have no difficulty

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at all in selling it. We had at first, when war broke out; we had considerable difficulty in selling coconut cake then.

4175. You have had no difficulty recently?—No.

4176. In August, for example, I noticed that copra was just a shade cheaper than palm-kernel cake per food unit.—I had not noticed that.

4177. I compare the prices of palm-kernel cake in Liverpool, where it was 1s. 7½d. per food unit, while coconut cake in London was 1s. 6½d. We have had a good deal of evidence that palm-kernel cake has found some difficulty in getting a market.—I have had nothing to do with that. I could not say whether that is so or not.

4178. If you have no difficulty in finding a market and if your food-unit price is slightly below the palm-kernel price, it indicates that palm-kernel cake is finding a good market?—Yes, I should think so.

4179. In which districts does coconut cake sell chiefly—south of England, east coast, or north?—We endeavour to find a market round our own mills as near as possible, so as to reduce the expense of delivery.

4180. That is to say, it is largely in the home counties?—Yes. The demand will always come from the milk dairy farms. It is no use trying to sell coconut cake in a wheat district.

4181. Your customers are the cow feeders?—Yes.

4182. (Sir Hugh Clifford.) And for sheep?—No, almost entirely for cows.

4183. (Mr. J. Couper.) Have we been informed where your mills are situated?—On the Thames.

4184. Entirely?—Yes.

4185. I do not want to question you on your private affairs, but could you tell us why you are putting up mills to deal with palm kernels?—We have been for years past importing German palm-kernel oil, and since the war began we have had to get it from the manufacturers and crushers in the north, and we have come to the conclusion that we might make it as cheaply in London as they can in the north.

4186. Have you made any inquiry as to your supply of kernels for the future? Have you any fears as to an insufficient supply to keep your mill going?—No. The present indication is that there will be excessive supplies of kernels. If other mills are going up which will produce more oil than there is a market for, there will be a scramble for the kernels and perhaps it will knock all the profit out of the business.

4187. What quantity do you propose to handle?—It is only a small mill that we are putting up.

4188. It does not run into any very large tonnage?—No.

4189. Questions have been addressed to you on the subject of the Dutch margarine manufacturers. It is always a little bit of a surprise to me to understand, as we have been taught to do here, that it will be a very good thing for this country that the Dutch margarine manufacturers should come over here. Have you anything to say on that point? Why should we be so pleased at the idea of the Dutch manufacturers coming to this country when we have margarine manufacturers here and might almost induce others to become so?—I am afraid I cannot answer that question.

4190. The business of the Dutch margarine manufacturer is, of course, very largely cultivated by them, so I suppose it is almost a household trade?—Yes.

4191. But you yourself would be rather glad to see Dutch manufacturers coming to this country to give you a market for your oil at your door?—I do not think that we should find a better market for our oil, because we can send it just as cheaply to Rotterdam as to Hull, for instance.

4192. So really you have no opinion on the matter at all from your own point of view?—No.

4193. On the question of taxation, leaving out altogether the question of an export tax in our colonies on palm kernels shipped to foreign countries, the suggestion has been made that there should be an import duty on margarine. But from the point of view of this Committee, which has to deal with palm kernels, does not that rather limit the objective of palm kernels to margarine? In your experience you

have possibly seen palm kernels used for various other things?—In the United States they are used almost entirely for soap-making.

4194. But margarine is an advance on soap?—Yes.

4195. Will not there be an advance on margarine some day—some more expensive use for it which will divert the trade?—Palm-kernel oil to-day is used in the manufacture of some of the best-class chocolates.

4196. Therefore, if we were to limit our tax to margarine, we only assist the palm kernel in so far as it is converted into margarine?—That is the bulk of what is used in this country.

4197. But, after all, the history of that is only a matter of a very few years?—Yes.

4198. And in a few years time it might quite well be something else?—Yes.

4199. Therefore, if you get at what the palm kernel must be converted into, which is oil, we would be more sure of our ground?—To tax oil imported into this country?

4200. In some form or other to tax oil in preference to a more highly manufactured article?—That would certainly enable us to retain the production for the home-trade demand; it would not assist our export business, whereas the taxation of the kernels would.

4201. (Professor W. R. Dunstan.) You are not a manufacturer of margarine, I believe?—No, though I have been connected with it once or twice.

4202. As you said, you are a crusher and refiner of oil?—Yes.

4203. And you are also a manufacturer of what may be called "vegetable butter," which I use as a general term without any special name?—Yes.

4204. In the manufacture of vegetable butter, for which your firm is very well known, do you use palm-kernel oil?—Yes, in some grades.

4205. You indicated just now that you had tried palm oil for that purpose, but had not found it very successful.—No, I never tried palm oil, because the figures show that it is not suitable; it is too soft and too liquid.

4206. To which palm oil are you referring? Have you ever tried the best palm oils prepared on the spot from fresh material—from fresh pericarp?—No, I have never been able to get any.

4207. You told Sir George Watson that palm oil was not suitable for the manufacture of margarine?—I only worked on the commercial oil.

4208. That, I think, we are all agreed about, but you have never had an opportunity of trying a better quality of oil?—No.

4209. For either margarine or vegetable butter?—No, never.

4210. Then you referred to extracted oil. You yourself have not been engaged in extraction so far as I gather at present?—No.

4211. But you thought the extracted oil was inferior to the pressed oil?—We have used extracted oil constantly.

4212. Do you find it is generally inferior to the other?—Yes.

4213. In that it contains more fatty acid?—Yes.

4214. That is exceedingly difficult, from a chemical point of view, to understand, unless there is a difference in the raw material from which the oil is extracted.

4215. (Chairman.) Did you mean your answer to apply to the fact of it containing more fatty acid, and is that the reason why you thought it to be inferior?—Yes.

4216. (Professor Wyndham R. Dunstan.) It is difficult to understand, unless that extracted oil has been made from kernels containing a high proportion of free fatty acid.—That is probably because the mills where the extraction was done were not very particular in choosing their kernels.

4217. I myself see no reason why the extracted oil should not be as good as and perhaps even better than, the impressed oil?—Nor do I.

4218. But that would leave a different result in the residual product; you would get a meal instead of cake?—Yes.

4219. Have you yourself sold cake?—Coconut cake; not palm-kernel cake.

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4220. What happens to your residue when you crush palm kernels?—We have not crushed any yet.

4221. The mills that you are putting up indicate that you are about to do so?—They are for that purpose.

4222. Therefore, you have hitherto purchased all the palm-kernel oil that you wanted?—That is so.

4223. With regard to outside competition with palm-kernel oil in the future, you refer, of course, to coconut oil?—Yes.

4224. Are there any other seeds that you can mention as possible competitors in the future?—No, I cannot think of any.

4225. Have you tried many experiments in the course of your business with seeds which give solid fats?—Yes. The principal competitor we have is illipé butter.

4226. The main difficulty there is that you cannot get a supply?—Yes, that is so; and with practically all the other seeds that we have tried the difficulty has been that we cannot get a regular supply.

4227. (*Sir Hugh Clifford.*) You used to buy the palm-kernel oil from Germany prior to the outbreak of the war?—We did not buy it from Germany, but through London or Liverpool merchants.

4228. And since the outbreak of war have you procured it from Liverpool?—Mainly from Liverpool.

4229. What has been your experience with regard to the prices you have had to pay?—We have had to pay a higher price relatively to the cost of the kernels than we did before the war.

4230. Were they much higher?—They were varying prices. At times we have had to pay them quite a good profit.

4231. And that caused you to begin erecting a plant on your own account?—Exactly.

4232. I take it you calculated the price at which you would be able to produce?—Yes.

4233. You will have compared that figure with the price you have been accustomed to pay for the oil imported from Germany?—As a rule the German price c.i.f. London worked out pretty close to the cost of manufacture in London.

4234. Then why was it that you always purchased from abroad?—Because we did not need to spend capital on putting up a mill to make our own.

4235. But now having your capital invested in a mill, supposing at the end of the war things return more or less to their normal condition, do you foresee that you will be able to produce palm-kernel oil at a satisfactory figure as compared with the price you have been accustomed to pay for the German article in the past?—Judging by the experience of the past, I think we should.

4236. Then you are of opinion that in order to secure a profitable return upon the palm-kernel oil that you will produce, no special protection would be required. I take that to be so, from what you say?—No, not for our own consumption, but for export we should.

4237. But for consumption in Great Britain you do not think any such protection would be urgently needed?—No.

4238. (*Sir Owen Philipps.*) You told us that in your view the chemical knowledge in your trade in England is quite equal to that of the Continent?—I do not think I said quite that, because I have not had any experience on the chemical side. I was speaking of the superiority of the goods. So far as the goods are concerned I say that ours are quite as good as any produced abroad.

4239. Is the machinery equally good?—Judging by the percentage of oil in the cakes of German manufacture that I have seen, I say that our machinery is as good as the best.

4240. Therefore if it was not for the advantages that the Germans get from their Government you would be able to compete with them?—Yes.

4241. And if those advantages that the Germans have had in the past are continued in the future, it would be only reasonable to ask for similar treatment from our own Government?—Certainly.

4242. Is there any reason, other than legislative reasons, why England should not supply oil to foreign countries?—I do not know of any reason. There always has been a large trade between Liverpool and America, and I do not see any reason why that trade should not be very considerably expanded.

4243. But I gather you do think it will be very difficult to retain this business, if we want to retain the whole of the palm-kernel trade in Great Britain after the war is over, unless there is some Government action?—Yes. The mills that are lying idle in Hamburg and Harburg, it would pay them better to work at a very small profit than to keep them closed down.

4244. (*Sir George Fildes.*) Do I understand from a reply you gave to Sir Owen Philipps that when you are estimating the efficiency of the German machinery you do not do it by direct knowledge of their results but by analysing the cake, and so ascertaining what is the oil product?—That is what I said.

4245. In other words, the more the oil product the less the efficiency?—Exactly.

4246. You do not assume that they would purposely have left a larger amount of oil in the cake?—Oh, no.

4247. You mentioned that you are constructing a mill for the exclusive production of palm-kernel oil?—Yes.

4248. What will its capacity be?—I was asked just now and I said I do not know exactly what it will be, but it is not a large one.

4249. Will it be 1,000 tons a week or something like that?—Nothing like so much as that. We really put it down as an experiment.

4250. For the purpose of using the whole product in your own business?—Yes.

4251. And you do not consider the question of selling the oil at all?—That is so.

4252. So that really you are no guide to us on the question whether or not it would be a wise thing for the ordinary crusher to do?—No. Until we have had some experience in the trade, I have not advocated on our board putting down more than sufficient for our own requirements.

4253. Of course you would be able to profit by that experience afterwards if you extend it?—Exactly.

4254. Can you tell me whether you think it would be a reasonable proposition for anybody to put down increased palm-kernel crushing machinery?—The difficulty is to get the machinery.

4255. I quite understand that.—I am afraid that we shall not get the machinery until after the war is over.

4256. But, given the machinery, as a business proposition would you say that in the absence of Government action, leaving things to take their own course, it would be a wise thing for a capitalist to embark capital in palm-kernel crushing machinery?—No; very unwise. I should not put my money into a concern brought out for that purpose.

4257. Not merely from the point of view that capital is occupied, and so on, but, if asked for your opinion, would you say definitely that it is not a business proposition in present circumstances?—It is very speculative, at all events.

4258. What are the speculative elements?—First of all to get the machinery at all and then to get it erected before the Germans have recovered their trade; otherwise by the time you get your machinery you have to oust the Germans out of the trade they have recovered.

4259. I do not know whether you have given special attention to this side of the question. Do you think the Germans will have any difficulty in recovering their trade?—I do not see the obstacle to it.

4260. Let me direct your attention to this; I do not know what it is worth. A witness this morning, and other witnesses, suggested that much of the German advantage in this particular trade was due to what I might almost call the illegitimate banking accommodation which they were able to command; that this is going to crumble away under the pressure of the war, and that when they are left to the ordinary resources of trade they will not be able to do it. Have

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[Continued.]

you directed your attention to that?—No, I have no knowledge on that point.

4261. You have no special information?—No.

4262. As far as you can envisage the situation, as a practical crusher—because that is the way everybody would view it who is going into it—would you definitely say that in the absence of Government action to counteract the German advantages, you would not advise anybody to put up palm-kernel crushing mills?—That is so.

4263. (Chairman.) You said you imported a good quantity of palm-kernel oil, and that you do not make margarine, but you do make vegetable butter?—Yes.

4264. For what do you use your oil?—We sell all the oil.

4265. You make no use of it yourself?—No.

4266. Then why are you importers of palm kernel?—Merely to refine it.

4267. For most purposes you say that coconut oil (as we know on analysis) and palm kernel are very nearly interchangeable?—Yes.

4268. But still you said you thought it would be a good thing for British trade to put an export duty on palm kernels going out from West Africa?—Yes. I have not very strong views on that point; the suggestion was only made to me in this room.

4269. Then I will not press it, because it is not fair. Will you consider this point: the effect of it might be to direct palm kernels to this country, naturally?—Yes.

4270. If the German mills are idle and copra is an alternative product, would not it really level matters out by their taking more copra in proportion if we took more palm kernels; or might it not tend in that direction?—It would tend to do so, yes.

4271. To that extent, as far as crushing in this country is concerned, the fact of copra being a much bigger trade than palm kernels would tend to even it out? I am speaking of the available world's supply.—Yes, I should think it would.

4272. You talked about a certain amount of dumping of oil in this country before the war. You say the c.i.f. price for German oil in London ran at much about the price oil could be produced at in London itself?—Yes.

4273. That is to say, that exported German oil could stand the export, freight, and other charges. Each person has to bear the cost of the kernels or copra being brought to the mill, sending them through the

mill, refining the oil, and so on, in each country; but it means that the German exported oil could stand the whole of the freight to this country in addition to the other charges and still compete with ours at about the same price here?—It was not competing with ours, because none was made here at that time, but there was not sufficient profit in the business to make it worth while to put down a mill before the war.

4274. The German export price was sufficiently low so that it could stand the freight here and make you doubt about putting up a mill?—That is so.

4275. About what would the freight from Hamburg have been? because the price of the oil would have to bear the cost of the return of the drums as well.—No, we sold all the packages here.

4276. How did it come over?—In casks.

4277. Not in drums?—No. You asked what the freight was; I do not remember exactly, but I think it was somewhere about 7s. 6d.

4278. (Sir Owen Philipps.) And what did you lose on the casks?—The casks were all profit; the price included the casks.

4279. (Chairman.) You said that while perhaps you could compete with German oils in the home market after the war, though the price might be close, what you want some help for particularly is the export trade?—Yes.

4280. Have you thought in what form that help could be given to you? How could any help given in this country particularly help you in the export trade?—I have not given the matter much thought before coming to this meeting. The suggestion that an export duty might be placed on the palm kernels going to countries other than the United Kingdom struck me as being of assistance towards securing the export trade from this country.

4281. Have you ever used shea nuts?—I have never used any at all.

4282. Have you used ground nuts?—Yes.

4283. In any quantity?—I have used a few thousand tons.

4284. How far is your machinery for them at all interchangeable? Can you use it for other nuts?—For ground nuts, yes.

4285. What other seeds or nuts would you crush with the same machinery that you use for ground nuts?—Copra and ground nuts are the two most suitable to go together.

The witness withdrew.

Adjourned to Wednesday next at 11 o'clock.

NINTH DAY.

Wednesday, 13th October 1915.

Colonial Office, Whitehall.

MEMBERS PRESENT:

Mr. A. D. STEEL-MAITLAND, M.P., Under-Secretary of State for the Colonies (Chairman).

Sir HUGH CLIFFORD, K.C.M.G.

Mr. L. COOPER.

Professor WYNDHAM R. DUNSTAN, C.M.G.

Sir G. FIDDES, K.C.M.G., C.B.

Mr. C. C. KNOWLES.

Sir F. LUGARD, G.C.M.G., C.B., D.S.O.

Mr. G. A. MOORE.

Sir OWEN PHILIPPS, K.C.M.G.

Mr. T. H. MIDDLETON, C.B.

Mr. T. WALKDEN.

Sir W. G. WATSON, Bart.

Mr. T. WILES, M.P.

Mr. T. WORTHINGTON.

Mr. J. E. W. FLOOD (Secretary).

Mr. ROBINSON called and examined.

4286. (Chairman.) You have been kind enough to come here as representing the Bristol Chamber of Commerce?—Yes.

4287. I hope that you will ask them to believe

that, as I said in my letter to them, it is really only limitation of the size of the Committee which has made it impossible to accede to their request to have a member of the Chamber upon it. We are very glad

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to consider any representations that they may wish to bring forward.—Thank you, I will tell them when I see them again.

4288. You are a member of the firm of Messrs. John Robinson and Company, Limited, Seed Crushers, of Bathurst Wharf, Bristol?—Yes.

4289. Have you been engaged in seed crushing for a number of years?—Yes—you mean our particular firm?

4290. Yes.—About 60 years I should say. I have been in it for about 40 years, or something over.

4291. Do you deal in all manner of seeds and nuts?—Our principal business is linseed, cotton seed, and soya beans since they came in.

4292. Not palm kernels as yet?—No, and I will tell you why presently.

4293. Nor copra?—Not up to now.

4294. Are you anxious to try the crushing of kernels if circumstances make it possible?—Yes. We are short of raw material, and we are open to crush anything; like other crushers we have extended several times in the last 20 years, and on at least three occasions we have got out plans for special machinery for crushing palm kernels and copra, but we could not get them direct, so we passed them by and went on with our usual cotton seed and linseed machinery.

4295. What have your difficulties been in detail in regard to dealing with kernels?—We cannot get them direct. We were quoted about 10s. or 12s. 6d. a ton to Avonmouth over Liverpool for palm kernels. We never deal with anything that we cannot get direct to Avonmouth, which is as good a port as any in the Kingdom. It is no good taking stuff to Liverpool and paying 8s. or 10s. to get it round. If you are going to work to advantage you cannot do it. Since R. & W. King were squeezed out 35 years ago all the palm kernels and palm kernel oil and everything of the sort has gone to Liverpool by one or two big lines that collect on the West Coast.

4296. How much seed crushing is done in Bristol as a whole?—Will you say the Bristol Channel?

4297. I am not thinking merely of Bristol City; I mean Bristol, Avonmouth, and all the ports.—Yes, and Sharpness. There is rather a small mill at Bridgwater. We crush, when all the power is on, fully 3,500 tons a week.

4298. Raw material?—Yes, oil seeds. I refer to the Bristol Channel. I do not say Bristol only.

4299. Bristol Channel ports?—Bristol Channel ports.

4300. Including Avonmouth?—Yes. We are not members of the British Oil and Cake Mills. I am glad to say that we are on cordial terms with them. You had Mr. Pearson, I believe, before you and heard something about it from him. We are working independently.

4301. To your mind then, if you could get, shall we say, freights on the same terms as Liverpool, that would meet the difficulty?—I believe that we could have been crushing years ago in that case. We know what it is, having regular liners. We do not expect to get things on quite the same terms. Within half-a-crown would do, but 12s. 6d. or 15s. is impossible.

4302. Within half-a-crown could you do it?—Yes; we generally find that we may have to pay a bit more for cotton seed to Avonmouth or Bristol than to Hull, because liners that go on the berth give rather better freights. Half-a-crown would be the limit.

4303. Do you never charter a steamer for cotton seed?—Yes. We never buy anything unless we get it direct. We get Egyptian and Bombay cotton seed direct, and River Plate linseed and Indian linseed, and soya beans from Manchuria we get direct.

4304. You crush 3,000 or 4,000 tons a week. You have more than enough capacity, you think, to warrant cargoes coming straight to the Bristol Channel?—We are crushing a variety of material.

4305. I do not mean that it is all one kind.—Working with our neighbours and splitting things up, we could easily distribute 3,000 tons if palm-kernel crushing were taken up in the Bristol Channel. The limit we take is about 3,500 tons, but we have taken shipments as big as 6,000 tons of soya beans for our own firm.

It is a great convenience to get 3,000 tons at a time, and we would take 1,500; other people would take 1,000 or 1,500. We would divide it between us. It is easier from a financial and warehousing point of view.

4306. If you could get the freight down to within half a crown a ton (I am not pinning you to a figure) you would do it?—Yes.

4307. You think that the margin is sufficiently wide even with a disadvantage of half-a-crown a ton?—Yes.

4308. Things are not cut so fine as to prevent it?—No, but we have not been able to buy them up to now at what we have considered fair terms as compared with Liverpool, and that has frozen us out.

4309. Very little had been done in Liverpool in the way of kernel crushing until the war?—They had two or three mills there.

4310. But very little had been done?—How about the African Oil Mills?

4311. Has there been any other on any large scale besides those?—I have always understood that the African Oil Mills crush on a large scale, and are owned by one of the shipping companies who carry kernels for them. Somebody said to me one day (I cannot prove it, but there is an old saying "There is no smoke without fire.") "You never will get them direct." "The African Oil Mills will not have competition." "They are under the control of the Shipping Companies."

4312. With regard to the amount crushed in the whole of England, a vastly larger amount was crushed in Germany than in England up to the beginning of the war?—Yes.

4313. What do you think are the causes of that?—What is the advantage of Germany over Liverpool?—One great thing is the protective duty on oil. It practically gives them a bonus on all the palm kernels they take to Germany.

4314. Let me put it generally. You were at a disadvantage as compared with Liverpool, and Liverpool in turn was at a considerable disadvantage compared with Germany before the war?—We cannot get them at all.

4315. But Liverpool was at a disadvantage as compared with Germany?—I should say that it would be so.

4316. In many ways—in the question of landing charges, for instance as compared with Hamburg. What are your landing charges at Avonmouth?—I have taken the trouble to inquire of the Hamburg Agent, named Stock, of the ships that went to Hamburg before the war, and he says that the charges in Hamburg are about the same as at Bristol and at Avonmouth.

4317. What would you put them at per ton?—About 2s. a ton I think.

4318. That is a good deal more than at Hamburg into lighter.—Is it 1s. 6d. at Hamburg?

4319. About 10d.—including the dues.—Liverpool I should think would be a good bit more than that.

4320. Have you machinery that could crush palm kernels?—No. As I tell you we have received tenders and plans on two or three occasions, but we could not get raw material direct and we diverted our orders to the linseed crushing plant.

4321. For kernels you need up-to-date machinery to do it as a business proposition?—It is not what I should call exactly up-to-date. Our machinery is up-to-date, but it needs special palm kernel machinery with very high pressure, and it has not been worth while to put it in because we cannot get raw material direct.

4322. You said, that if you could get the raw material direct you would distribute the kernels. That means that each of the people to whom you distributed would have to have machinery suitable for the purpose?—I think that they would all go in for it. You cannot work to advantage with the ordinary Anglo-American machinery. You cannot do the work regularly and extract the oil regularly.

4323. Would they be willing to put in specialised machinery for the purpose if they could get the material?—What does Mr. Pearson think about it?

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4324. I want to know what you think about it?—He is a very up-to-date pushing man. I believe he would do it. I know he has done well lately.

4325. I will not pin you down but would your firm be prepared to do it?—Most certainly.

4326. Here you have the case that before the war the vast bulk of the trade was in Germany and not even in Liverpool?—Yes.

4327. If you were going to justify it to shareholders or if a friend was going into the trade and was about to put his money into new machinery, would you not anticipate the possibility of the trade going back to Germany after the war even if you could get freights like those to Liverpool?—Not if the English Government would allow us to trade on the same terms as Germany. I do not want any advantage over them. Our other machinery is as good as theirs and we could put in as good machinery for crushing palm kernels. In Germany they get bounties on oil, protective duties which give them a higher value for oils, and they can work it at a profit where we cannot.

4328. That is so in Germany no doubt, but as regards the export of oils to this country from Germany and Holland, you do not need them surely for that purpose?—You mean palm kernel oil?

4329. Yes. To transfer the industry to this country does not mean, surely, that you would necessarily want to have prices as high as the German oil crusher gets in the interior of Germany. You have only to compete with the export trade here, have you not?—Let me see that I follow. I put down somewhere what they get. There is an import duty on this oil I believe in Germany of about 1*l.* a ton. Say that there is about 8*s.* or 9*s.* a ton profit on the palm kernels for crushing. We would do a lot of crushing at 4*s.* a ton and be very well satisfied. Palm kernels are a rather higher price. We might want 5*s.* on them.

4330. But surely the fact that the German oil merchants in the interior of Germany in their own domestic market get a large profit through a tariff or anything of the kind, does not mean that it is necessary for the English merchant to get a similar profit through a similar protective tariff in this country?—I hold that it is necessary. May I give a very clear instance of how they do it? It does not concern a West African product, but I hope that you will not rule it out of order. Take Egyptian cotton seed. All the Egyptian cotton seed, practically four-fifths of it, twelve years ago used to come to the United Kingdom; about 500,000 tons used to do so. It produces the best edible cotton oil you can get in England. We can turn it into oil for margarine and edible purposes, fish frying, and so on. The cake is the best cotton cake we can get. The Germans set envious eyes on it; they could not deal with us on level terms. They would have a cargo to Bremen twice in the season. We got it practically all to England. They would come over and look at our machinery. One of our neighbours who was friendly showed them his machinery which was the same as ours. They began it seriously, and in twelve years they have taken half the trade away. Instead of it all coming to the United Kingdom only half of it comes, and in three years more it will all be gone. The best edible oil you could get would be lost to this country and go to Germany.

4331. For consumption in this country do you mean?—Yes. They have a 6*l.* duty, I think, on edible oil imported into Germany. How can we compete with that?

4332. But you want to sell your product in the United Kingdom?—Yes.

4333. If you want a market in the United Kingdom, what you are competing with is not oil sold in the interior of Germany but oil, if any, exported here?—I will tell you what we have to compete with. We have to compete with the German as a buyer and as a seller. He can buy over our heads. We give 8*l.* 2*s.* 6*d.* for cotton seed, he will give 8*l.* 10*s.* It does not matter what he gives for it if he has a protective duty.

4334. I agree; but when all is said and done, and you have to bid more to come up to him, and what you are disadvantaged in is the market in this country. The price you buy raw material at will no doubt affect

the price in this country at which you sell, but you are competing with foreign oil, if any, coming into this country. Do you say that the duty on oil going into Germany and sold in the interior is what affects you most?—Certainly. It enables the Germans to buy raw material that ought to come to England.

4335. I cannot carry that much further.—But you see my point.

4336. I see your point but I do not agree with it; I do not think it is valid.—I have given you a very clear instance in the Egyptian cotton seed. What is the practical flaw? I want to be put right. I have come here to give information and I shall be only too glad to receive information. How is the English crusher to stop this gradual attraction of all the Egyptian crop to Germany? In three years more it will all be gone.

4337. You have to bid against them?—But if we bid against them there is no working margin. It is not enough to get the seed here and bid against them if there is no crushing margin. We have shareholders to look after.

4338. What is the crushing margin determined by? Is it not determined by the price of the product in this country?—Say it costs 1*l.* and 1*s.* a ton to crush a thing, if we cannot get the 1*l.* and 1*s.* back and something more, it is not worth doing.

4339. Then it depends on the price you get for your product in this country, as I asked you?—Yes.

4340. What prevents you getting higher prices in this country?—Competition.

4341. By other merchants in this country?—No; it is not that. Oil is poured in at such low prices. American oil comes in. They dump 4,000 or 5,000 tons of American oil in, and that will last all through winter.

4342. They have to compete in buying? How do they buy?—They have to take what price they can get. We do not deal in that.

4343. If American oil is competing with yours in this market and preventing you from getting a higher price for your product, in that case the Americans have to bid also for the raw material?—But they grow their own seed. They do not buy Egyptian seed which is a thing by itself, on its own bottom. The Americans have 10,000,000 or 15,000,000 tons of seed. They never crush it all; it is used for manure.

4344. Why do you not bid for it? If they can outdo you why do you not buy American seed also?—The reason why it is used for manuring the cotton crop, and so on, is that it is often in such remote districts from any shipping port, that it cannot be shipped. A mill in a neighbouring village might take a portion of it. If 500 tons from the Mississippi had to be carted and carried on the Mississippi to New Orleans, it could not be done commercially.

4345. The oil from the neighbouring mill has to come here, even if the seed does not, has it not?—They only send surplus oil when they are in a financial fix. They did last year at the beginning of the season, but do not do so now, I think.

4346. (*Mr. T. H. Middleton.*) Could you crush American seed without decorticating it?—No, not to any advantage. The Egyptian seed is splendid. It makes splendid cake and oil. It stands by itself. It is a bitter thing to us to see it all attracted to Germany.

4347. (*Chairman.*) With regard to palm kernels you think you could put in up-to-date specialised machinery if necessary?—Yes. I have had plans and estimates from Messrs. Greenwood and Batley our engineers in Leeds.

4348. Do you refine?—Yes, cotton oil.

4349. And would you refine palm-kernel oil?—We should, but up to now we have not used palm kernels. We have two refineries and plenty of refining power.

4350. You say that the advantage that Germany has lies in the tariff system. As regards refining are we on a level with them on the chemical side of it?—I only go by what I see in the papers. They are very clever chemists, no doubt, but we make edible oil that pleases a great many people.

4351. I do not only mean buying the services of a highly priced chemist who is very good, and influencing

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the works and the management, but you do think that on the whole we could turn out as good a quality oil. I am speaking of palm kernel oil. Would you say that the quality of the oil produced here would be as good?—I do not know. The American cotton-seed oil is better than English. They make their oil from decorticated seed, which is free from any flavour of the hull.

4352. It is not only a question of tariffs. One has to look to the quality as well.—The Germans are crushing the same seed. They have not the advantage which the Americans have. I am told that there is going to be a good bit of cotton seed grown in West Africa, and that is why I am so keen about it. There is some being grown now. I want it to come to the Bristol Channel. We cannot get enough there. There is a very large trade in cotton seed.

4353. What we are most anxious about is palm kernels. Cotton seed may or may not be a success.—And ground nuts.

4354. Do you take many ground nuts at Bristol?—We did not do so until this year. Six cargoes have been brought, but it is a new thing.

4355. Have you special machinery for ground nuts?—No; we use the same machinery. We do not decorticate.

4356. Undecorticated do you think you could produce oil of anything like the French quality?—Not without decortivating.

4357. Do you heat them, or do cold crushing?—We heat them. When the war began they were in a fix with ground nuts, and they sold a lot very low. Our neighbour, Mr. Curtis, took more than we did. We were glad to buy them. Unless the nuts are decorticated as the French do it, you cannot make fine oil.

4358. Do you make ground-nut cake or compound cake?—We have sold it up to now as ground-nut cake. We use a little in the compound cakes. We have had something over 2,000 tons of ground nuts, and we like them. They work very well.

4359. Do you go in for compound cake or linseed cake and cotton cake?—Our figure is about 1,800 tons of oil seeds and about 300 of compound cakes. We could work the palm-kernel cakes in our compound cakes.

4360. I was wondering whether you would use it as plain palm-kernel cake by itself or use it as an item in compound cake. Have you considered that?—It wants blending, I think. It is not very attractive to cattle, and it wants blending with treacle or locust beans—something appetising. The farmer is winking up a bit. I think he will do the blending and mixing by formulas of his own. He has not taken much trouble up to the last few years, but he is doing it now more.

4361. (Mr. C. C. Knowles.) Do you think that if you could get kernels at the same price into the Bristol Channel as to Liverpool, you could compete with Liverpool?—We should have a try, you know.

4362. You would have to sell your oil?—Yes.

4363. Who would be the consumer of your oil?—We have one or two soapmakers in Bristol. We have one in a big way.

4364. Messrs. Christopher Thomas?—Yes. They are a branch of Sir William Lever's Company, I think.

4365. They use very little palm-kernel oil?—A good proportion of our oil goes away.

4366. But could you crush palm kernels economically to give the best results and get the best market, or as good?—We could get a very good market for the cake, and that being so you can afford to drop a bit on sending your oil away.

4367. I do not know that you can.—But it is a case of up-and-down.

4368. I know; but supposing, say, to-day the oil is worth about 38*l.* a ton and the cake is worth 6*l.* 10*s.*?—Well, I suppose it is 6*l.* 10*s.* or 7*l.*

4369. Five shillings rise or fall on the cake is quite important. What do they get out of the palm kernels?—About half cake, is it not?

4370. Roughly about 46 per cent. of oil, and 54 or 55 per cent. of cake. 5*s.* a ton is an important advance on cake, but a very small thing on oil at 38*l.* a ton?—Yes.

4371. I merely want to point out that if you had not some consumers around Bristol you would have to forward your oil to wherever the consumer was established?—We make 400 or 500 tons of different sorts of oil a week. How much of that do you think is used in Bristol.

4372. Very little indeed I know?—About 100 tons a week. We could do with the palm kernel oil what we do with cotton oil and linseed oil and soya bean oil—sell it, to go away.

4373. You export a great deal of cotton-seed oil to Holland?—A lot goes to Liverpool. We send a tremendous lot to Holland sometimes, and we sent to Marseilles and London. We have inland trade to Birmingham and South Wales as well.

4374. I know. If you sent to Liverpool you would have to pay the freight on it?—Yes.

4375. Would it not be more economical to crush it at Liverpool if you can get it to Liverpool at the same price as to Bristol?—We should try to get a better price for the cake.

4376. How much better?—Enough to counter-balance the cost of sending oil up there.

4377. Do you think you would find little difficulty in making the extra price of the cake balance it?—We sold last Saturday a lot of soya bean oil to go to Liverpool. They crush there, and yet they buy our oil. It is a remunerative business. It was not to get rid of our stuff at a dumping price. They were glad to take it and we were glad to send it.

4378. You do not send to Hull?—No.

4379. A great deal of the oil consumed in Liverpool has to be brought from Hull. Hull practically fixes the price and it fixes your price?—Yes.

4380. You in Bristol can get about the same price as is got in Hull?—Yes.

4381. Most of the oil consumed in Liverpool has to be brought from Hull?—There is a tremendous trade done from Hull to Liverpool. I know. It regulates our price, as you say. We have to compete with Hull.

4382. You really compete with Hull?—As in other things.

4383. You do not compete with Liverpool?—I suppose they crush there.

4384. Very little cotton seed?—There are a lot of big mills there. I do not agree with you, really. Take Caucasian seed, how much do you think they get in a year?

4385. You mean Russian seed?—Yes.

4386. They have got very little lately.—This year, but in normal times, I mean. I think they get 15,000 tons of that stuff. One mill will take that. They are big crushers there, and crush a lot of cotton seed.

4387. Liverpool has to depend on Hull principally for the supply of cotton oil. I am speaking of things I know about.—They have very big soap mills in Liverpool and no doubt they want more cotton seed than is crushed there, but I do not agree with you that only small quantities are crushed there. I think it is a large total bulk although it may not be Egyptian.

4388. Small quantities comparatively, I mean?—I expect they crush 35,000 tons a year there if you tot up all the different sorts. They get a tremendous lot of Brazilian seed. There are liners to Liverpool from Brazil, and they get 500 tons at a time all the year, and it means a great deal totted up, I think.

4389. The point is that palm kernels cannot be put in the same category, so bringing them down to the level of cotton oil; they are different. You have not the demand. You have a demand for cotton oil from Bristol, because the big consuming centre, Liverpool, has to bring oil from Hull the freight being about the same as from Bristol. If you crushed palm kernels in Liverpool you would have the oil on the spot, and could hardly afford to bring it from Bristol?—I consider that we could take it to Liverpool. We send large quantities of linseed, cotton seed, and soya oil, and why not send palm-kernel oil? We are left with

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the residuum of the cake, and our own travellers go all over the place, and make good prices with farmers.

4390. If you crush in Liverpool you have it on the spot, and you do not have to pay the carriage from Hull or from Bristol?—No, but your working charges in Liverpool are something fearful. You are a Liverpool gentleman, I expect.

4391. Yes.—Are they not something fearful?

4392. What do you consider fearful? What do you think it cost to crush Egyptian cotton seed, for instance?—Before the war?

4393. Before the war.—About 19s. a ton I should say.

4394. We can do it quite as low.—Getting it to your mill, and everything?

4395. Yes.—Can you?

4396. Yes, quite as low—about 20s. a ton.—I thought that your charges were higher than that.

4397. With regard to export we consume compared with Germany very little palm kernel oil in this country. There has been a large export from Germany which we should hope to get. Have you good shipping facilities from the Bristol channel to South America?—Not to South America.

4398. The United States?—Yes, and Canada. We have good shipping facilities to New York, anyhow. We import a good deal from New Orleans. I take it that it does not go to New Orleans.

4399. No. Could you get freights as low with regard to South America, the United States, Scandinavia, and Italy?—From Bristol.

4400. Yes, as you can from Liverpool.—I should think so to the United States, anyhow. They are very glad to take stuff back as a rule.

4401. Do you ship much to the United States?—At times very large quantities. It is rather spasmodic and uncertain. Sometimes they want a great deal. It is in fits and starts.

4402. You have not crushed in the past you say because you could not get palm kernels direct to Bristol?—Exactly.

4403. When you got out a plan for new machinery I suppose you went into the calculation to see if you could make a profit on crushing. All crushers make such calculations, I suppose?—Yes. The machinery was to treat both palm kernels and copra.

4404. Could you at any time within the last ten years, say, see a profit?—We could not get them; that put us off.

4405. You did not go into it very closely?—Yes, I have figures and plans for big round presses. You have been in an oil mill?

4406. Yes.

(Chairman.) Mr. Knowles is connected with Lever Brothers.

(Witness.) I did not know that. I had an idea that there was no seed crusher on the list of members.

4407. Mr. Knowles was added and his appointment was in the papers afterwards?—You would not add a seed crusher, but you added a soap manufacturer. I was anxious to get a seed crusher on.

4408. Mr. Knowles has crushed palm kernels considerably.—But still he is not a seed crusher, pure and simple.

4409. We had better not discuss it.—But it shows what a disadvantage our trade is under.

4410. (Mr. C. C. Knowles.) With regard to profit, I may tell you that we have gone into the calculation for the last fifteen years over and over again, and never could see a profit on crushing kernels.—Do you put it down to these duties in Germany?

4411. Yes, I think you are more or less right. There is a protective duty of 1l. a ton really on edible oil going into Germany. The duty is prohibitive. You cannot ship edible oil to Germany. Germany has always been able to get a big price for oil consumed in that country, and to dump it at a low price in this country. When the war ends, if we do not alter that state of things, and do not help the crusher in some way, there will still be no profit?—Not if Germany resumes her old ways of doing things, but I hope that that will not be allowed. We want

to be on the same terms as Germany. We do not want any favouritism.

4412. Can you suggest any way in which this Committee could help the crusher?—I have been a Free-trader all my life, but I have had enough of it now—I have really.

4413. That is very frank. It has been suggested that if an export duty of, say, 2l. a ton was put on kernels from West Africa and if all foreign countries that crush kernels had to pay that 2l. and the British crusher got a rebate of 2l., that would help him to get the trade from Germany. Do you think it would?—You are not asking whether I approve the scheme?

4414. I am going to ask that next.—I think it would help him.

4415. Would you approve the scheme?—I think it would cause friction with the Colonies. Do you call them Dependencies.

4416. Crown Colonies.—They would not stand it. Bad trade comes on and prices would go down, and they would get very indignant about it.

4417. (Chairman.) Will you consider it from the point of view of the trade here? It may be that the Colonies would or would not be willing to accept it.—I said before I think that it will help the trade, certainly.

4418. (Mr. C. C. Knowles.) It would help to bring the trade here after the war, you think?—Certainly.

4419. (Sir F. Lugard.) You spoke of locust beans?—Yes.

4420. Have you any large import of locust beans in the Bristol Channel?—Yes, a lot come there.

4421. From West Africa?—From Cyprus and Portugal principally, some thousands of tons in a year. They are very light things. 3,000 or 4,000 tons a year come, I should think, or more than that.

4422. What sort of price do they command?—Well, I think the last cargo we bought was about 6l. a ton, cost freight and insurance. They are dearer now I think. Freights are so difficult. They are 6l. or 7l. a ton now.

4423. Do you get ground nuts direct to Bristol from West Africa?—Since the war we have had six cargoes to the Bristol Channel since the war started, as I said just now, but as a rule they go to Marseilles. They decorticate them there, I believe.

4424. (Chairman.) Ground nuts come from the Gambia?—Yes.

4425. (Sir Owen Philipps.) You have told us that three times during the last fifteen years you have gone into the question of palm kernel machinery?—Yes, and copra. I put them together.

4426. When you went into the matter did the palm kernels show a profit on crushing. Did examination lead you to that?—Taking year by year I believe we could crush them at a profit.

4427. I am not asking that at the moment. You have told the Chairman that you have seriously considered on three occasions putting up a palm kernel mill in Bristol?—Quite true.

4428. On those occasions when you looked into the matter was there a profit on crushing palm kernels assuming the freight to be the same to Bristol as it is to Liverpool?—We felt quite sure that we could crush palm kernels and copra, and make money out of it.

4429. But did your figures show it?—Yes, they did; we reckoned that we could do it.

4430. The Committee has been told by Mr. Pearson, the Chairman of the Bristol Oil and Cake Mills, who, I think, you will agree is a very able gentleman —.—Yes.

4431. That during the last nineteen years he has constantly compared the price of palm kernels with the price for palm kernel oil and cake, and that prior to the war there was practically never a working margin. How do you account for the fact that the result of your examination was so entirely different from that?—Did he say anything about copra? You keep on leaving copra out.

4432. We are enquiring about palm kernels, and I want to keep to that for the moment.—I have been in the trade longer than Mr. Pearson, and I have no doubt at all that we could make a profit on crushing the kernels.

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4433. He had been carefully into the question prior to the war, so his opinion is wrong?—I do not know.

4434. It is diametrically opposite to yours.—What I tell you is perfectly true, and I can send you the plans, and Mr. Hopper of Messrs. Greenwood and Batley, will bear it out. On three occasions we have had plans of machinery for crushing palm kernels and copra, but not being able to get them direct to Bristol we here passed the thing by, and put in Anglo-American machinery instead.

4435. I am not asking about that.—If we like to do it, and it does not pay, that is our business.

4436. Then you practically admit that you found that there was no profit?—No, I do not. I say for palm kernels and copra this machinery would pay us.

4437. Are you aware that hitherto the total quantity of palm kernels crushed in this country has been comparatively small—only about 50,000 tons?—Yes, and I will tell you why. No one will take it anywhere but to Liverpool. It is in the hands of a big shipping line. I hope that this will help your line very much, Sir Owen. Out there all the wharves and boats and everything are in the hands of one shipping line, and they will not ship anywhere else, or they do not, anyhow. There are the Hamburg people, Woermann's, and they are all alive, and they take it to Hamburg.

4438. I will deal with that in a moment. You have said something about bounties and protective duties by which German crushers have been able to secure supplies of edible nuts on more advantageous terms than British crushers. Has this been an important factor in preventing the establishment of the palm kernel industry at Bristol—not the only factor but an important factor?—Well, you see it attracts the palm kernels to Hamburg and Bremen just like that instance I mentioned just now about cotton seed being attracted to Hamburg and Bremen. They have this sort of bonus on their oil to play with.

4439. Therefore there have been difficulties in the way of starting the crushing of palm kernels at Bristol quite apart from the disadvantage in connection with freight compared with Liverpool?—What disadvantages?

4440. Those to which you have alluded.—I said just now that I look on the Germans as competitors. They buy against us and force the price of the raw material up to prices we cannot give owing to these duties.

4441. You have informed the Committee that it has been impossible in the past to buy palm kernels for Bristol except at 10s. over the Liverpool price?—And more than that.

4442. Are you aware that for many years shippers by the regular steamship lines have been given the option of having their cargo delivered at Bristol, *via* Liverpool, at an extra cost of 6s. 3d. a ton which is about half the cost to the shipping companies of forwarding it to Bristol?—I am not aware of it. All I know is that we have asked a price. We cannot get them direct. We should not put up a lot of machinery on terms of that sort. We should feel that we were subject to an act of grace of the shipping companies at any time, and if it came to a fight we could not put up machinery unless we could get them direct in our own bottoms as in the case of other seeds.

4443. If you put up machinery at Bristol for palm kernels would you be able to deal with a sufficient quantity to provide full cargoes from West Africa to Bristol?—Well, we have several times bought 6,000 tons of soya beans for ourselves. Generally we like about 3,000 tons. Our cotton seed boats and soya bean boats generally bring us half a cargo and then go on to Liverpool and the west coast. We have storage room and ample accommodation for 5,000 or 6,000 tons.

4444. Have you ever known of a full cargo of palm kernels to your own knowledge having been offered to the steamship companies for conveyance to Bristol from West African ports?—A tramp steamer?

4445. Have you ever known of a full cargo in the market being offered up to the time of the war?—No. I have heard of it since the war.

4446. Are you aware that whilst linseed and cotton seed are shipped in full cargoes from one port of loading to one port of discharge, palm kernels are shipped from a number of small ports in West Africa?—That is so, I believe. A man who is living near Bristol farming now, who has spent a great deal of time there, and Mr. King, have told me that it is so. Kernels are picked up at various places.

4447. Have you or your friends ever approached steamship companies and asked them to provide facilities for delivering palm kernels at Bristol?—No, we do all our business through brokers. They have more influence than we have. They approach the sellers.

4448. Can you give the Committee any warrant for the correctness of your statement that all the quays and wharves have been under the control of the large shipping firms or any of them? I want to know on what you put the statement which you have made.—Is it not correct?

4449. No.—If you assure me that you have been out there and it is not correct, I accept your assurance, I am only telling you what I have been told by other people.

4450. You have made the assertion practically then without any ground for it?—No, I have not. I have made the assertion because the facts have been given to me by people who have been out there. Did I say entirely under the control or very greatly? Which was it, Mr. Chairman?

(Chairman.) I could not tax my memory at the moment.

(Sir Owen Philipps.) I do not know any port in West Africa to which that what you have said applies.

(Witness.) If I said "entirely," I am quite willing to qualify it, but I have been told that they have a preponderating influence.

4451. Anyhow, it is only what you have been told?—I do not admit that.

(Sir Hugh Clifford.) You say in your *précis*, "I understand that all the quays, wharves, barges, &c., have been under the control of a large shipping firm, who also have a large oil mill in Liverpool fit for crushing palm kernels, consequently the Bristol Channel has, so to speak, been frozen out of the trade."

4452. (Sir Owen Philipps.) You also assert that this same shipping firm has a large oil mill in Liverpool for crushing palm kernels, by means of which, and the alleged owning of the quays and wharves, the Bristol Channel has been "frozen out of the trade?"—Yes.

4453. Are you aware that the oil mill in which the shipping firm in question has only part interest is only a small concern with a total crushing capacity of not more than 30,000 tons per annum and that it was erected by Sir Alfred Jones twenty years ago with the express object of endeavouring to obtain for this country some share of the palm kernel industry?—I knew that he was chairman, but I did not know the output, and I did not know that it was a philanthropic mill. I thought they ran it for their shareholders. It has a capital of 100,000l.

4454. Are you aware that this milling company, until the war removed German competition, was not a very profitable business, and for several years lost heavily?—I will answer in this way—that for two years we made no money. Seed crushing has been bad lately. In this war year we shall have to pay on war profits fortunately, but before that we made nothing practically.

4455. You said that the milling company was through its connection with the shipping firm able to compete unfairly with other crushing concerns?—Did I say that—"unfairly"?

4456. You inferred it. Anybody reading your evidence would infer that. This mill receives no advantage whatever from the carrying companies and is not a direct importer of palm kernels, but purchases its raw materials through brokers and merchants just as other companies do, it being, in fact, an independently run concern. Can you contradict that?—I do not see what you mean.

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4457. Your evidence seems to be directed to conveying exactly the opposite?—The ships belong to Messrs. Elder Dempster and the mill.
4458. No, it belongs to a separate company. The managing director is a big grain merchant in Liverpool?—Sir Owen Philipps is a director, is he not?
4459. No. You are talking to him. I am not a director, and I never have been.—But you have directors of Elder Dempster on?
4460. There is one—my colleague.—My information was received when Sir Alfred Jones was alive. He was chairman, was he not?
4461. You sum up by saying that it has always been impossible for the Bristol Channel to obtain these kernels direct. Are you satisfied that had sufficient quantities been offered to the steamship companies to make it commercially practicable to proceed to Bristol for discharge, you could not have secured direct shipments at an equal rate of freight?—What does that amount to?
4462. If you had had cargo, are you satisfied that the lines would not have given you a service to Bristol?—We have never been offered that, and we have asked several times about it.
4463. You recognise, as a business man, that a steamer is an expensive thing to run, and cannot be put on to any port or ports for small shipments?—Yes.
4464. Are you aware that as soon as Mr. Pearson and other big crushers at Hull showed their willingness to deal on a business basis with palm kernels and approached the shipping companies, they at once put on a direct service to Hull from West Africa at exactly the same rate of freight as to Liverpool?—Was that not since this Committee was appointed?
4465. No. Directly after the war started they brought about 20,000 tons.—Since this Committee has been appointed we have received offers at about 2s. 6d. over the Liverpool price. The position seems to have altered, but I am speaking of what was happening before the war.
4466. We have had evidence that before the war no Hull crusher seriously entertained the business, but that directly after the war and long before this Committee was appointed they approached the shipping companies. You were not aware that they had got a direct service by asking for it?—I thought it was when this Committee was appointed.
4467. (Sir W. G. Watson.) With regard to Bristol there is a very good local market for cake?—Yes. We have a good cake trade generally—in the Cheddar Valley, for instance.
4468. There is rather a small local market for the oil?—That is what we suffer from.
4469. What is the percentage of oil in the various cakes that you crush?—For Egyptian Cotton seed it is about one-fifth.
4470. About 20 per cent.?—Yes.
4471. Linseed?
- (Mr. C. C. Knowles.) 33 per cent.
- (Witness.) I was thinking it was two-sevenths
4472. (Sir W. G. Watson.) Soya beans?—About 11 per cent.
4473. In other words, those are comparatively low percentages of oil compared with palm kernels and copra?—I do not admit that. I think that linseed is a very oily seed. Good linseed has 38 per cent. of oil in it and even 39.
4474. What percentage of oil have palm kernels?—I think they get half out.
4475. 50 per cent.?—Yes. Linseed has not so much oil as palm kernels.
4476. That is my point.—But linseed is a very oily seed. It has nearly 40 per cent. of oil.
4477. But less than kernels or copra?—Yes.
4478. Now is it not very important that when you are crushing seeds or nuts which contain a very large proportion of oil (copra or kernels) you should be close to the market for the oil. It is more important, is it not, to be close to the market for the oil than to be close to the market for the cakes because the oil is not only of more value but even weighs heavier than the cakes?—With a very oily seed, you mean?
4479. Yes?—We should run it up to your place, the Maypole Dairy Company.
4480. But you would have freight to pay?—We are using tank wagons very considerably now.
4481. You might run it up in that way certainly. Have not the German millers had a great advantage in having margarine factories in close railway or river connection with them as compared with the British miller who has to send across the sea to get to the factories?—Are the margarine factories situated close to the mills?
4482. Yes.—They would save the carriage then.
4483. More than half the margarine consumed in this country is made in Holland and therefore it pays margarine manufacturers to get supplies from German oil millers rather than from British oil millers.—But you see we are letting 100,000 tons of splendid Egyptian oil go to Germany and they move it from there to Holland.
4484. That is right.—Why cannot we have it? You know what fine oil Egyptian cotton seed makes, do you not?
4485. I can enlighten you. The best cotton seed oil for edible purposes is undoubtedly American.—Yes.
4486. Germany cannot get that best quality because there is a heavy tariff on oil to Germany from America, and that is the reason why they go in for Egyptian cotton seed.—I take it that it is so, but American oil goes into Germany in spite of that. I was looking at a list the other day and noticed that it is so.
4487. Was that list before the war began or since?—Before the war. It said so many barrels into such and such ports. I suppose the ports are Bremen and Hamburg as far as I remember.
4488. That might possibly be for re-import to Scandinavia?—It may be so.
4489. (Mr. T. Walkden.) I wish to ask you a few questions as an importer. As you know, before the war, the bulk of the kernels went to Hamburg?—Yes.
4490. Practically 50,000 tons only came to Liverpool or our English ports and that is a very negligible quantity. You said that this trade had been lost to Bristol, or that Bristol had been crushed out?—Frozen out.
4491. Frozen out. Since the war commenced the bulk has come to Liverpool, has it not?—Yes. I have heard that the arrivals in Liverpool of palm kernels have been tremendous during the last few months or so.
4492. The importers naturally are very anxious to dispose of their products from West Africa?—Yes.
4493. Have you ever approached any importers since or previous to the war about your crushing palm kernels?—We bought a 50-ton lot through a broker to see how far our machinery would enable us to crush to advantage, and finding that we could not crush to advantage it was no good going on.
4494. And therefore you would have to put new machinery down?—Yes.
4495. If you could come into close touch with the importer, would he not find a means of getting the kernels to Bristol?—Do you mean now?
4496. Yes.—It is no good now, we have not suitable machinery.
4497. As a previous witness said, if you seriously desire that kernels should come to Bristol you could get a line of steamers as has been done to Hull?—You mean now?
4498. Yes.—We have not the machinery, but I expect in Hull they are using the solvent process for getting the oil out.
4499. I suppose so, and also the crushing process. You have imported ground nuts?—Only since the war.
4500. Because you find you can crush them?—Yes. We bought a couple of cargoes because we could crush them.
4501. You could get those in a chartered steamer?—Yes, about 1,000 tons in a steamer. They are very light. They take up a lot of room. We were able to get convenient sized steamers.

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4502. After the war you would not be able to touch them, or would not touch them?—We could touch them by putting in decorticating machinery, but it would not be of any good without putting decorticating machinery in.

4503. You would not take the crushing of ground nuts seriously in normal times?—We know something about ground nuts now which we did not know before. We know that the farmer will buy and likes the cake. That is a great step. It is quite a new thing in the Bristol Channel. The farmers will come again. They say it is suitable cake for milk producing.

4504. You have not taken palm kernels seriously as the Hull crushers have done?—We cannot crush palm kernels now. I wrote to our engineers. Our engineers are engaged on war work and cannot do anything, so it is no good following it up.

4505. You have not thought seriously of erecting machinery so that the palm kernel trade could be retained?—Yes. I wrote to our engineers to know if they would take an order if we gave them one. They will not take it.

4506. You mentioned R. W. King. They were the first that had sailing vessels to the West Coast and they were frozen out?—Yes.

4507. Why?—Steamers would naturally freeze out sailing vessels. That has happened in other cases—with the River Plate linseed and Egyptian cotton seed. The steamer has taken the place of the sailer, but we can get River Plate linseed and Egyptian cotton seed direct in steamers.

4508. They had to pick up small quantities at so many ports that it did not pay R. W. King, and that is why they lost the trade on the West Coast practically?—It did not pay them to bring the seeds home.

4509. (Mr. Worthington.) Where did your ground nuts come from?—Gambia and Rufisque.

4510. West Africa?—Yes; so they would come under this inquiry, would they not?

4511. (Mr. T. Wiles.) Do I understand that the weekly out-turn of all the ports fed by the Bristol Channel is 3,500 tons only?—Did I say that?

4512. Yes.—I should say that that is the minimum. At Sharpness, which I am including, it would be rather over that, I think.

4513. Has the capacity of the mills increased during the last five or six years?—Our last extension was about six years ago, when the soya bean began to come. Yes, it has increased.

4514. If you put up another plant for crushing kernels do you consider that it would displace any of the trade in linseed and cotton cake or compound cake?—I do not think so. A tremendous lot of foreign cake comes into Bristol from other places, and then there are maize extract and things of that sort. It would take the place of those, I think, to some extent. Agriculture is flourishing and I think there is plenty of scope for more cake being sold.

4515. Do you think that there is sufficient trade for a shipping line to have a weekly or fortnightly steamer from West Africa calling at the Bristol Channel?—Well, you see, we have gone into that a bit locally. We tried to get Fry's, the cocoa people, to interest themselves in it, but they did not seem inclined to. They buy a lot of cocoa, I think, from there.

4516. Can you give any reason why there is no line from West Africa to Bristol?—No, I could not. The only thing I can think of is the difficulty of outward freights, but that is generally got over by ships going to Cardiff or Newport on the tide and taking coal back. They first cross the Bristol Channel. Although people talk a lot about there being no outward freights from Bristol there are good outward freights from the Bristol Channel in the shape of Welsh coal.

4517. Since the war began I think you say you have received offers of kernels to Bristol at 2s. 6d. over the Liverpool price?—Yes. I can show you a letter if you like.

4518. Before the war, had you never any offer at all to Bristol?—If we inquired it was always 10s. or 12s. 6d. over.

4519. Does not that suggest to you that there is likely to be a shipping line to Bristol?—There is an

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opening for one I should say. A ship going to Liverpool may drop 1500 or 2000 tons now and then. That is done by some ships. They drop 1,000 tons at Bristol on the way to Liverpool sometimes.

4520. If you heard that a shipping company was making arrangements for kernels and other produce from West Africa regularly, would you have sufficient faith in that to put up machinery?—Certainly, I think so, but I cannot say. I am only chairman of the Company. Do you know Sydney Robinson, one of our Directors?

4521. Yes.—I think we should.

4522. Do you think that the promise of a shipping company to call there would be sufficient to warrant your recommending your Board to put up machinery?—Yes, I really think so.

4523. (Mr. T. H. Middleton.) How much ground nut have you crushed?—Just about 2,000 tons. That is all within the last few months. Until the war we had not done anything.

4524. Roughly, how much cake did you get from the 2,000 tons?—I am not quite sure what ground nuts give. I should think that we should get out of 2,000 tons about 1,600 tons of cake.

4525. What percentage of oil does the cake generally contain?—We are leaving about 7 or 8 per cent. in.

4526. Did you find any difficulty in starting ground nut crushing?—We only had to alter the rollers a bit, that was all. It goes through heavy steel rollers. We altered them to crush the ground nuts.

4527. You have already said that farmers like the cake and are coming back to you for it?—Yes. We doubted at first whether they would like it, but they do like it, and they say it is a capital thing for keeping the milk supply up.

4528. Have you had any complaints about the cake not keeping well when stored?—No, I cannot say that we have. Trade has been pretty active and there has not been any need for us to stack it or for the farmer to stack it. It has gone off pretty well. I have read in articles that it does not keep, but in our experience it does. It keeps well enough for commercial purposes I should say.

4529. Do you know of any case where it has been kept as long as three months?—No. We have had a busy summer and farmers have taken it off pretty well as it has been made. We have been able to sell it promptly so we have not kept any as long as that.

4530. (Professor Dunstan.) I gather that your view is that there are possibilities, everything being equal, of a trade in ground nuts and palm kernels with Bristol?—Yes; I have really no doubt of it myself.

4531. It seems to be probable that you would have a good market for cake, but there seems to be some doubt as to whether you might have some difficulty with the oil?—Three-fourths of our oil goes away so that three-fourths of the palm kernel oil would have to go away as well.

4532. What about the ground-nut oil?—That is going away too.

4533. You have no difficulty about it?—No. It goes to France—a good bit of it.

4534. Whether you can depend on a large market is rather doubtful?—We are refiners ourselves. They seem to want crude oil in France.

4535. You probably know that since the war began most factories in Marseilles have been working for a very short time, and some have closed altogether?—I think that they have recalled men from the front and are running them now.

4536. To a very small extent, I believe. Taking it generally, you do not doubt, as a business man, that you could make a profitable transaction out of the ground nuts and palm kernels at Bristol?—I really believe so.

4537. But you would not consider that possible under the conditions which obtained before the war, especially in relation to Germany?—They do not like the palm-kernel cake. That is why I feel sanguine about ground nut. Palm-kernel cake has to be bleached or put into compound cake. They take the ground-nut cakes by themselves.

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4538. Ground nuts have hitherto gone to France, and palm kernels have hitherto gone to Germany. For the moment, as far as the Committee is concerned, the more important question is that of the palm kernel.—And the ground nut too. They come from the West Coast.

4539. I agree, but the main question is that of the palm kernels. There is probably more urgency in reference to the palm kernels. You insisted just now on taking palm kernels and copra together?—Yes.

4540. What you meant was, that in your own business you would have to consider the price of the one as compared with that of the other?—We like to have two strings to our bow. If we put in machinery and one crop fails, the machinery is idle unless we have another.

4541. You would have no difficulty in dealing with palm kernels?—No, I believe we could do it.

4542. You told the Committee that up to the present time you have been crushing undecorticated ground nuts?—Yes.

4543. You would not propose to do that if you went on, would you?—Well, I have been pleased, as I said before, with the way in which the cake has gone off. The farmer in England does not always want a decorticated cake. You can feed an undecorticated cake out at grass. You know what scouring in animals is?

4544. Yes.—Cotton cake stops that, and the ground nut does the same.

4545. You do not find that they object to shell in cake?—No. It is that which prevents the scouring.

4546. In France they have found rather the opposite to be the case. Very few mills will crush undecorticated ground nut.—That is because they have their eye only on the oil, is it not?

4547. I am told not. It also affects the cake I am told.—In France it is straw feeding-chaff and things, whereas here the farmer feeds in the open.

4548. How will it affect your oil? Will you be able to produce a ground nut oil of a quality suitable for edible purposes?—It would not be so good for edible purposes whether decorticated or not.

4549. I take it you look to ground nut cake and palm kernel cake taking the place of a number of these imported cakes?—Yes, and meals.

4550. You think you can successfully compete with those?—Yes, I think so.

4551. The ground nuts you have crushed have come almost entirely from the Gambia and West Africa?—Yes, entirely.

4552. You have bought none from India?—No, I have bought none from India.

4553. (Sir Hugh Clifford.) I understood you to say that even if you could get your raw material landed in the Bristol Channel at the same rates as at Liverpool you would not be able to compete unless some form of protection was afforded to you?—I think what I said was that we want to be put on the same terms as the Germans.

4554. Which means, I take it, that something in the nature of a protective duty on oil would be necessary?—Well, if they do not put a duty on we do not want it, but why should they have an advantage over us?

4555. Quite so. In the past they have always put a duty on?—Yes.

4556. What you would recommend would be that a similar duty should be imposed in this country?—Yes.

4557. You said that you have been a Free Trader all your life?—I have. I come from a Free Trade family, I am proud to say.

4558. On what grounds have you changed your opinion in this particular matter?—I will tell you what has changed my mind more than anything else, and that is the cotton seed business. We used to make all our money out of crushing Egyptian cotton seed. Now they have taken half the crop away, and in three years' time none will come to England at all.

4559. You think that without protection the crushing industry will be destroyed in England?—Well, we made nothing for two years until the war began. We may muddle on somehow if we get a dry summer and a rise in prices, and a boom in the market through intelligent anticipation of events, but we do not get any crushing margins. We have done well out of soya beans. We were about the first people to crush them, I think, there. We have stuck to them. Some people have given them up. A good deal of our mill power is engaged on them at present.

The witness withdrew.

Mr. ERNEST WALLS called in and examined.

4560. (Chairman) You are a member of the firm of Christopher Thomas Brothers, Limited, soap manufacturers?—Yes.

4561. You do not yourselves do any crushing, do you?—No.

4562. You buy oils of various kinds and make soap from them?—Yes.

4563. Please remember that we always realise that there may be some things you may not wish to make public, so do not feel yourself bound to answer any question that you do not want to answer. What sort of oils or fats have you been using mostly of late?—We are soap manufacturers, and in addition we have an important department which makes edible products of a special kind. As far as our soap manufacturing department is concerned, we are not large users of oils from West Africa. As far as our edible products department is concerned, we are large users of oils similar to those that come from West Africa, though hitherto we have not got our supplies from West Africa.

4564. I want to take each very briefly. On the soap side I gather that you do not use palm-kernel oil in any quantity, or copra oil?—Copra oil we use in considerable quantities.

4565. For soap?—Well, we are rather curiously placed in that way. We have an edible department which makes several products using imported coco-nut oil as the raw material. We press the coco-nut oil and get from it a stearine, which we sell as an edible product known as cocoa-butter substitute, which is used

by chocolate manufacturers. We also make certain other products of a similar type, but the cocoa-butter substitute is a rather highly specialised type of edible product, not in any way comparable to the soft butters which are used so largely for margarine. That type of edible oil we do not make at all. Less than 50 per cent. of the oil becomes the cocoa-butter substitute or stearine, and we have left over more than 50 per cent. in the form of oil which is not available for edible purposes, and it is used for soap-making in our own works. We use our own by-products entirely for soap-making, where a soap-maker in the ordinary way would use palm-kernel or coco-nut oil instead.

4566. In other words, your coco-nut oil in its comparatively crude state yields the first part, which you make up into what you sell for your specialised edible fats, and the residue you are able to use for soap after having sold the first at a higher price?—Yes.

4567. With regard to West African oil, would palm-kernel oil suit your purposes in the same way as coco-nut oil? Could you use it for edible fats and have a margin over?—Yes, probably so. Speaking of the edible trade, we first went into the business a good many years ago (as soap makers we are a very old firm), and it was at the very outset of the use of coco-nut or palm-kernel oil for edible purposes. We experimented on both, the coco-nut oil coming mainly from Ceylon and palm-kernel oil from Hamburg. We found that we could not make a product suitable for our requirements from palm-kernel oil at that time. We have practically to guarantee that our cocoa-butter

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substitute will remain sweet practically for an indefinite period. In that way it is rather different from ordinary edible fats or butters.

4568. They are only expected to keep for a short time?—Yes. Our cocoa-butter substitute forms the base of chocolate; it has to be re-manufactured by the chocolate maker. It is then sold by him and put into stock, and may be kept in stock for quite a long period, and it is absolutely necessary that we can say that our product will keep sweet for any reasonable period—several years.

4569. You could not even now say that you could treat palm kernels so as to use them in the same way?—Well, I do not know. I think that probably we are getting in that direction now. It was always very difficult, particularly when we were experimenting (and after you have experimented and made sure of your process, you do not want to be always experimenting), to know whether the palm-kernel oil which we got from Hamburg was pressed, crushed, or extracted. It was always very doubtful. There is no question about it that extracted palm-kernel oil was absolutely useless for our purposes. There was undoubtedly great uncertainty at that time. In view of the special characteristics which we have to get in our cocoa-butter substitute, we found that certain types of coco-nut oil were not suitable for our requirements. We had to pick and choose our coco-nut oil. Some coco-nut oils we could not use because they would not make a suitable product. Practically we found that we could only use Ceylon or Cochin coco-nut oil. Now, those oils are crushed when the thing is fresh, and therefore they would tend, in any case, to be sweeter for our purposes than oil crushed from palm kernels which have been lying about a long time and then are imported into the country.

4570. Would not refining do away with that?—Well, now that palm-kernel oil crushed in England is available and you can be sure that a certain maker's palm kernel is crushed and not extracted by sulphide or similar solvents, it probably follows that you would have more control over the oil, and would know that it was fresh, and so on; and we have been of opinion that it would be useful.

4571. Do you find, generally, that oil obtained by extraction is of a different quality from oil obtained by crushing in the case of palm-kernel oil, or possibly coco-nut oil, too? Would you say that it was different and of a rather less marketable quality?—Yes.

4572. Distinctly? You would not like to say whether that is due to some taint due to the solvent remaining in the oil, or to the fact that the solvent has taken some characteristics out of the oil which are left in by crushing?—I should think that it was the former case. I do not see that there is any reason to suppose that in an oil which you have before you which you find will remain sweet for a long period, that may be due to anything present in the oil. I think if you have an oil which does not remain sweet for a long period it is more likely that that is due to something present; but refining these oils is a very ticklish process, one may say, and you can never be quite sure what you have done to an oil that has made it tender—which is the word that would be used; that is to say, liable to become rancid. Our experience is that if the oil has been obtained by solvent it is very tender.

4573. (*Sir Hugh Clifford.*) In the past your firm has never worked with palm-kernel oil bought from any firm in England, I understand? It has always been imported?—Yes, we have in past years experimented with palm-kernel oil made in England.

4574. Made in what part of England?—Liverpool. I am talking of, say, ten years ago.

4575. But not on a very large scale?—No, not on a very large scale.

4576. During the ten years immediately preceding the war any palm oil you used was imported, speaking roughly?—Yes, I think so.

4577. From where did it come?—I think entirely from Hamburg.

4578. Did copra oil that you get from Ceylon come direct from Ceylon?—Direct to London.

4579. Did you get it from Freudenberg's?—We have had their oil and Vavasour's oil.

4580. You get them direct from the crusher in Ceylon?—I could not say that, but we were always well aware whose oil we were getting, because it was always bought on the market in London. You were not necessarily sure whose mark you would get, but generally we have specified our mark.

4581. What marks did you usually specify?—Most of the oil from Ceylon which we have used was Vavasour's oil. And Volkart is another mark which we like.

4582. Of late years it has practically not been possible to do any deals with British merchants for palm-kernel oil?—No, except on the market. You could be offered on the market Hamburg crushed palm-kernel oil without dealing direct with the crusher.

4583. Quite so, but the place of origin was Hamburg and not Liverpool, for instance?—Yes, certainly.

4584. (*Professor Dunstan.*) Your firm, I believe, has a connection with Lever Brothers, has it not?—Yes.

4585. Is there any interchange of products between your factory in Bristol and Lever's factories elsewhere?—Yes.

4586. So you are able to work in with the products that are made at Port Sunlight your own products in Bristol?—Yes.

4587. You have been asked by Sir Hugh Clifford about the coco-nut oil from Ceylon. You said that it generally had the mark of Vavasour and Volkart?—Yes.

4588. That oil has been produced by modern European pressing methods distinct from the native methods?—Yes.

4589. A very large quantity of the coco-nut oil that comes on the market has been made by native methods and is therefore unsuitable for your particular purposes?—Yes.

4590. You gave your views about extracted oil, especially extracted palm-kernel oil and pressed palm-kernel oil; you compared the one with the other?—Yes.

4591. Was that about the same date?—Yes, about the date of our experiments.

4592. About ten years ago?—We made very extensive experiments at that time. I do not say that we have not made others in the meantime.

4593. You have a chemist of your own?—Yes; a dozen chemists.

4594. Have you recently examined a sample of extracted palm-kernel oil in comparison with a sample of pressed palm-kernel oil?—No, not on a large scale. We have not made large scale experiments with extracted palm-kernel oil for ten years. Perhaps we did six years ago, but not for a long period.

4595. Your impression some years ago was that the objection to the extracted oil arose from the presence of something derived from the solvent?—There was nothing noticeable in the taste of the product. I doubt if you could distinguish the products, but we had then to keep our experimental makes for a year and examine them in the interval, and stearine from no extracted oil ever remained sweet at the end of twelve months.

4596. Was that German extracted oil?—Yes, I think entirely German extracted oil.

4597. It occurs to one that it is quite possible that that oil was inferior, because inferior palm kernels were used in producing it.—There is always that possibility.

4598. My own view is that it has not yet been proved that extracted oil properly prepared is inferior to pressed oil.—Of course, you must start out with palm kernels or copra of the sweetest possible kind and in good condition.

4599. Exactly.—On the other hand, the process which we use for making cocoa-butter substitute, which consists of putting coco-nut oil under hydraulic pressure and removing the oleine, is in a way comparable to the crushing of copra. It is, so to speak, carrying it a little further. There have been in existence processes for making cocoa-butter substitute by alcohol extraction, all of which gave products which were tender and I believe have been abandoned. I could not say defi-

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nitely, but I believe so. They were in vogue, for instance, in Marseilles.

4600. Your requirements, I agree, are very special, and it may be that there is this difference between the

Sir FREDERICK LUGARD in the Chair.

4601. (*Professor Dunstan.*) Have you in your business had any experience with hydrogenated oils?—Yes.

4602. Are you using them to any extent? Do not answer what you do not want to.—Yes, we are using them to some extent.

(*Professor Dunstan.*) Will not they to some extent take the place of palm kernel oil or even of coco-nut stearine?

(*Mr. C. C. Knowles.*) I do not think that that is a question we ought to go into.

(*Professor Dunstan.*) We have already gone into it. It is a very important question in connection with the future of this industry.

4603. (*Professor Dunstan.*) I will ask the question in very general terms. You have employed hydrogenated oils in your business?—Certainly.

4604. Could you answer this question: do you consider them serious competitors with the other natural fats that you have been using?—Not for making cocoa-butter substitute at all.

4605. (*Mr. J. Couper.*) You know that the object of this Committee is to divert from Germany the trade in edible nuts which she formerly did with West Africa. Now, how would you achieve that object?—Well, in the first place, by having established in Great Britain sufficient crushing capacity to deal with the palm kernels, and in the second place by crushers and those interested being assisted in some way to maintain the business. The palm kernel business is one which, for the reason I have already given, we have not been directly interested in, but it is closely parallel with the coco-nut oil business. We are very large users of coco-nut oil. It seems to me, from our experience of coco-nut oil, that we want cheap freights from West Africa to England, or at any rate an abandonment of the old agreements and rings which certainly are not in the interests of Bristol, the port I am specially interested in, in that they make it very difficult for new lines to be established or for the shipper to have freedom as to the line he would ship by.

4606. Then it is only a question of expense in bringing the product to Bristol. That is all the assistance you want?—Yes, I think so, from Bristol's point of view.

4607. Would it be possible for any practical purpose to obtain cheaper freights to any English port than to a German port? Can you expect to get a preference for any English port over a German port?—Do you mean under pre-war conditions?

4608. Yes.—I do not think you could.

4609. Then how do you propose to get that assistance which you say the trade requires?—Well, it appears that the German importers receive from their Government some assistance in the way of a bounty or in the way of rebate. In some way they receive assistance in importing their products from the coast to Germany; and it seems to me that it should be possible for the British Government to help the British importer of palm kernels in the same way.

4610. Not in the shape of any duty?—I should not think so.

4611. Do you think then that a difference of 10s. a ton, say, in regard to palm kernels would make all the difference if that were assured to the British importer?—I imagine that it probably would, but it is not a question I am qualified to answer except by giving an opinion.

4612. You are not in favour of any protective measures?—I should not be in favour.

4613. Neither in regard to the palm kernel nor its product, the oil?—No. It is of interest in that connection to say that the export duty which has been levied as from October 1st in Ceylon on coco oil was immediately followed (it may be a coincidence) by a rise in the price of Ceylon coco-nut oil to the amount of the tax.

two oils. I want to be quite clear that your comparison has been made with the same material got from the same nuts, and it is not quite clear that that is so.—No. You would have to be perfectly sure.

4614. You mean that the consumer is going to pay for it, or it looks like it?—The consumer apparently is paying. Possibly the producer is also paying. Possibly there is payment at both ends. I do not know.

4615. Is it a discriminating tax?

(*Sir Hugh Clifford.*) It is a war tax designed to contribute a million sterling to imperial funds.

(*Professor Dunstan.*) No rebate is given to this country.

(*Sir Hugh Clifford.*) None as far as I know.

(*Mr. T. Wiles.*) Does your firm buy its oil in the open market in the ordinary way?

(*Witness.*) Yes.

4616. Through a broker or something of the kind?—Yes.

4617. You practically always buy imported oil from Hamburg?—We have not bought any oil from Hamburg for many years, because we have used entirely Ceylon coco-nut oil for our product.

4618. Does the oil come here before it is sold, or do you generally buy it to arrive?—We buy it to arrive almost always, or on the ocean.

4619. It is not what is called dumped here, I understand?—Very, very rarely.

4620. You make the contract for shipment in different months?—Yes.

4621. It is not sent here to be sold to the highest bidder?—No, that method of sale is not adopted.

4622. If a duty were put on the importation of oil into this country that would affect your business, I take it?—Certainly. It could have a considerable effect on the cocoa-butter substitute. Anything which increased the price of raw oil 1s. a ton, any circumstance whatever, would increase the price of the cocoa-butter substitute about 2l. 10s. a ton, because we get less than 50 per cent of coco-butter substitute out of the oil; and the pressed coco-nut oil which we use for soap-making instead of palm kernel oil would not have any higher value than the ordinary market price for similar products.

4623. If a duty were put on the importation of this oil, would you put up your prices to the public because of it?—Well, we should be bound to do so.

4624. You would put up your prices, I take it, all round?—We should be compelled to because it would be an extra cost.

4625. (*Mr. T. Worthington.*) You said just now, I think, that you did not wish to see any duty on palm kernels or oil from West Africa?—Yes.

4626. You also mentioned that the Germans had an advantage in the shape of some kind of bounties that they received. Will you tell us what the bounties are to which you refer?—I think that I used the word "bounty" rather inaccurately. I was meaning some rebate or discount or bonus on freights. I was not thinking of any fiscal question. I was referring entirely to freights that have hitherto existed.

4627. Not a Government matter?—No.

4628. Have you been able to investigate what you allege?—I could not say that I could give any detailed information, but it has, I think, been general knowledge that under the shipping rings there has not been what I would describe as freedom of action.

4629. But is it not a fact that British steamers have been by arrangement making the same allowances as steamers to Hamburg?—Yes, I believe so; but at the same time I have always understood that if it were found convenient to send freight (not being direct shippers of these articles I am not so much in touch, of course) by another line by a shipper in Ceylon of the oil which we get, if we did not belong to the ring the shipper would not obtain his rebate at the end of the year, or it might be withheld from him. The ring could hold that over him as a threat.

4630. What you mean is that the same thing occurs in the West African trade?—Presumably so.

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4631. Do you think that a West African merchant shipping to Hamburg could charter an outside steamer?—I imagine that he could not without running grave risks.

4632. Then there is not any advantage that I can see in that way between the position of the importer who pays the freight in Hamburg and the position of the importer who pays the freight in Liverpool?—No except in the matter of freedom of choice; and therefore to some extent one could imagine a certain amount of stifling of competition between lines.

4633. In either case the man would lose rebates on shipments by regular lines if he chartered outside of them?—Yes.

4634. I do not see where the advantage that you refer to as equivalent to a bounty comes in?—You mean as compared with Germany?

4635. Comparing the business in Germany with that in England. What advantage would the Germans have?—I take it that they would both have been on the same terms in the past.

4636. (Mr. G. A. Moore.) Messrs. Lever Brothers are crushing oil in Opobo and Lagos, as I presume you are aware?—Yes.

4637. Did you ever have a sample of that oil to test and find out whether it was in any way different from the palm kernel oil bought in the ordinary way?—You are referring to palm kernel oil?

4638. Yes; that is the only oil they crush in Opobo and Lagos.—No, I do not think we have tested oil crushed there at all.

4639. I think I understood you to say that you have not tested any extracted oil in recent years?—No, I do not think we have tested any for quite six years.

4640. Have there not been many advances in the processes of extraction recently?—Yes, certainly.

4641. It might be worth while to test now and carry out what Professor Dunstan suggested?—Yes, I quite agree that it is advisable to test, and indeed we have been for the last twelve months conducting a number of tests, but about none of them could I give any information, because you have to wait a year before you know anything of the result.

4642. (Sir W. G. Watson.) You spoke of shipping rebates, and you also mentioned Ceylon in that connection. Is it within your own knowledge that there are any shipping rebates in connection with Ceylon?—In this way it has come to my knowledge: the Bristol Chamber of Commerce was very anxious to get direct shipments, not only of coco-nut oil but of other Ceylon

products from Ceylon, and we were asked whether we could help, and, of course, we said that we were large importers of oil from Ceylon and we would certainly help. The Chamber of Commerce, through some of its members, and I think somebody connected with the Docks Committee, went very thoroughly into the question at the time, and their report was that they were not able to establish direct connections from Ceylon to Bristol and back for that reason.

4643. My own impression is that Ceylon is quite free so far as shipping is concerned. That does not apply to Singapore or Penang.—I am particularly basing my statement on that experience, which is perhaps three or four years ago.

4644. (Sir F. Lugard.) You are against any form of protective duty you told us, either as an export duty from the Colony, or as an import duty at this end. Did I understand you to say so?—That is judging it purely and simply from the point of view of our own particular product. I cannot see that anything but disadvantage would accrue from that.

4645. But still you desire to have an equivalent basis with Germany. In what way then would you put it—simply a difference in freights?—A difference in freights—some advantage in freights.

4646. Should that involve Government action, or should it be simply a matter for the shipping companies, would you say? I want to make it clear. Did you assume any kind of legislative interference by this country or in the Colonies, or is it a matter for the shipping companies only?—I imagine that it could be carried through by the shipping companies themselves. On the other hand, one little instance, where our port did get for a time some temporary advantage in the way of development of the trade in Bristol, was during the period when the Elder Dempster line from Bristol to Jamaica was supported to some extent by an allowance by the Government for mails. It was helped in some way really by the Government, and during that period the trade between Bristol and Jamaica was developed very much.

4647. (Mr. J. Couper.) How many soap works are there in the Bristol district?—In Bristol itself there is only our works, which is the last of about 300 which I believe there were in the 17th century.

4648. Are there no other soap works in the Bristol Channel at the present time?—No. There are soap-works at Exeter and Plymouth which would be fed from Bristol.

4649. Are Messrs. Lever interested in these?—I really could not say.

Adjourned for a short time.

Mr. STEEL MAITLAND in the Chair.

Mr. CURTIS called and examined.

4650. (Chairman.) We are much obliged to you for coming here. You are a member of Messrs. Curtis's firm of seed crushers in Bristol?—Yes. At present I am the only principal. Mine is a private firm and my two sons are at the Dardanelles.

4651. Do you crush all kinds of seeds and kernels?—Not kernels; we do not touch those; we touch linseed, cotton seed and soya beans.

4652. Copra?—We do not touch that. The same thing would apply to palm kernels as applies to copra. We have touched ground nuts. I do not know whether that interests you or not. That is a new venture. We have had in 4,300 tons and have another 1,000 tons to come.

4653. The object of the Committee is to see how far the trade established in Germany before the war which consisted very largely, so far as West Africa is concerned, of palm kernels, can be established here on a permanent basis.—More so than ground nuts I take it.

4654. The ground nuts trade before the war was principally with France. Our terms of reference apply principally to Germany. Have you ever considered the question of crushing palm kernels?—Yes.

4655. You have been into it yourself as far as you can?—We have not altered our machinery. We could

not get machinery altered at present owing to war conditions.

4656. At present it is impossible, but I am speaking of before the war. Have you considered it once?—Since the war commenced it has opened our eyes to a lot of things. In the spring of this year I made up my mind to go in for ground nuts and bought three or four cargoes right away when they were fairly reasonable and that has been going on more or less since.

4657. As regards palm kernels, since the war started you have been considering the subject?—Yes.

4658. It would mean putting in specialised machinery?—I take it that we could adapt our present machinery to it by alterations.

4659. Is it the Anglo-American press, if I may ask?—Yes.

4660. You know that there is specialised palm kernel machinery?—Yes; box presses are the principal things.

4661. By which you get a great deal more oil out of the kernel?—Palm kernels will not keep in the presses without some special arrangement. It is not like the ground nut in the shell or cotton seed or linseed.

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Mr. CURTIS.

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4662. Do you think that the Anglo-American press would be up to the work?—It could be adapted I think.
4663. Could you get to anything like 6 per cent. of oil?—Not without two pressings.
4664. That would be expensive, would it not?—It means half the output and double the expense in working.
4665. In other words, using Anglo-American presses would not be as good a business proposition as new machinery, if you could have it?—Very likely not but we have at present machinery and we could do a lot more than we are doing at the present time. We could do 16,000 tons a year more than our biggest year at present if we kept running all the year with the exception of a fortnight for repairs.
4666. If you were asked to put up machinery or to adapt your machinery for palm kernels in this country, would you feel inclined to do it as things are when the war came to an end. I will not mention a definite time.—It has to come to an end.
4667. At some time or other.—And we believe, as Englishmen, that it is coming to an end in our favour.
4668. Supposing it was within the next year, or some time in 1916, would you think it safe for people to put up mills in Bristol for tackling palm kernels?—No, not to put up mills. Our present output in Bristol and the Bristol Channel is a very large one. I used to be with Messrs. Robinson, and I know them fairly well, and Foster's at Bridgwater. It is a very big output. We could increase what we do at the present time, I think, at least 40 per cent.
4669. Mr. Robinson this morning told us that the whole of the Bristol and Avonmouth and Bristol Channel ports came to something like 4,000 tons a week.—Yes, about 200,000 a year.
4670. Under what circumstances should you feel yourself justified in adapting your works to palm kernels?—You would have to protect us against Germany by an export duty on the kernels, or nuts, or whatever it was, or by seeing that Germany never puts any duty on oil.
4671. At present, as you know, quite apart from the duty, there are certain advantages which Germany enjoys; that is to say she has always a market at Hamburg for kernels, which there is not in England?—Liverpool would have that more or less. I take it, at the present time.
4672. You may take it from me that Liverpool has not got it actually at the present time. Are the landing charges at Bristol and Hamburg much the same?—I should think so. Ours might slightly exceed on account of labour, and by-and-by if we have a lot of trouble with the dockers, we shall have to have special arrangements and machinery for discharging the cargoes.
4673. Are the mills near the landing stage?—We have rail accommodation, not water. We have made arrangements with regard to Bristol Docks by which we shall have a slip in the canal—a feeder it is called—for the seed. We shall be equal to anybody in the Kingdom.
4674. You will have cheap carriage?—Yes.
4675. Now the Germans having already got the trade means something?—Of course it does.
4676. That is always an important factor?—Yes.
4677. Would you say that your product in cotton-seed oil was up to the German product?—Not quite, but pretty nearly—within 10s. or 20s. a ton. We are having alterations made at the present time, and we hope to make our product quite equal to theirs or to that of anybody in the Kingdom.
4678. You have certain existing disadvantages?—Practically nothing.
4679. You do not think that the existing disadvantages count for anything?—Not much.
4680. Is there much disadvantage with regard to getting cargoes to Bristol at the present moment?—Bristol ought to be one of the best ports of the Kingdom, and is, if we get freights right. Our difficulties as regards parcels are greater than those at Liverpool, but not for entire cargoes.
4681. Putting other questions aside, if you got a line, say, into Liverpool, you could not ask them to call at Bristol for a parcel of 100 tons, could you?—No.
4682. Only if it comes up to half of the whole cargo, or something like that?—Take ground nuts, as an illustration. We have been buying from the West Coast of Africa. We had in the first steamer 1,600 tons, next 1,000 or 1,200, then 800, and then 1,000. We can get those small shipments as cheap as they can to Liverpool or London, and cheaper than the Frenchman can to Marseilles.
4683. Do you attribute your disadvantage as against Germany at present to the question of freights?—Not so much freights, but it is a question of duties put on.
4684. You think it boils down to duties?—I think I am correct in saying that they have syndicates for all kinds of business in Germany. If they made up their minds to get a trade, they will arrange freights and railway charges accordingly, as the case may be.
4685. Really so far as goods have been shipped from West Africa to Hamburg and Liverpool or the United Kingdom, it has been in two hands, the Woermann Line and Elder Dempster, and they charge similar freights with similar rebates. Sir Owen Philipps, chairman of the Elder Dempster Company, is here, and he can put any point to you.—I am more interested personally in the tramp freights, the small steamers from the West Coast of Africa. I should very much prefer to get them for my firm's own requirements than the regular lines.
4686. That is all right from the Gambia, but could you conceivably get tramps calling at 90 different ports?—No, I do not suppose we could, and I have heard it hinted that the Elder Dempster Line put difficulties in the way of small steamers.
4687. Speaking quite frankly here, I know that that is thought but that does not much affect the question as between this country and Germany?—No.
4688. What is sauce for the goose is sauce for the gander whether it is good or not. In your opinion does it boil down to the question of the German tariff system really?—Practically.
4689. Would you think that an export duty in Africa, with a preference to this country, would meet the circumstances?—Certainly.
- 4689a. You think that it would?—Without any hesitation.
4690. If a duty were put against kernels going to Hamburg and at the same time they were allowed to go free to this country, that would help matters you think?—Quite.
4691. So far as the oil is concerned, palm kernel oil and coco-nut oil are practically the same, being almost interchangeable?—Pretty much so, I think, but I could not say for certain with regard to soya and cotton and ground-nut oil. But to corroborate what I say, we never touched ground-nut oil until the last three or four months. Now, the last week or ten days we have had a very fair market trade and are pushing that trade and we are not far behind the finished article in France, where there are experts.
4692. You think that an export duty on palm kernels would be the easiest way of getting over it on the whole?—Very much the easiest way.
4693. If it was found possible and compatible with the interest of the Colonies?—Yes.
4694. You say that you have been crushing ground nuts during the last few months?—We have crushed 4,440 or 4,500 tons.
4695. How would it compare with the finished product from elsewhere?—Our finished products for the cakes are quite equal to those from anywhere.
4696. Do you crush them decorticated or undecorticated?—Undecorticated. It is a totally different kind of cake. The undecorticated sells very rapidly. There is considerable difficulty in selling the other.
- 4696a. Why?—Because the farmers of this country want more of a binding cake with more woody fibre, The decorticated ground nuts have very little woody fibre.
4697. They are very rich in albuminoids?—Too rich by a long way, and not a safe feed at all, unless fed with something else.

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4698. Do you think that you would have any difficulty in getting rid of kernel cake?—A good deal. I should say. Possibly you have seen something in the "Morning Post" this morning in regard to experiments conducted in Scotland.

4699. No.—They say that palm-kernel cake has to be supplemented by locust beans to sweeten it.

4700. Then as regards ground-nut oil, you think you could get a product equal to almost any foreign ground-nut oil?—With a few alterations that have to be made, I think our product could be made quite equal to ordinary French oil.

4701. In quality?—In quality.

4702. Do you press them cold? Do not answer if you do not want to.—We do not press them cold.

4703. Could you get a quality equal to that produced by a first pressing cold?—I am hoping we shall, but if we do not and have to press twice, that makes a serious difference in the expenses of output.

4704. Obviously. It is a question of quality versus expenses of output?—Yes. I do not think it would answer.

4705. (*Sir George Plades.*) You said you thought that if an export duty were put on palm kernels from West Africa, it would induce you and other crushers to consider seriously the crushing of palm kernels?—Certainly.

4706. What, in your opinion, is the minimum export duty that would be sufficient?—Well, off-hand, it is not easy to say, but suppose it was 30s. or 2l. a ton. It might be less than that, one would want to go into figures.

4707. Have you given attention in this connection to the question of machinery for the collection? I suppose you imagine that it would first be collected and afterwards refunded on proof of crushing?—Yes; a drawback would be given for what was imported to the United Kingdom, say.

4708. A preferable system might be exportation under bond from the point of view of the merchant?—It would not matter to the crusher.

4709. No, it is not his concern, but if the crusher once adapts his machinery for crushing palm kernels, it is vital to him to have a constant supply at a reasonable price?—Yes.

4710. Are the ground nuts you speak of which you have been crushing all imported from the Gambia so far?—Yes, so far. We like Rufisque nuts the best. They are a little better quality than the Gambia nuts.

4711. Where do they come from?—Senegal—adjacent.

4712. You have been getting the French nut as well?—Yes; we bid for another cargo to-day. We are likely to go fairly well in for ground nuts.

4713. From the Gambia?—Yes, not direct, but through London brokers.

4714. The Gambia product interests us.—Yes; we are likely to go in for that.

4715. Nearly all the trade in Gambia ground nuts has been done by the French hitherto?—Yes. They are not so big sinners as the Germans perhaps, but they put on a duty. We have been sending a lot of oil and they have penalised us. The last week or ten days things have been a little firmer, and we have made considerably more money for the home trade.

4716. Supposing that before the end of the war, the West African Government should impose a duty of 2l. a ton (to take your figure) on kernels not crushed in this country, what practical effect would that be likely to have on you? I do not want you to commit yourself to anything. If such legislation were passed would it induce you to take active steps for crushing palm kernels in future?—Certainly, if we thought that there was a chance of that being permanent.

4717. Assuming that it was passed, do you consider that that would be sufficient to turn the scale and cause you to set up new plant or adapt plant to crush palm kernels?—A few years ago we thought of increasing our machinery. We should not do that so much for linseed, cotton seed and soya beans, we have plenty for those. We should do it to keep our mills running all the year and take palm kernels and

ground nuts and sesame seeds and shea nuts for instance.

4718. You are satisfied in your own mind that there will be a market for any amount of oil that can be crushed in this country?—Not altogether in this country; sometimes we shall have to export.

4719. But I said a market wherever it is. Do you think that the world's demands for oil products will be even in excess of supply?—Yes; it will get bigger and bigger as time goes on. There is no question of that, I think.

4720. You see no reason why you should not find an external market as well as one in the United Kingdom?—Personally, if anything of the kind arose, I should be prepared to extend our machinery. We have room both as regards land and accommodation to double our plant.

4721. You do not hold the view that oil crushing in England is a dying industry?—Not if it were placed on equal terms.

4722. You think that the measure which has been suggested would put you on equal terms?—Yes.

4723. What you fear is not ordinary trade competition, but competition organised by a foreign Government?—Yes, and not fair from an Englishman's point of view.

4724. (*Sir Hugh Clifford.*) Have you had a large experience of crushing copra?—None at all.

4725. Perhaps, then, the question I was going to ask you will be one which you would find difficulty in answering. Supposing that the export duty on palm kernels, which you suggest, were imposed in West Africa, would not the immediate effect of that be, in so far as it checked the import of palm kernels to German ports, to stimulate the importation of copra into those ports?—It might, possibly. It depends on how many other things they could get to keep their mills running, if they could keep them running.

4726. Quite so—that is to say other oil-producing seeds from British Colonies or from Egypt?—Yes.

4727. Then in other words, the duty imposed in West Africa on palm kernels would be for the protection of one product from the British Colonies only, at the expense of the others?—It might be, but if Germany was on equal terms with regard to cotton seed (she has touched us up very keenly in the past) we should not fear Germany or any other country in the world.

4728. You would require protection not only with regard to palm kernels, but with regard to Egyptian cotton seed and possibly also copra?—We should say to Germany "You shall not put a duty on, or if you do, there will be a different arrangement with regard to your buying these things." We want to be placed on equal terms.

4729. You would wish to be placed on equal terms and would require to be placed on equal terms, not only with regard to palm kernels but with regard to all oil seed produce from British Colonies?—If we let Germany put 6l. a ton on cotton oil, the same thing would operate as in the past. Our industry has been to some extent destroyed.

4730. Really the protection of palm kernels alone would only touch a very small corner of the oil crushers' market?—Yes.

4731. (*Mr. L. Couper.*) Have you considered the effect on the price paid to the native of such an export tax as you have been speaking of?—No. Naturally we only look at what we can get palm kernels at, and at fair and equal terms with any other country. We do not know and to some extent I may say, do not trouble about the price paid to the native.

4732. (*Sir Hugh Clifford.*) It is not your business?—No.

4733. (*Mr. L. Couper.*) This Committee, and more particularly the Colonial Office, could not be indifferent to the interests of the native producers.—I can tell you what I have heard the last few months when freights have been very difficult. Take the price that the grower got for ground nuts at the early part of the summer. That was only about 2l. or 3l. a ton. Excessively high freights have been prevailing.

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4734. For ground nuts?—Yes. So what he gets depends to a large extent on freight arrangements.

4735. You admit that the high freights of the last season probably accounted for the low price which the grower got in the Gambia for his nuts?—Undoubtedly it did. His market was restricted on account of the war.

4736. Then the imposition of a duty on the kernel might conceivably come off the price paid to the native, or a part of it at least?—It might. It depends on the market—on supply and demand, and, again, it depends on freights.

4737. It is evident that if our full object was achieved and Germany got no palm kernels from West Africa, there would be no duty, and the native would be unaffected?—Yes.

4738. But it would be a very long time before we could look to this country to take all the kernels produced in West Africa, would it not?—If the business showed a fair profit, not an excessive profit, the seed-crushing industry of the country would extend, I take it, within two or three years.

4739. On the question of ground nuts, it was very interesting to me to hear you speak so well of the future, because we have, apparently quite erroneously, been brought up to the idea that there was only one home for the ground nut, and that was France. Do you anticipate that after the war the French will not outbid you for the ground nuts because of the particular purposes for which they require them?—They would have a good deal of difficulty in doing that, I think. They may be able to do it to a certain extent. They put a big duty on oil, and they had practically the Mediterranean trade, the Mediterranean littoral right up to Turkey and Italy. There they would beat us for all the oil wanted there. With regard to the oil that France sends to the United Kingdom and America, which is a very large amount in ordinary times, we could beat France.

4740. This country was a large purchaser of ground-nut oil from France?—Yes, and America was, and I think we can get that trade.

4741. Have you any figures as to the proportions?—No, I have them at home. You can see how many ground nuts are imported yearly to Marseilles decorticated and undecorticated. It is a very big trade.

4742. All the ground nuts from the Gambia and Rufisque are undecorticated, I think?—I think that 250,000 to 300,000 tons a year go into Marseilles in ordinary seasons.

4743. Not from West Africa?—Some from India, I think.

4744. (Mr. T. Walkden.) With regard to ground nuts, you have only crushed them since the war commenced?—Yes, only this summer, in fact.

4745. Quite recently. You are aware, no doubt, that the price to-day or the price that the native has been getting is less than half of what he had been receiving previously to the war?—Yes, because freight is about 4*l.* a ton.

4746. It is not the freights exactly, but previously to the war the ground nuts went to France from Senegal and the Gambia. You are aware, of course, that owing to the war scarcely any crushing has been taking place in Marseilles. The harvest of ground nuts had to be gathered. Do you follow me?—Yes.

4747. You probably know that it was a record crop of ground nut. Therefore the native had to dispose of his crop, and that is why he only got 4*l.* per ton as against probably previous to the war, 12*l.* per ton.—Yes.

(Mr. L. Couper.) 9*l.* or 10*l.*

4748. (Mr. T. Walkden.) You think that after the war you could retain the trade as against the decorticated nuts. The French decorticate before they crush?—Yes.

4749. With regard to oil, do you know the difference in price between decorticated and undecorticated?—I cannot say. The French would probably get 10 to 15 francs.

4750. 10*l.* to 15*l.* per ton difference?—About 15*l.*, say.

4751. With regard to tramp steamers, would you be able to get the kernels in tramp steamers from the Gambia after the war?—Yes, I think so. We do a lot with produce brokers. Tramp steamers have been running year after year. They are easy to get; it is common.

4752. Most of the firms established in the Gambia, which is an English colony, and also in Senegal, are French firms. The leading buyers and importers are French firms. They are established at Marseilles.—Yes.

4753. And probably some of the firms are interested in crushing mills in France.—Yes.

4754. Do you think that that trade is likely to be diverted?—The freights to Bristol or United Kingdom ports would probably be less on the average than to Marseilles. That is what I am told. We can buy for less than the Frenchman can.

4755. Are you shipping to France?—We have shipped a lot and we have a lot more to ship.

4756. The crushing firms at Marseilles have very large stocks bought previous to the war. If you buy at 4*l.* per ton, and they at 5*l.* or 9*l.* per ton, naturally you have the advantage?—We have been paying within 2*s.* 6*d.* the same in freights, the difference being in favour of the United Kingdom.

4757. (Mr. G. A. Moore.) Do you crush any Indian ground nuts?—No, I do not think we are likely to. The freight from India is considerably more than the freight from the West Coast of Africa.

4758. Do the ground nuts go entirely to Marseilles?—No, Germany has taken a good many, but Marseilles is the chief market—the market.

4759. Since the war began, where have the Indian ground nuts gone to?—Very few of them have been shipped, comparatively speaking, I think. They have been kept at home.

4760. Have you any experience of Nigerian ground nuts at all?—No. I called on the Niger Company this day three weeks and I saw Mr. Trigge. They promised to send me samples, but they have not done so.

4761. If you installed machinery for crushing palm kernels and the supply of palm kernels failed, could you use it for cotton seed?—Not so well for cotton seed, but I think you could use it for that and you could use it for copra.

4762. Could you use it for lower oil-bearing seed, such as linseed and cotton seed?—Not for linseed but for cotton seed, but not so well. There are close presses, and you would have to remove the sides, but it could be done.

4763. (Sir W. G. Watson.) Do you crush undecorticated ground nuts?—Yes, all ground nuts.

4764. You said that the English farmer likes undecorticated ground nut cake better than decorticated?—Very much better.

4765. I take it that the decorticated ground nut cake would command a higher price per ton?—Yes, but I am not so sure that it would with all farmers, the ground nut cake, the shell is just what he wants. A thing I have only heard the last day or two, is that the decorticated cake turns rancid much more quickly than with the shell, and that is bad for the cattle.

4766. Do you know that when you make the highest quality of oil for edible purposes, you have to have the decorticated nuts?—Yes, no doubt.

4767. Do you know that for the refined oil made from the decorticated nuts you get 50*l.* or 52*l.*, whereas you get only about 37*l.* for the undecorticated?—The last day or two we have sold edible ground-nut oil at 38*s.*, 39*s.*, and 40*s.* per cwt.

4768. We have bought over 3,000 tons of refined ground-nut oil in the last few months made from decorticated nuts at over 52*l.* a ton.—I hope that by-and-bye we shall approximate nearer the price you have been giving.

4769. I trust so, and we shall be only too pleased to pay you the price.—That is what we should like to get.

4770. Bristol is where you are situated?—Yes.

4771. I take it that there are not any margarine factories at Bristol?—None.

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4772. Therefore you would have the carriage involved in taking the oil from Bristol to wherever the margarine factory was?—Yes.

4773. To that extent you would be handicapped in competing with German mills within easy reach of a margarine factory?—Well, I do not know. If the margarine factory is in Hamburg it is there on the spot, but if they had to send 50 or 60 or 100 miles we should be on equal terms.

4774. But they can send by water, by tank barge, or in a tank railway truck?—That would give some advantage. Possibly we could make it up in cakes.

4775. Do you think that you would get a better price for cakes than they would in Germany?—Yes.

4776. We have been told in this Committee that they get a very high price in Germany for the cakes.—Possibly they do; I cannot say. I cannot say what the cakes make.

4777. (*Sir Owen Philipps.*) If you were guaranteed a line of steamers to Bristol with exactly the same freights as to Germany, would that alone encourage you to put down a palm kernel mill in Bristol?—Not alone, unless we had protection in some form or another against unfair German competition.

4778. That is the essential?—I think you will find that that is the essence of the situation.

4779. (*Sir F. Lugard.*) A previous witness told us that a very large quantity of oil seeds of different kinds are bought by neutrals and stored in England. Have you any experience of that?—No. I have heard that there has been a lot in Liverpool, but it is more hearsay than anything else.

4780. Do you know the object of storing them? Do they want to store them till after the war?—It may be that they wanted to export them and there were no buyers for the article. Personally, I have not heard of any large quantity.

4781. (*Mr. C. C. Knowles.*) You have pointed out to us that the ground-nut cake is so much more valuable to the farmer if it contains the shell—that the undecorticated is more valuable than the decorticated?—It is and is not, if I may say so. The best value cake is the decorticated. You cannot get away from that; but it does not suit the English farmer.

4782. Now I want to ask you if you know this—that to make the finest ground-nut oil you must import the kernel in the shell because it protects the kernel?—Quite so.

4783. And reduces the chances of free fatty acids being set up. The present manufacturers of the finest ground-nut oil decorticate the ground nut, and not only that, but they have machinery for taking out the germ. There is a little germ in every ground nut?—Quite so.

4784. And that germ causes the oil to be bitter and gives it a rancid kind of taste?—You could get over the bitterness, I think. You might get the shell away or decorticate the nut, but I do not think there is any need to get away the germ which causes the bitterness in the oil.

4785. The Continental producers of the finest oil have considered it always very necessary to take away that germ, and quite an army of girls are employed to pick out the bad nuts. They consider it very necessary.—So I am told, but I should think it would hardly pay them.

4786. Well I do not know, but taking all that into consideration, do you think that by crushing undecorti-

cated nut there is the slightest chance of producing oil equal to that which is produced abroad in the way in which I have told you?—I would not say that you would ever get quite the same quality, but I think you would get near it, and it would be much more practicable to a seed crusher than it would be to separate the nuts and crush them in a cold pressing.

4787. At present in Marseilles and in Holland they get the finest oil from the cold pressure. The first of the oil out of the nut is always better than the last out of the nut.—That applies to everything in the way of crushing.

4788. Yes. That is why they do it, no doubt. As far as the ground-nut cake is concerned, I do not know whether you know that the Continental mills, after taking the husk off, grind it up and mix it into the cake again. So to decorticate nuts does not mean that you do not mix the shell in the cake.—Quite so.

4789. Now you seem to think that at the termination of the war, if we are on equal terms, you will be able to retain the ground-nut crushing trade in Bristol?—Yes, I hope so, or to get a share of it, at any rate, and get a good deal more of it than we do now.

4790. I suppose you know that most of the ground-nut oil, except what has been used for margarine making, has hitherto been used in France?—I do not know about with the exception of margarine making. A lot goes to America.

4791. I think you are wrongly informed on the American export.—We have an American agent, and he has been urging us very strongly for some years to press ground nuts and refine the oil.

4792. During the last two or three weeks you have made quite a high price for ground nut oil, I understand you to say?—Compared with what it was before. It was a very quiet trade previously. You could hardly move it.

4793. Cotton oil has gone up from 28*l.* to 46*l.* a ton in the last six months. That is the principal reason, is it not?—No doubt that has had a great deal to do with it. That has helped considerably.

4794. Do you refine all the ground-nut oil for edible purposes, or do you use a large quantity for soap making?—Have you any particular reason for asking that?

4795. Bibby does it.—I daresay, and we have been tempted to, but we have not done it. Until the last week or ten days we have had great difficulty in selling nut oil.

4796. (*Chairman.*) Do you make compound cakes?—Yes, but since ground-nut cakes have come on, we have not troubled about the compound cakes. Ground-nut cake is a better article for considerably less money.

4797. Supposing that you found that you could not sell palm-kernel cake, what would you put the extra crushing at to make it into compound cake? Would it put you to great disadvantage? You would have to grind it up again?—Yes, and find a trade.

4798. Supposing I said to you, "This is pressed palm kernel cake; the cattle will not eat it as it is; I want a little sweetening or something of the kind," it has to be ground up again for compound cake or for sweetening. What would it cost you?—To press it again would cost you very nearly as much as the original work. You would have to go through the whole process again.

The witness withdrew.

Adjourned to Wednesday next at 11 o'clock.

TENTH DAY.

Wednesday, 20th October 1915.

Colonial Office, Downing Street.

MEMBERS PRESENT :

MR. A. D. STEEL-MAITLAND, M.P., Under-Secretary of State for the Colonies (*Chairman*).

SIR G. FIDDES, K.C.M.G., C.B., Assistant Under-Secretary of State, Colonial Office.

SIR WILLIAM G. WATSON, Bart.

SIR F. LUGARD, G.C.M.G., C.B., D.S.O.

SIR HUGH CLIFFORD, K.C.M.G.

SIR OWEN PHILIPPS, K.C.M.G.

MR. L. COUPER.

Professor WYNDHAM R. DUNSTAN, C.M.G.

Mr. C. C. KNOWLES.

Mr. T. H. MIDDLETON, C.B.

Mr. G. A. MOORE.

Mr. T. WALKDEN.

Mr. T. WILES, M.P.

Mr. J. E. W. FLOOD (*Secretary*).

SIR WILLIAM GEORGE WATSON, Bart., called and examined.

PRÉCIS OF EVIDENCE SUBMITTED BY SIR WM.
GEORGE WATSON.

Prior to the commencement of the war, practically all the comparatively small quantity of palm kernel oil crushed in the United Kingdom was used for soap making, whereas the greater part of the immense quantities crushed in Germany was refined and used for edible purposes. This edible oil commanded higher prices than the soap makers could pay, so the German manufacturers were enabled to pay better prices for nuts than their British competitors, and to continually enlarge and improve their German mills for the treatment of nuts coming to them from British colonies.

The margarine makers give the best prices, and are much the largest purchasers of edible oil.

The use of, and to a certain extent the crushing and refining of, edible nut oils on the Continent is largely in the hands of two Dutch margarine makers, who now control over 50 per cent. of the margarine trade in each of the following countries: Germany, Holland, Belgium, and the United Kingdom.

These firms, originally established in Holland as margarine makers, shipped their products therefrom to customers in Germany, Belgium, and England, but after tariffs were put upon margarine in Germany and Belgium, they built or acquired works in those two countries, and later, when nut fats became largely used in the manufacture of margarine, they built or interested themselves in crushing and refining mills in Germany, and to a smaller extent in Holland, to produce the refined oil they required. These firms, in both of which English capital is invested, are now the largest users of those edible nut fats, and to induce these Dutch firms to erect factories in the United Kingdom I think it may be necessary to adopt here, for a few years, the tariff policy of Germany and Belgium, as otherwise it pays these firms better to continue manufacturing in Holland and Germany and to supply their English customers from their Dutch and German factories.

The average rate of carriage on margarine from Rotterdam to British customers does not exceed the average rate from a British factory.

It is quite possible—indeed, in my opinion, most probable—that the transit and other difficulties caused by the war will alone induce the two large Dutch margarine manufacturers to establish crushing and margarine works in Great Britain. If so, a tariff or protection will be unnecessary to bring at least half the total kernel trade to this country.

During the past few years the two large Dutch manufacturers have gradually bought up many of the smaller Continental margarine makers, and their business is now of the nature of an immensely powerful, experienced, and well-managed trust, with which it is very difficult for a small maker to compete. I say "trust" because it is common knowledge that these firms work together in many ways.

I estimate that the Dutch margarine makers use about 60,000 tons of kernel and copra oil per annum in making the margarine they sell and ship to British consumers. It would cost 90,000*l.* a year (30*s.* per ton) to transfer this oil from British oil mills to the Dutch margarine factories, whereas it only costs 15,000*l.* a year (5*s.* per ton) to transfer this oil from German and Dutch oil mills to the Dutch margarine factories by means of tank barges or tank waggons.

This freight difference is 25*s.* per ton, whereas the normal profit obtainable on oil averages 20*s.* per ton, so it would be financial madness to establish oil mills in the United Kingdom to supply the Dutch margarine makers with the oil they use in Holland to make the margarine they sell to their British customers.

The Dutch margarine manufacturers often have financial interests in the business of their British customers, some of their trade being of the nature of "tied houses," and therefore quite unobtainable by British margarine makers.

Oils with comparatively high melting points, like copra and palm kernel, are expensive to carry across the sea. The fact that they become solid at certain temperatures has hitherto prevented the use of tank vessels for the transfer of refined oil, and necessitates the heavy expense of barrels or drums, the extra cost of which more than absorbs the average profits of manufacture.

British oil millers are also slightly handicapped by the lack of demand for nut cakes in the United Kingdom; but given a regular supply, I believe British farmers would soon be as keen to buy these cakes as the German farmers. The cost of transferring a ton of cakes to Germany is only a third of the cost of transferring a ton of oil across the sea to Holland or Germany. This is one of the reasons why nuts and seeds producing a large percentage of oil have been crushed in Germany, whilst the British oil millers have confined their operations largely to the seeds which contain a smaller percentage of oil.

My firm (Maypole Dairy Company, Limited) manufacture in Great Britain all the margarine they sell. This fact induced us to start the building of a large crushing mill on the Thames before the outbreak of war, to produce and refine most of the oil we use at our margarine factory.

Owing to longer storage, and possibly lack of ventilation on shipboard, the quality of the crude kernel oil produced from kernels received since the commencement of war has greatly deteriorated. Nuts required for edible purposes must have every care. Quality is more important than price, and for this reason the closest co-operation is necessary between the West African merchant and the crusher.

I suggest that, to encourage the manufacturer of oil and margarine in this country, the retailers of "British made" margarine should be allowed to put their approved and registered name and the words "British made" in addition to the word "Margarine" upon the wrapper in which the margarine is sold to the public.

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Sir W. G. WATSON, Bart.

[Continued.]

The public might then distinguish and give some preference to "British made" margarine when making their purchases.

The consumption of margarine, and incidentally of palm kernels, would be greatly increased if the makers of nut margarine were allowed to sell and describe it under a different name. There is a most unreasonable prejudice in this country against the name "Margarine." I do not think it would be fair to butter makers to describe it as "Nut Butter," but I think when made solely from nuts and milk it might be sold as "Nutine" or some similar fancy name, without injuring the legitimate rights of the butter producers.

WM. GEORGE WATSON.

(Chairman.) I will reserve my questions to the end.
4799. (Mr. C. C. Knowles.) I think you are Chairman and head of the Maypole Dairy Company, Limited?—Yes.

4800. I have read your memorandum, which covers a great many questions. You say: "The use of, and to a certain extent the crushing and refining of, edible nut oils on the Continent is largely in the hands of two Dutch margarine makers, who now control over 50 per cent. of the margarine trade in each of the following countries: Germany, Holland, Belgium, and the United Kingdom."

4801. I suppose you know that these firms are also hydrogenators of oil?—I do.

4802. And the hydrogenated fat they use more or less in their margarine?—Yes.

4803. They are, I think, the most important hydrogenators of oil in Germany?—Very much so.

4804. Naturally they cannot produce hardened fat unless they produce hydrogen?—No.

4805. By the way, they are the producers of nearly the whole of the hydrogen in Germany, or a very large proportion of the hydrogen?—That is so, to the best of my knowledge.

4806. I just wanted to call attention to the fact that that hydrogen is being used for the Zeppelins, and that is practically the big source of supply. One of those fat-hardening works is at Emmerich, just over the border.—Yes, that belongs to Jurgens.

4807. Another hydrogen plant is at Bremen—in fact, there are two at Bremen.—I know of one.

4808. There is one belonging to the Bremen-Besheimer Company, and another one belonging to a firm which is controlled by Jurgens?—Yes.

4809. I do not think that Jurgens or Van den Berghs in Germany crush a great deal of copra or palm kernels.—I should imagine they are interested in crushing concerns; they do not absolutely own them. Since last week I have heard that Jurgens have bought a very large crushing works established at Amsterdam.

4810. I do not know whether you know it, but I can give it to you as a fact, and I should like you to confirm it, if you can, that Jurgens and Van den Berghs in the past have made arrangements, some of the contracts extending over a period of ten years, with the crushing mills in Bremen and Hamburg and Harburg to crush copra, palm kernels, ground nuts, and other seeds for them.—I understand that is so.

4811. And they are paying them so much a ton on the crushing?—That is so. We tried to make an arrangement very much of that nature with a German firm, but it broke down because we insisted, as part of the contract, which would have amounted to over five millions sterling, that the firm should join us, each to have 50 per cent. of the shares, in establishing a crushing and refining mill in England. We settled all the other details, but when we made this condition that they must establish works in England jointly with us on the completion of this contract they said that under no condition would they establish works in the United Kingdom so long as there was no tariff.

4812. If some Dutch margarine makers have such an arrangement with some of the most important crushers in Bremen—I know that they have such an arrangement with the Bremen-Besheimer Company, who are large crushers, and pay them 10s. to 30s. a ton for crushing—does not that make it very difficult for the

British crusher to compete? It is not a question of profit or loss with the Bremen-Besheimer Company?—The Bremen-Besheimer Company would get a profit on the crushing at those rates, but their advantage is that they can transmit their oil to the margarine factories owned or controlled by the Dutch firms at a cheaper rate than the British oil miller can do it.

4813. Jurgens and Van den Berghs manufacture their margarine in Holland and in Germany; no matter what the oil costs, they want it, and they pay a certain profit to the crusher, so that so far as the Bremen-Besheimer Company and some other mills are concerned, they are not on competitive lines with us and would not be so.—But take it from me that Messrs. Jurgens or Messrs. Van den Berghs would not pay any more for crushing than they could possibly avoid; they would see that the oil miller did not get too much the advantage of the deal.

4814. On page 2 of your memorandum you call the combination of Jurgens and Van den Berghs more or less a trust. I suppose you know that, anyhow in the German firms, they are combined; they own the German firms together?—Yes. But I think, whatever combination there is, they are very careful to keep it private and secret.

4815. Until the war began I believe there were a great number of German names on Messrs. Jurgens' board. Have you noticed that the board of Messrs. Jurgens has been entirely altered since a prospectus was sent out?—No. I have not. I have Messrs. Jurgens' old prospectus, but I was never interested at that time in noticing the constitution of the board of directors. I quite agree that what you say is correct.

4816. A little lower down at the bottom of page 2 of your memorandum you say: "This freight difference is 25s. per ton, whereas the normal profit obtainable on oil averages 20s. per ton"?—Yes. There were some doubts thrown upon my statement about the difference being so much, so I got our people at the Erith Oil Works to get out what it actually cost them to transfer the oil from Hamburg to Erith on the Thames. It figures out at 1s. 5·78d. per cwt., or as nearly as possible 30s. per ton. The chief items are: freight from Hamburg to London 7·53d. per cwt., and returning drums and loss on barrels 8d. per cwt. The balance is made up of insurance, lighterage, and landing charges.

4817. (Chairman.) The loss on barrels or the return of drums amounts to more than the original freight?—That is so.

4818. (Mr. C. C. Knowles.) You say: "Whereas the normal profit obtainable averages 20s. per ton."—I am speaking from our experience. I do not know whether other gentlemen in the oil trade found that they could make more than 20s. a ton. As a matter of fact, I found that to be the average.

4819. For some years there has been no profit per ton.—That, I take it, is in England?

4820. Yes.—I have no experience of crushing in England up to the present.

4821. On page 3 of your memorandum you say: "The Dutch margarine manufacturers often have financial interests in the business of their British customers, some of their trade being of the nature of 'tied houses,' and therefore quite unobtainable by British margarine makers." Do you refer to Jurgens and Van den Berghs?—The only one I know for certain is Van den Berghs, but I have very good reason to believe that Jurgens are also interested in and connected with some of the "multiple shop companies."

4822. Can you give the names of the tied houses?—One or two of them I am certain of, but I prefer not to mention names I cannot absolutely prove. One is the Meadow Dairy Company and the other is Pearks, Limited.

4823. And the Home and Colonial Stores?—I am not in a position to state definitely, but I have every reason to believe so.

4824. But it is generally thought that there is a great number of tied houses?—It is; but of course a manufacturer never lets it be known that he is connected with retail stores, because if he did those in

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competition with those stores would object to buy from that manufacturer; so these arrangements are kept strictly private.

4825. That makes it very difficult for the English margarine manufacturer to sell his margarine?—Yes. You may take it that the English manufacturer cannot get orders from those tied customers.

4826. What proportion of the imported margarine would you say is sold through those tied houses?—I am not in a position to say with any certainty. I should think it might be anything up to 50 per cent., but I could not prove that.

4827. On page 4 of your memorandum you say: "I suggest that to encourage the manufacturer of oil and margarine in this country the retailers of 'British made' margarine should be allowed to put their approved and registered name and the words 'British Made' in addition to the word 'Margarine' upon the wrapper in which the margarine is sold to the public. The public might then distinguish and give some preference to 'British made' margarine when making their purchases." Do you not think that the foreign makers of margarine should be made to put the country of origin on their wrappers? Would not that help the British margarine maker?—Undoubtedly it would. That would extend my proposal. At present the law says that you must put nothing but "Margarine" on the wrapper in which the margarine is given to the public, but, in view of Mr. Asquith's advice to push British manufactures, a few weeks ago we put the words "British Made" on, so it is quite possible that my firm may appear in the police court for breaking the law; but under these circumstances I thought I would risk the opinion of a judge on the question.

4828. Then you would strongly support the suggestion that the foreign manufacturers of margarine should put on the wrapper the country of origin?—I would; though, speaking as a retailer, it would make it rather difficult for a retailer who was buying from two or three sources. I do not know whether that would pass through Parliament without any objection, and in these times you do not want a proposal except one that will be carried unanimously.

4829. Would it not help to bring the foreign margarine manufacturer here to manufacture his margarine?—Undoubtedly it would.

4830. It would go a long way to help it?—Certainly.

4831. Do you think it would help it as much as a duty would help it?—No, I not think it would, because sentiment is only forceful in war time. When the war has been over a few years I think sentiment would not be worth anything; it would not be worth a farthing a pound at all events.

4832. In the last paragraph of your memorandum you say: "I do not think it would be fair to butter makers to describe it" (that is, margarine) "as 'Nut Butter,' but I think, when made solely from nuts and milk, it might be sold as 'Nutine' or some similar fancy name without injuring the legitimate rights of the butter producers." That, of course, applies more particularly to your margarine, which is entirely vegetable fat?—Yes. I think those who make vegetable margarine should be allowed to have some special name other than "Margarine," against which the public are very much prejudiced. During the last few weeks we have had hundreds of letters from customers, hotel keepers, school-owners and housekeepers who, I suppose, have servants, saying: Cannot we supply them with goods without the word "Margarine" on, or will we sell the goods to them and let them take the wrapper off when they buy them? I have one letter that I should rather like to hand in so that you may see it.

4833. Could you not suggest some other name than "Nutine" which would cover animal margarine, of which large quantities are consumed here—something to cover the two?—In other words, instead of using margarine for what is commonly known as margarine, give it another name. I do not think we could give good reasons to the agricultural party for wishing to

make that change; therefore, I would prefer it confined to margarine made of vegetable fat.

4834. Would you support the placing of an import duty on margarine? Do you think that would help the trade here?—It would undoubtedly help the trade, I would, provided it was quite clear it was only imposed for a limited period, say, of five years, and only for a small amount, say, 1s. or 2s. per cwt. I have a great objection to heavy duties, and only believe in them when it is to bring an industry to this country or to allow people here to establish themselves.

4835. Can you suggest any way in which further to popularise margarine?—No. I think the present high prices of butter are having the desired effect in regard to popularising it.

4836. You have heard many witnesses say they would suggest, to help the palm kernel crushing trade here, an export duty from the coast. Are you in favour of that export duty?—I cannot say that I am, because then you are taxing the colonies, and I think that is the way we lost the United States when we taxed their tea; therefore I am dead against it. I think if we have not the courage to tax ourselves we should not tax the colonies.

4837. (Sir F. Lugard.) On page 2 of your memorandum you say: "The average rate of carriage on margarine from Rotterdam to British consumers does not exceed the average rate from a British factory." I do not quite follow the meaning of that?—When you are at Rotterdam the large factories there are beside the water. Your customers in England are situated in every town in England. These large firms have customers in every town, and the average rate of carriage from Rotterdam to all those different towns is no more than it would be if you had your factory in England, and had to send the goods from London to all those different towns in England.

4838. In the paragraph before that you advocate the adoption for a few years of a tariff policy here in order to establish margarine manufacturing works in the United Kingdom.—I make that suggestion in order to induce this large Dutch Trust to put their works in England.

4839. Would not that in the meantime give an enormous advantage to any existing works in this country?—It would give an advantage undoubtedly, but if you put it at only 1s. or 2s. a hundredweight the objection to that advantage would not be so serious. You have to look at the advantages and the disadvantages, I take it.

4840. Later on in your memorandum you lay stress on the fact that the nuts required for edible purposes must have every care and must be fresh. I would like an expression of your view on the question that we have all discussed so much as regards local mills in Africa, the great advantage being that they would handle fresh nuts and produce a better class of oils.—I am in favour of that if they could get over the practical difficulties, but I doubt if they can. I make that remark in my précis, because since the war we find that the palm kernel oil crushed in England is distinctly lower in quality than it used to be. We have gone into it with the crushers, and they put the fault upon the fact that the kernels they now get have a higher percentage of free fatty acids owing to being delayed in transit, or brought over in unsuitable vessels, or perhaps stored too long in this country.

4841. That is a purely temporary condition due to shortage of freight?—Yes. We shall get over that when the war is over.

4842. Do you think the margarine industry will be permanently affected by our being able to import a better class of oil from West Africa?—If we can get a better class of oil, no doubt it would. I have no fault to find with palm kernel oil crushed as it was before the war from nuts coming over under good conditions. We found the quality of that oil was excellent in every way. I am not quite satisfied in my own mind that the quality of the palm kernel oil would be improved by being crushed in Africa.

4843. You have not formed any definite opinion as to whether it would be an advantage or a disadvantage?—I think it would be an advantage so far as quality is

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concerned to a very small extent, but it would be a great disadvantage in another respect. In Europe the modern palm kernel mills are of enormous size, and I do not think you could equip mills of that character and size in Africa.

4844. Which class of mills have you in mind? I understand that there are two wholly different propositions: one is the extraction of oil from the pericarp as advocated by Mr. Smart and by Mr. Knowles; the other is the pressing of the kernels at a coast port.—I am speaking of the palm kernels.

4845. What do you say as regards palm oil?—That must be done in Africa undoubtedly, if it is to be done satisfactorily and the oil is to be satisfactory when it arrives here.

(Mr. C. C. Knowles.) I actually sold palm-kernel oil crushed on the coast to Loders Nucoline Company at fully 1l. a ton more than the oil crushed here.

4846. (Sir F. Lugard.) As regards palm oil, you are emphatically of opinion that it is better crushed on the coast?—Undoubtedly. That is the only way of doing it. You cannot bring the pericarp to Europe and crush it here.

4847. With regard to the reply you gave to Mr. Knowles about an export duty on the coast, I did not fully gather your view about taxing the native. The native at present gets a price which is dependent on the home market. It seems to me that if there is a duty put on palm kernels which are exported to Germany, or to any foreign country, that will practically knock on the head any export to countries other than the United Kingdom, but it will make no practical difference to the native, that I can see.—In my opinion, it will lessen the demand for the kernels, and anything that does that must have a deleterious effect on the price. The price is fixed on supply and demand, and everything and anything that raises the price in any way affects the demand.

4848. Is it conceivable that it would depress the price?—I think it would if you lessen the demand.

4849. The bulk of the merchants would be exporting to the United Kingdom, and would not pay that duty; consequently, the same price would be offered locally to the native, and if some particular merchant wished to export to Hamburg, the extra duty must fall upon him. He cannot expect to get a higher price for that particular parcel than the others who are bidding all round him for nuts coming to England. Do I make myself clear?—Perfectly clear; but my strong opinion is that any policy that raises the price to any customer in any part of the world will lessen the demand for these nuts. If you raise the price that the Germans have to pay for them the demand will be naturally lessened, and if you lessen the demand you certainly will lower the price.

4850. With the enormous demand which is going to come for all kinds of oil nuts in view of requirements for edible purposes?—I do not think the average price in the future will be less than in the past, but I say that by putting that export duty on you thereby lessen the price to a certain extent that the native will get in the future as compared with what he would otherwise be getting.

4851. (Sir Owen Philipps.) You have told us that you are interested in some crushing mills on the Continent, and you have mentioned that those crushing mills have made a substantial profit on oil?—I do not think I called it a substantial profit.

4852. About 1l. a ton?—Something less than 1l. a ton.

4853. Like other mills on the Continent, these mills have been in the habit of exporting oil to England or importing oil into England?—To a small extent. We used to have a small quantity from Denmark. From Germany we took a lot of unrefined oil to our refining factory in England.

4854. But they did bring some oil into England?—Yes.

4855. They did that notwithstanding the fact that the cost of transporting the oil from the Continent to England, including the cost of casks or drums, works out at approximately 30s. per ton?—That is so.

4856. Am I correct in drawing the conclusion that these mills on the Continent are able to make approximately 1l. a ton profit, pay 30s. a ton freight and charges, and still compete with the English oil mills in England?—I do not think that the unrefined oil we got from Germany to England yielded us any profit. Originally we had a refinery at Erith, which was established by the company with which I am connected, in order that it might deal with the Ceylon oil that came here. When we found we could get a better class of oil from Continental mills, it was the question of quality and price which tempted us to take Continental oil from the Continent to Erith rather than buy Ceylon oil; and further than that, the quantity coming from Ceylon was not quite equal to keeping our large Erith refinery fully supplied.

4857. We have been told by a previous witness that mills to crush palm kernels have been erected in West Africa, and we have also been told by a previous witness that these mills are now closed down. As a practical man in the business, have you drawn any conclusion as to why they are closed down, apart from any evidence the Committee have had?—Yes, I have come to the conclusion that they closed down because they did not pay.

4858. Therefore, would you be prepared to put either your own money or recommend anybody to put money into the erection of similar mills in West Africa?—Certainly not. My experience is that you only want to do the business there which is absolutely essential to be done—that is, buying the kernels or copra. I find that there is a very great difficulty in manufacturing in tropical countries.

4859. (Sir Owen Philipps.) You told us that you were not in favour of an export duty in the colonies because it might limit the price obtainable by the natives?—That is so, unless the proposal for that duty was made by the natives themselves, but I suppose they are not sufficiently developed to make a proposal of that character. They are suffering owing to the fact that their goods cannot get into Germany, and now there is insufficient accommodation to manufacture them in this country.

4860. Has your attention been drawn to the fact that the price of palm kernels yesterday reached 17l. per ton?—No; but I know that copra has taken an enormous jump up, and also that, owing to the advance in the price of butter, there is a tremendously increased demand for margarine.

4861. Has your attention been drawn to the fact that America has come into the market for a considerable quantity of palm kernels, and that that is already having its effect upon the price?—It is, and I understand the Americans are making so much money that they are speculating in anything. They have also rushed cotton seed oil up to an enormous price in the last day or two.

4862. That itself shows the advantage of the argument you put forward against an export duty in the colonies?—Yes.

4863. Could you tell the Committee anything on the questions that we have had before us of crushing versus extraction as applied to palm kernels. I do not want you to divulge any trade secret.—I am not a technical crusher, but the impression I have got from what I have heard on this Committee, and also from our practical man, is that originally the mills in Germany crushed it all, but now the great tendency is to extract. I have also heard on this Committee that meal is unsaleable in England.

4864. In your own business is an extracted oil as valuable to you as a crushed oil?—I am told by our manager that it is, but, as a matter of fact, the oil that we have imported from the Continent has chiefly been the crushed oil, and we were very satisfied with that. Our managers tell us that the extracted oil gives equally good results.

4865. You mention in your précis that English capital is invested in the Dutch companies. Could you tell the Committee whether to your knowledge German capital is also invested in Dutch companies?—I could not say from my knowledge. I have every reason to

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believe that it is, but not nearly to the same extent that British capital is so invested.

4866. (*Mr. G. A. Moore.*) Just following up what Sir Owen Philipps was asking you about, crushing or extracting, do you mind telling us whether you propose to put up crushing or extracting mills, or both?—Both.

4867. So you think there is a probable use for both kinds of mill in the future?—Yes, except that I am getting a bit nervous about the extracted part, after what I have heard lately.

4868. Speaking about margarine, is it not the fact that some kinds are partly vegetable and partly animal fat. And if that mixture is continued, will it not make it rather difficult to provide any new name for margarine?—My proposal was that the new name should be confined exclusively to margarine made from vegetable fat: that is, from what we call nuts and milk.

4869. Is there not a tendency to use a certain amount of animal fat in most margarines now in order to improve the texture?—I think the tendency is to use a certain amount of animal fat now, more with a view of being able to charge the public a higher price to make them believe that the quality is better by reason of the use of the animal fat. Personally I do not agree that the quality is improved by the use of animal fat, provided we can get our palm kernels or copra in first class condition.

4870. Do you not think the prejudice against the name "margarine" was largely due to the fact that it was supposed to be not always the cleanest animal fat?—I do.

4871. Therefore, if anybody knew that animal fat was put in it, it would not induce them to buy, but rather the reverse?—The reason that people speak so much about animal fat is that the large multiple shops who sell margarine at 6d. a lb. advertise it as nuts and milk, and must give some excuse why a higher price should be paid by their other customers for another kind.

4872. Naturally, as an importer I am very much interested in the statement you have made with regard to the quality of palm kernel oil since the war began. In shipping kernels to Hamburg the steamers carried very little else and depended entirely upon kernel cargoes.—Yes.

4873. In coming to Liverpool it is not possible to do that, and there is a certain quantity, and a considerable quantity, of palm oil carried, so the stowage becomes a very difficult question in order to keep the two separate. Very often when we are delivering a parcel of palm kernels we find a small proportion of them are what we call oil stained, that is they have been in contact with palm oil and the palm oil goes in at the germ hole and gets into the interior of the kernel. Is it possible that that might account for a deterioration in the quality of palm kernel oil?—I think it would, and the other cause I mentioned. I think palm kernels have suffered to a certain extent by being stored and kept rather longer than usual.

4874. You seem to have an objection to this idea of an export duty—a differential export duty, because it must not be confounded with an export duty pure and simple such as the Ceylon export duty—on palm kernels from West Africa which would not be imposed if the kernels came to this country. I am not quite sure in what way you really do think the industry in this country that we are trying to set up should be protected?—In my opinion, if you get this Dutch Trust to come to England we can do without protection. But I am in favour even then of a small protection to prevent dumping—that is 1s. a cwt. or 1l. a ton I would be perfectly satisfied with.

4875. 1l. a ton on oil?—On oil would probably be the best thing. That would prevent the German oil millers from dumping their surplus oil in England below the cost of production. A British oil miller cannot retaliate on the German oil miller, and cannot sell a few hundred tons in Germany and thereby seriously affect the price on thousands of tons; whereas the German oil miller can dump a few hundred tons in England, and thereby affect the price of several thousand tons.

4876. Then your remedy for the position would be that there should be an import duty in this country of 1l. a ton on palm kernel oil?—That is so. I think that even that would have the effect of bringing the Dutch Trust to England.

4877. As to the paragraph in your *précis* about "British made," is there anything in the law at present which prevents you, if you made an article in England, saying, "This was made in Great Britain"?—There is in connection with margarine. The idea when it was made the law that only the word "margarine" was to be put on the paper, was to prevent people printing all sorts of matter round it so that you could not see the word "margarine." All I want is three other words to be allowed to be put on this wrapper, that is, "British made," and the particular approved name of the margarine, namely, "Maypole," or "Blue Band," or what not.

4878. Does that restriction only apply to margarine?—Yes.

4879. Was this paragraph in your memorandum written on the spur of the moment, or written after considering the whole question, which is a very large question?—It was written after considering it very carefully.

4880. Are you aware that there was some little while ago a proposal to have a British Empire trade mark, but it was violently opposed both from Liverpool and Manchester? That is very much the same thing. The result was that the Government would not allow it to be proceeded with.—Probably the objection may have come from those who suffered when that law came in, that you must brand everything "Made in Germany" or "Made in Austria" to let the customer know where certain things were obtained. There cannot be any objection to letting the customer know that the margarine he is buying is British made.

4881. You are aware, I suppose, that "Made in Germany" is considered to be one of the most gigantic mistakes ever made?—I perfectly agree it was so.

(*Sir Hugh Clifford.*) To the ordinary layman it is not clear why it was such a gigantic mistake.

4882. (*Mr. G. A. Moore.*) There is hardly an importer of German goods in this country who will not tell you what an excellent thing it has been for his business—that it has been the finest advertisement Germany ever had. I was going to say that the West African merchants have had a controversy which has been going on for some years, with a certain amount of sympathy from the Colonial Office as against the Board of Trade, about marking the goods in West Africa. We are more afraid of Germany retaliating by marking all German goods "Made in Germany" than we can very well say. We think it would be a most disastrous thing. I was wondering whether you had considered the question from that point of view. That in suggesting that the words "British made" should be put on margarine, whether it is not as a matter of fact leading up to a corresponding advertisement like putting "Made in Holland" or "Made in Germany" upon their goods?—What you say would be right if the Dutch could make better margarine, but I think we can make margarine quite as good in Great Britain as they can make it in Holland.

4883. Do you not think the words "British made" would ultimately lead to a similar advertisement as the words "Made in Germany" was in relation to German goods?—Not in connection with margarine. Margarine does not come from Germany, and I do not think "Made in Germany" will help to sell anything in England for the next year or two, or in my time, I think.

4884. I instanced the words "Made in Germany" because that was the one phrase most prominent in this country, but we also see on various goods "Made in Sweden," "Made in Holland," or some other place. The same thing would apply to "Made in Holland" if people took a fancy for Jurgens and Van den Berghs' margarine?—It would be so if they turned out a better article undoubtedly; but I do not think they can.

4885. As to the words "British made" what we very strongly believe in West Africa is that any

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marking of that description is a double-edged weapon.—I do not agree that it is in connection with margarine, but I quite agree that it would be with many things.

4886. You mentioned about copra being unobtainable. Do you buy copra?—Yes, our Continental works buy large quantities. We have just started to buy a little, and we have inquired the price on the London market.

4887. Can you tell me whether the scarcity of copra at the present time is due to the extraordinarily high freights charged upon it or due to a failure in the crop?—I think it is due to the increased demand for copra, which has arisen in the last few weeks owing to the fact that all margarine manufacturers are very busy.

4888. (Mr. T. Walkden.) Just reverting to this tariff policy, you are quite of opinion that if this trade is to be retained in this country after the war it must be protected in some way. I mean the crushers or the margarine makers.—I think we should have the trade in this country, provided the Dutch Trust established works here. That would be sufficient in itself to bring the trade to this country so far as oil crushing and refining is concerned and margarine making.

4889. You object to this export duty on kernels from the Colonies?—I do, unless the proposal comes from the Colonies.

4890. For the reason, I suppose, that there are very large mills in Germany, and it is not likely that they will allow those mills to be empty or idle after the war. They will try to find other kernels and other seeds to crush if they cannot get the kernels?—I am sure they will. I understand now they are crushing grape pips, beech nuts, and acorns.

4891. Therefore, very likely the demand for palm kernels in this country would diminish. If Germany were crushing and had a market for their oil, it would have a tendency to compete?—It would lessen the total demand for palm kernels.

4892. And, therefore, it would have a deleterious effect on the native in regard to the price?—Yes, it would.

4893. Unless you can get a large export trade?—That is so.

4894. Therefore, in your opinion the native would have to suffer?—Yes.

4895. As mentioned by Sir Owen Philipps just recently, all oil seeds have been going up in price in a remarkable way—palm kernels, ground nuts and copra. That is, we understand, owing to the demand from America?—And also an increased demand from manufacturers in this country.

4896. Therefore, if Germany after the war are in competition with other nuts it is likely that the demand there for kernels will again diminish?—Undoubtedly.

4897. Therefore, in order to be protected, in your opinion would it not be better to put an import tax on the oil coming to this country?—I think it would.

4898. Or would you suggest a tax on margarine?—I think it would be better on the oil.

4899. Do I understand that in this country we are not allowed to put a preservative in margarine?—We are allowed to put in a preservative. The amount is limited, I think, to one half per cent. boracic preservative.

4900. Are the Dutch allowed to put more preservative in goods coming into this country?—No, it is the same.

4901. We understand that a lot of this oil has been dumped in this country previous to the war. Therefore, if you put a duty on the oil coming in it would assist you materially?—That is so. It will give small assistance if you only put a small duty like 1*l.* a ton; it helps, but it is not so very material. Still, when your total profit is 1*l.*, that 1*l.* a ton is the difference between profit and loss perhaps.

4902. There must be a difficulty in the case of these outside margarine manufacturers with this Trust you speak of. How are they able to get a market here?—Prior to the war they were not very successful, but since the war the Dutchmen have had great disadvantages to contend with and the others have, therefore, made a great deal of headway.

4903. They would be at a disadvantage after the war if things went on as they did previous to the war?—Undoubtedly.

4904. Therefore, this import duty on oil would help them in that way?—It would help them although I do not think it would be of any help to them if that brought the Dutch Trust here, because they would still compete on equal terms again.

4905. You mention in your Memorandum about the quality of the oil since the war. You think it is probably due to the quality of the kernels?—I think so. But all I can speak of is that the oil that we have bought since the war has been distinctly lower in quality.

4906. In buying these kernels do you think the buyers take notice of where they come from and the quality of the kernels?—I cannot say.

4907. There is probably a difference of 2*l.* to 3*l.* a ton between kernels coming from one part of the coast and those coming from another part?—Yes. In my *précis* I say that quality is more important than price, and for this reason the closest co-operation is necessary between the West African merchant and the crusher.

4908. That is what I meant to impress upon you. It is for the crusher to say where he is buying his kernels from—from what market on the coast. Do you think it is possible that he might be mixing his kernels after he had bought them?—If he does that of course his customer may give him the go-by next time. If I were buying for my oil factory I would give a premium to the merchant who would sell me some kernels that were slightly above the average quality. Quality in edible goods is infinitely more important than price. That is what the Germans realise and I do not think it is quite so well realised in this country.

4909. In Nigeria we have an examination by the Government before the exportation of kernels, and we find that the quality is very much better than from those ports where they have not any control or any inspection. Therefore do you not think it would be wise to have some control or inspection?—From what I have learned on this committee I do not know that it is wise, because the difficulty is to get reliable inspectors in Africa.

4910. But we have a white man who is at the head who can look after it. You can trust and rely upon an Englishman.—In my experience sometimes white men go wrong in tropical countries.

4911. You have inspectors here as regards butter and other food-stuffs, and you rely on those people?—Yes.

4912. Therefore why not rely upon them in West Africa?—It is more difficult to control men when you get them out in West Africa.

4913. The proof of the pudding is in the eating. The kernels are much better coming from those places where there is inspection than where there is not.—If that is so it might be well to adopt it.

4914. As to the question of marking margarine with the country of origin, as Mr. Moore said, this has been a rather sore point in both the Manchester and Liverpool Chambers of Commerce. In our own West African Colonies we have found that where the goods are marked "Made in Germany," the natives have naturally sent their orders through their middlemen to Germany. The experience of the Manchester Chamber is that it is not only in the West African Colonies but in nearly all the markets of the world that it has had a bad effect on our trade.—But margarine is rather in a different category. It is bought in the shops by the public who eat it, and they are not likely to send an order for their next pound of margarine to Germany or to Holland. On the other hand, I admit that if the quality of that marked "Made in Holland" or "Made in Germany" were better than that marked "British made," undoubtedly the public would gradually go on to that superior quality. You cannot get rid of competition.

4915. Our experience has been that the Germans have sent the commoner or lower class of goods in hardware and tinware and cotton goods, and therefore it has been to our advantage to have "British made,"

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which will speak for itself all over the world.—But you cannot mark anything "British made" unless it is British made.

4916. Would it not be better to have it "British-made" instead of "Foreign made" or the country of origin?—Yes, I would rather be less specific so far as the foreign-made article was concerned; I would rather call that "Foreign made" than Dutch, American, French, and so on. My original suggestion was to mark the British-made margarine with the words "British made." Mr. Knowles suggested going a little further, to which I said I had no objection, but I agree the words "Foreign made" would be the best wording for foreign-made margarine.

4917. I wanted to point out why there has been so much cheap stuff in West Africa. There may be a demand, but since they are going in for articles of British manufacture, probably we shall retain that title, because of a better class article. I quite agree with you that margarine had got rather in bad repute, owing to being made from bad or dirty fats.—I think the bad repute also came from the fact that we attacked a very old industry, the agricultural industry, and they spread about some statements, which were often false, respecting it, and the public rather believed those statements.

4918. You mentioned "Nutine," or some other name that might be used?—Yes.

4919. How about "Milkoline"?—I do not want a name for margarine; but I want a fancy name with no resemblance to "Butter" or to "Margarine."

4920. (Mr. T. H. Middleton.) I think margarine was made originally exclusively from animal fat?—Not exclusively; we always used a certain amount of cottonseed-oil or arachide (ground-nut) oil—that is the liquid oil.

4921. But it was largely from animal fat?—Yes, largely.

4922. Your view is that the public still believe that nearly all margarine is made from animal fat, or partly from animal fat?—No, the multiple shopkeepers have advertised margarine made from nuts and milk, which they sell at a very low price. Those who want to sell at a higher price want to give some reason to the public why they should pay that higher price, therefore the people who make certain qualities at a certain price are inclined to put more animal fat in, and advertise the fact that there is animal fat in it: although as a matter of fact, since margarine has been advertised as made from nuts and milk, a lot of prejudice has disappeared, and a lot of people buy it now who did not buy it before we guaranteed that it was made from nuts and milk.

4923. Do you guarantee that margarine can be made of the highest quality from nuts and milk?—I do, provided you get the nuts fresh and they are crushed and refined under the best possible conditions; but that is rather impossible while the war is on.

4924. Your first object is to secure a name differentiating between margarine containing animal fat and margarine made exclusively from vegetable fat?—That is so.

4925. That would require legislation, would it not?—It would.

4926. And at the present time I think you will agree it is out of the question?—I think that is so.

4927. Your second suggestion was that we might meantime adopt the term "British" on the margarine wrapper?—But that would also necessitate legislation, because the law says distinctly that nothing but the word "margarine" must be put on the wrapper.

4928. First of all, would that word "British," in your opinion, assist the sale of the nuts and milk margarine as against the mixture margarine?—No, but it would assist the sale of margarine made in England as against margarine made in Holland.

4929. What is the proportion of margarine made in England from nuts and milk to the total production?—It is a difficult thing to say. I should say there is 70 per cent. made from nuts and milk.

4930. That fact would be easily advertised so that a person buying British margarine would have a 70 per cent. chance of buying nuts and milk?—But

you might have a 70 per cent. chance of getting nuts and milk if you bought Dutch margarine. We have not the exclusive right to make it in Britain.

4931. But the consumer does not know what the Dutch maker makes it of?—Yes, many multiple shopkeepers who supply Dutch margarine advertise it extensively as being made from nuts and milk.

4932. I rather gathered that the chief manufacture of nuts and milk margarine was in Great Britain, and that foreign margarine was more largely made from animal fat?—No, that is not so.

4933. What view do you think the Margarine Defence Association would take of this proposal to adopt the name "British Margarine"?—I think that association is controlled by the Dutch margarine manufacturers, so whatever was their interest would, no doubt, be their view.

4934. No doubt the use of "British" would be strenuously contested?—Yes, undoubtedly the Dutch makers would be dead against it, and also the English customers of the Dutch makers would be against it.

4935. I think you said that you use the words "British Margarine"?—We are putting the words "British Made" on our goods.

4936. Do you expect your friends of the Defence Association to have the legality of it tried?—They might hesitate in time of war to initiate a prosecution for the use of the words "British Made."

(Mr. T. H. Middleton.) I am afraid we shall hear more of it.

4937. (Sir Hugh Clifford.) You are risking it?—We are only doing it at our London shops. I thought it was too dangerous to do it in every case, because we might print 2,000L. or 3,000L. worth of paper which would be useless.

4938. (Mr. T. H. Middleton.) You pointed out the difficulty of dealing with people who use three wrappers. Do I understand that they strip off the outer wrapper before they hand the goods to the customer?—In many cases they leave the customer to strip it off, but in other cases no doubt small shopkeepers do strip it off.

4939. The difficulty is that there is no offence if the customer does it?—No. It is not quite clear in the present margarine law whether the word "Margarine" should be on the first wrapper or the last wrapper. We always put it on the first, but then sometimes a customer after he or she has bought a pound of margarine asks for it to be wrapped up with some tea; we then have to put it in a brown paper parcel, and some inspectors rather threaten us that we ought to print the word "Margarine" outside this brown paper parcel, the consequence of which would be that the poor person would have to carry it through the streets with a label "Margarine" on. I do not think margarine has had fair play in the past.

4940. Are there any disabilities that manufacturers are under in connection with the development of the British trade other than the want of a special name?—No, provided that those who are trying to develop the British trade have got very large capital. It is necessary to have very large capital to compete successfully with these large German oil millers. I do not think the oil millers of this country realise the up-to-dateness and size of the plants with which they have to compete.

4941. You have no trouble at all in complying with the requirements in regard to the use of certain fancy names for margarine?—Not the slightest.

4942. (Mr. L. Couper.) I have one suggestion to make in the matter of names—that you should go to the classics. As you know, the word "margarine" itself is derived from the Greek word, which means pearl. It is a very happy expression, and I suggest you should look there rather than to some hyphenated or compound word?—I thought the word "nutine" gave the idea of nuts.

4943. You state in your *précis* that the German manufacturers were able to pay better prices for nuts than their British competitors. Would it not be more correct to say that freedom of market was only to be found in Germany?—If a manufacturer has got customers who can pay him a high price for his oil he can

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naturally give a higher price than a man who has not got the customers to pay so high a price. The proof that the German manufacturer has paid higher prices than the British is that he got nine-tenths of the crop. The matter of price rules the quantity of the article you get.

4944. As a matter of fact was it possible to get a higher price for one's kernels in Hamburg than in Liverpool?—I cannot say that it was.

4945. Then I wonder that Liverpool got any.—I suppose it is certain to get some for the African mills.

4946. What will be the crushing capacity of the new mill on the Thames that you are building?—A little over 100,000 tons as originally planned, but we always build our factories so that we can double them. We build a building and leave a space of land adjoining so that we can just double it, and it will be a compact factory although doubled.

4947. Will that capacity be added to your existing output, or will it take the place of other mills that you may now have?—I suppose it will, to a great extent, take the place of what we used to get from the Continent. We shall not import so much. It will also take the place of what we now get from millers in this country.

4948. The new mill is to crush kernels, and is being so made?—Yes; kernels, copra, and ground nuts.

4949. Did you ever undertake the work of crushing kernels before?—Not in England.

4950. You also refer in your *precis* to the two Dutch margarine manufacturers, Jurgens and Van den Berghs. Is the former an English company?—No, it is a Dutch company, but they issued some preference shares on the English market before the war. Then since the war they have formed an English company, and I am not quite sure whether that has not taken over the selling rights of the Dutch company so far as England is concerned.

4951. Van den Berghs is an English company. I see it was registered in 1895 with a capital of over two million sterling. During the last ten years the dividend has varied between 8 and 25 per cent., the latter rate having been paid for 1912 and 1913, following upon 17½ per cent. in the three previous years. It is evident, therefore, that the manufacture of margarine, at all events in Holland, is a profitable occupation?—When done on the scale on which Van den Berghs do it, and when the business also is ably managed.

4952. Since the war the position of these Dutch manufacturers is not so favourable. If I am correct Van den Berghs have even had to pass their dividend?—No, I think not. I think they have omitted to send the report out. I suppose that is because they cannot get particulars or do not think it wise to publish particulars of the state of affairs at their German factories. As a matter of fact I think you will find they paid interim dividends and rather good ones.

4953. I was under the impression that they passed one dividend or postponed it. In your opinion have they suffered largely by reason of the war?—No, in my opinion they have rather benefited.

4954. Then the war is not likely to drive them to England or to show a weakness in their business which would compel them to come to England?—If it would pay them better to manufacture in England I think they would come, especially if they have done so well during the war that they have the necessary surplus capital to build the required mills in England.

4955. Then you think they may come without any tariff or other assistance?—I think it would be wise for this Committee to ascertain from them—from Jurgens in particular—whether or not they are coming.

4956. Is margarine still being improved and is there much to be done before you yourself would regard the process of manufacture as finally settled?—I think it is being improved from year to year, but I think the future improvement will be more in the nature of using more care in collecting the nuts and getting higher quality oil when they are crushed and refined.

4957. Was there not a Royal Commission on margarine some years ago?—I do not know. We have had

several Parliamentary Inquiries with regard to the margarine law, but I do not think there has been a Royal Commission.

4958. Do I understand that animal fats are still mixed with edible nut fats in the manufacture of margarine?—Yes, largely.

4959. But the proportion of animal fat in a pound of ordinary margarine is how much?—All the margarine we sell (and I suppose we are the largest retailers in this country) contains no animal fat. The consumption in all countries of animal fat in making margarine is lessening, and the consumption of nut fat is increasing.

4960. The proportion of nut fat is increasing?—Yes.

4961. We have heard here that palm kernel oil is now being used for the manufacture of high-class chocolates. Do you consider that there is any likelihood of palm kernel oil passing the door of the margarine manufacturer as it has passed the candle maker and soap maker?—I do not think there is the slightest chance, because I do not think the chocolate makers can take the quantity which is likely to be available in the future.

4962. Your view has been made quite clear to-day on the subject of an export tax on palm kernels shipped from British Colonies to foreign countries. You think the tendency would be to place such a tax on the shoulders of the native producers?—Yes.

4963. In that case you would agree it was opposed to the development of the Colony which must depend ultimately upon the natives. If the price of palm kernels should fall, the purchasing power of the native and his capacity to contribute to Customs Revenue on imported goods must likewise decrease?—Yes, I think so.

4964. Let us suppose that the Germans return to West Africa after the war, though I am not sure we would not be better without them, and that they find that although the market price at Lagos is, say, 10*l.* they could only pay 8*l.* by reason of a new export tax of, say, 2*l.*; if they, the Germans, had to buy kernels, and the supply was abundant, would not the local English buyer be tempted to pay only 8*l.* 10*s.* or something just over the German price?—A German buyer always buys, if he does his duty, the goods as cheaply as he can get them; so naturally he would try to buy as cheaply as he could.

4965. In that case it would drive the price down to something rather over what the German had to pay?—The price would be ruled by the demand.

4966. We have heard of co-operation between millers and merchants to ensure the flow of kernels to this country being continued after the war. I would like to have your opinion on some ideas of mine. Perhaps you will say if you consider they are of any practical value. My idea is that a co-operative scheme might be inaugurated under which Colonial Governments, merchants, shipowners, millers, and consumers would agree to limited purchases of kernels being made by a central body of control when and if it appeared that shipments to the United Kingdom were less than the quantity required for our own use. I would suggest that losses, if any, would be limited by guarantees from Colonial Governments and divided amongst all the parties I have mentioned: Profits, if any, above a certain percentage to be used in the development of the resources and methods in the colonies in relation to edible nuts. I want to see whether, if shipments to England are made under most favourable conditions as to purchase, transport, handling, and sale, by the co-operation of all the interests referred to so as to ensure these advantages, the trade, or the part of the trade which depends on English consumption, cannot be retained.—I think the danger of an arrangement of that kind would be that it would stop competition, and anything that stops competition I think is harmful in the long run—that is equally as harmful for the natives as an export duty. Another thing I think is that any co-operation of that kind between different interests would only last for a limited time. The only way to have a lasting co-operation is by amalgamation where all interests are the same.

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4967. My idea was merely to form some outside body which would hold a watching brief on the future course of the kernal trade for a period of years—that it should have the right to buy for all interests within its own doors a certain amount of produce if it were thought to be necessary.—Of course it is a matter that I have not considered. There might be something in it, but I am greatly in favour of having competition in anything.

4968. (Mr. T. Wiles.) Can you tell us the price of margarine in Germany before the war—what it was retailed at per lb.?—I cannot say of absolute knowledge, but my idea is that the price paid by the public in Germany is considerably higher than in England. One reason is that it is a proprietary article in Germany and the manufacturer advertises it very extensively and packs it in small packets and the cost of those small packets and the advertising has to be borne by the margarine; whereas in England more than 50 per cent. of the margarine is sold from bulk and by people who have their own stores and therefore it only costs the public 6d. a lb.

4969. Your view, broadly, is that it was retailed at a higher price in Germany than in this country before the war?—Yes, I think so.

4970. If what are known as the Dutch firms are compelled by a tariff or some other means to put up factories in this country, would not it mean a great deal more competition for the British manufacturer?—No, I do not know that it would mean much competition. It would bring increased competition in this respect, that they would be able to describe their product as "British Made," if there is any advantage in that. On the other hand, they would be handicapped by the fact that they have to put up fresh capital to build these works in England when they have their works in Holland which probably would be too large for the local demand in Holland. As they could not send margarine from Holland into either Belgium or Germany owing to the tariff, I am afraid their works in Holland would be rather a tax on them.

4971. At the end of your *précis* you say it would be a good thing if the retailers of margarine here were allowed to call it "British Made." Is it not legal now for them to call it "British Made"?—No. When you sell margarine to the public, on the wrapper you must put the word "Margarine" and no other word whatever on that same paper.

4972. (Chairman.) That is under section 8 of the Margarine Act?—The original idea was very good; to prevent people putting so much other printed matter around the word "Margarine" so that you could not read the word "Margarine."

4973. (Mr. T. Wiles.) Can you tell us what the tariff policy of Germany and Belgium is?—The tariff policy with regard to margarine is that they put a rather heavy duty on it; and as far as Germany is concerned they also put a heavy duty on oil, whereas they let the raw material go in free.

4974. How do you suggest a tariff should be put on? Do you suggest it on the oil or on the margarine?—I suggest 1s. or 2s. a cwt. on the oils coming into this country.

4975. Is that instead of putting an export duty on nuts from the colonies?—Yes, I am against that, because I think you then tax the native, and I think we ought to tax ourselves and not be allowed to tax other people.

4976. If you tax all the oil coming into this country, I take it you would put a tax on margarine too?—I should put a tax, but a smaller tax, on margarine because it is not all oil.

4977. Would you put a tax on margarine coming from Holland only?—No, but on any coming into this country.

4978. And on any oil coming into this country?—Yes.

4979. What do you think would be the effect of that?—It would prevent dumping, which is a very great disadvantage to the British oil mills, in that the German oil miller can sell, perhaps, 500 tons of oil on the British market and thereby bring down the price of thousands of tons of oil; whereas if the British oil

miller wants to retaliate or return the compliment he cannot sell his oil on the German market.

4980. But I want to know the effect that that would have on the price of margarine if a duty was put on margarine coming into this country.—It would have no effect on the retail price. I do not suggest a duty of more than 1s. or 2s. a cwt., and that would have the effect of making the Dutch margarine makers put up a factory in England to avoid that duty.

4981. That is your view?—That has been the effect. The Dutch manufacturers have established works in Belgium when they put a tax on margarine, and when the Germans put a tax on margarine they established factories there.

4982. Then you tell us that it is dearer in Germany. If it is dearer in Germany with a tax on it, does it not occur to you that it might be possible to make it dearer in England if a tax is put on?—I do not think it would. In Germany there is a tax of 10l. a ton, I think.

4983. By whom would the tax of 2s. a cwt. be paid?—There would not be any tax after the first year.

4984. I mean the first year when it is put on; whom do you think the tax would be paid by?—In the first year the public might have to pay a small proportion of it, but the next year the Dutchmen would have their factories ready here, and there would be equal competition again, with the price no higher, and there would be no revenue after the second year.

4985. And no advantage to the manufacturer?—It would encourage the manufacture of margarine and oil in this country, and would increase the employment of British labour.

4986. And you think the public might have to pay more the first year?—Yes. I think any increase in the cost of the thing is bound to be paid by the public. The manufacturer and the public share it to a certain extent.

4987. Do you export margarine at all from this country?—Practically none.

4988. I notice in your *précis* you say that before the war you were putting up machinery for crushing. You thought that would be a profitable investment, I take it?—We thought it would be for us, because we have our margarine factories in this country.

4989. Even without any State assistance?—Yes. We also have the advantage of having interests on the Continent, and therefore could get all the necessary technical knowledge, plans, and machinery to enable us to put up a factory which we thought would compete successfully.

4990. Perhaps the Board of Agriculture said something to you about this. You say the demand for nut cakes in the United Kingdom, you think, is rather doubtful?—No; I think, given a regular supply, there will be a sufficient demand. As a matter of fact, what I have heard on this Committee shows me that there is a demand already.

4991. I thought the evidence from the various cake manufacturers was that they could not manufacture it quickly enough to supply the demand.—That is so.

4992. You are building your factory in London. You do not think you will have any difficulty in getting a supply of palm kernels here?—I do not think so; I hope not. If we find any difficulty in getting palm kernels we shall confine ourselves to copra.

4993. Do you think you will get palm kernels at the same price they do in Liverpool?—I hope so.

4994. You have no knowledge of that?—I have no knowledge. On the other hand, we are quite prepared to charter a vessel to bring a cargo if we cannot get them otherwise.

4995. You are prepared to charter a vessel. Supposing you found if you chartered one vessel in a year you could not get any more kernels to London because you had chartered a vessel, what would be your position then?—We should have to keep on chartering vessels. It is a question between us and the shipowners, I take it.

4996. (Professor W. R. Dunstan.) I understand that your firm until recently have not done any crushing?—Not my English firm,

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4997. You have done no crushing in this country?—No.

4998. So that most of the material you have used has been got from other crushing firms?—That is so.

4999. Apart from the Continent, have you bought in this country?—Since the outbreak of war we have bought largely in this country, but before the war we practically confined our purchases to Ceylon oil in this country which came in from Ceylon.

5000. That means that at that time you were not using any palm kernel oil?—No palm kernel oil crushed in England.

5001. For the manufacture of margarine you were not only using Ceylon copra oil, but palm kernel oil too?—Yes.

5002. And that you were getting from abroad?—Yes.

5003. Since the war you have got that supply of palm kernel oil from this country?—That is so.

5004. Is there any secret about the source from which you got it? Did you buy it from one crusher?—We bought it from nearly all the crushers.

5005. Then you refined that oil?—That is so.

5006. I suppose it is mostly pressed palm kernel oil that you buy?—It is chiefly pressed, but I think some extracted—in fact, I know it is.

5007. You said to-day that you find the extracted oil not inferior to the pressed oil?—That is so.

5008. That oil is refined by you. Is there any secret about the process that is used? Is it your own method of refining?—Yes, it is a process which has been developed by the Continental firm in which we are interested.

5009. It is a foreign patent you work under?—No patent; it is more secret processes and the machinery. You get chemical engineers, and they first of all improve one thing and then another. You have a research staff, and you keep finding things out.

5010. The point is to adapt the oil for the particular purpose of manufacturing margarine?—That is so.

5011. Will you give us your opinion about the possible competitors in the future with palm kernel oil? Have you had experience of other oils which you consider might possibly compete with palm kernel oil in the future? I may mention palm oil to begin with. Have you had any experience in the use of refined palm oil in the manufacture of margarine?—Yes, we have had some experience with some palm oil and palm kernel oil mixed, and, judging from what a witness before this Committee said, that was evidently produced by some system where you crushed the whole lot together. The results from a commercial point of view, I understand, were unsatisfactory as far as the crusher is concerned. So far as we, as buyers and users of the oil, are concerned it was most satisfactory, but we have never had offers of further quantities.

5012. Was that process carried out on the coast or here?—On the coast, I think.

5013. Are there any other oils that you would mention as probable competitors with palm kernel oil?—Coconut oil is absolutely similar.

5014. We recognise that that is similar. Are there any others which you would name?—There is the cohune nut.

5015. Have you had experience of cohune nut oil?—We have, but not in large quantities.

5016. The trouble is that the nut is difficult to get in large quantities?—You can get it in large quantities, but the difficulty is cracking it and getting the kernels out at a reasonable cost.

5017. You referred to the difficulty of exporting palm kernel oil which is solid at certain temperatures, and say in your précis: "Copra and palm kernel oils are expensive to carry across the sea. The fact that they become solid at certain temperatures has hitherto prevented the use of tank vessels for the transfer of refined oil and necessitates the heavy expense of barrels or drums, the extra cost of which more than absorbs the average profits of manufacture." Is it not the case that a large quantity of refined cotton-seed oil has been sent from this country abroad in barrels or drums?—Yes, but that is

not such a cheap way of transporting oil as having a tank vessel.

5018. I quite understand that, but my point is that it can be managed with refined cotton-seed oil. Why should it not be managed in future with palm kernel oil?—When you are transporting palm kernel oil from England to Germany you are sending it where the palm kernel mills are, whereas if you are exporting cotton-seed oil you are probably sending it to a place where there are no cotton-seed oil mills.

5019. You suggest that the presence or absence of German competition accounts for the fact that you could afford the barrels in one case and not in the other?—That is so.

5020. With regard to tank steamers, is it not possible to employ a heated tank?—I think it is, but I do not know whether it has been done up to the present time.

5021. Has it been done in the case of copra oil from Ceylon?—No. I have heard that it has been done from the Philippine Islands to America, but I have no personal knowledge.

5022. That is so; but there would be no serious difficulty in keeping the oil liquid in the tank during the voyage by using the steam from the ship to get the slightly increased temperature?—No; but it requires certain expense in fitting the vessels with pipes.

5023. But if the trade were a large one it might be worth while to do that?—Perhaps it would.

5024. You told us this morning that the margarine which is prepared in Holland by the Dutch companies is sold in this country at a higher price than you can offer your margarine at.—No. The Dutch companies sell some margarine to multiple shopkeepers (which is the name by which you might describe my firm), and that is sold at the same price as that at which we sell margarine to the public. But then they make other brands for which they charge higher prices to people who have been buying butter, perhaps; but when butter is 1s. 8d. or 1s. 9d. a lb. they say it is too dear, and the customers say "What is your next price?" and they say "1s. a pound," and the customer would rather give a shilling than sixpence a pound, because if the shopkeeper says "It is 6d. a pound," the customer would say "That cannot be good," and will not buy it.

5025. But it is a fact that Dutch margarine is being largely sold in this country at present at 1s. 6d.—Yes, and also a lot of English margarine is being sold at 1s.

5026. To what do you put that down?—To the fact that the public would rather pay a higher price. Those who have been purchasing butter and have had to buy margarine are better satisfied to pay 1s. than 6d. That is the reason we sell our sixpenny margarine "1s. double weight," because the public do not like it to be too cheap to be good. We only sell at one price, 6d., which we call "1s. double weight."

5027. Which you regard as equal in quality to the Dutch margarine at 1s. 6d.?—Not since the war, because the oil has not been of such good quality as it was. Prior to the war, we think we could make a quality of margarine as good in every respect as the margarine that is now being sold at 1s.

5028. If the British public are prepared to pay 1s. a pound for this Dutch margarine, that means a very considerable profit to the manufacturer?—Certainly.

5029. Would a small duty such as you suggest be sufficient to deter him from going on with that manufacture abroad and sending the material here?—He might remain in Holland and confine himself to the high-priced margarine. A grocer buys some to sell at one price and some to sell at a lower price, and if the margarine manufacturer cannot supply that to be sold at the lower price he does not get the order for that to be sold at the higher price.

5030. But apparently there is a very large sale for Dutch margarine at 1s. a pound at the present time. You attribute that to the fact that people who pay 1s. instead of 6d. are paying it because they are under the impression that they are getting a very superior quality of margarine?—That is so; they are getting a very superior quality, undoubtedly.

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[Continued.]

5031. Is it very superior to yours?—It is superior to that which we are now selling at 6d., but not intrinsically worth more than 2s. a cwt., or one farthing a pound more. On the other hand, if we had not war conditions the quality of margarine we could supply to them at 6d. would be fully equal to that they are selling at 1s.

5032. Then the fact that the public are paying that higher price may be because that they are getting a better quality?—Under present conditions that is so; they are getting an article worth a farthing a pound more for which they pay 6d. extra.

5033. Is it not true that if they are getting double the price for their margarine in this country they are not likely to be stopped in that exceedingly remunerative business by a duty such as you suggest of 2s. a cwt. on the oil?—But half the margarine that the Dutchmen are now sending to England is being sold at 6d. a pound.

5034. I understand that, but there is a very largely increasing sale also of margarine at 1s.?—Yes; but that has only sprung up in the last few weeks and will probably die as quickly as it has sprung up as soon as butter becomes anywhere near the normal again.

5035. With regard to labelling, you said it is not possible to use the term "British-made margarine" at present?—Not on the wrapper.

5036. But it is the fact, I believe, in the case of your firm that you do announce on the label that it is made at Southall?—No, we put a separate printed slip with each pound.

5037. But that little slip states that it is "British made"?—I think it does.

5038. So that, practically, the difficulty is got over without infringing the law by your use of the slip?—We try to get over it in that way.

5039. On that slip I notice it is stated that the margarine is made at Southall under Government supervision. What exactly does that mean?—We hope to get a little advertisement in that way, because the Government officials do, from time to time, pay a visit to Southall. I may tell you that when this Margarine Act was passed it took eight or ten clerks to keep a record of all margarine that went out, and they kept it for a long time before anybody came from the Government to look at it.

5040. What is the nature of the Government supervision referred to in that slip, quite broadly?—An inspector calls three or four times a year, looks over the factory, and takes samples, &c.

5041. (*Professor W. R. Dunstan.*) I suppose the Dutch margarine, so long as it is not made in this country, could not claim that supervision?—No, and we hope to get a little advantage from that fact.

5042. From the two facts—that you are able to say it is British-made at Southall and made under Government supervision?—Yes.

5043. I believe your business is carried on partially as a dairy, and that you actually sell butter as well as margarine?—That is so.

5044. Is there any particular reason for doing that?—No. We started selling butter and margarine, and have always continued to sell those two articles.

5045. But if you used the term "vegetable butter" would not there still be an ambiguity? As a matter of fact your margarine, strictly speaking, does contain an animal fat?—In what way?

5046. Inasmuch as milk is used in its preparation, strictly speaking there is animal fat in it.—We use separated milk, so there would not be much fat—very little. We separate the cream from the milk before making the margarine.

5047. Still, some of the constituents of an animal product, milk, enter into the making of your margarine?—But vegetarians drink milk.

5048. But you were trying to draw a line between a margarine which contains animal fat and one which does not. Milk seems to me to introduce the animal element.—My suggestion is to use some other name for margarine when it is made from nuts and milk.

5049. The point arises on a question which Mr. Middleton asked you as to the margarine which

contains animal fat and that which does not.—I would only suggest a fresh name for that which does not contain animal fat, or for that which is made from nuts and milk.

5050. My point is that it would be difficult to contend that it is wholly of vegetable origin if you use milk.—My suggestion is to use a name for that margarine made from nuts and milk.

5051. (*Sir Hugh Clifford.*) You told the Committee that since the war the oil you have received has been of inferior quality?—That is so.

5052. Before the war where did you get the bulk of your oil from?—From Germany.

5053. Do you consider that the inferiority of the oil with which you have been supplied since the war is due to the fact that the crushing methods, and so on, were superior in Germany to those which exist in this country?—No, I think it is due to the fact that the ships in which the kernels were brought over were not so well ventilated, or perhaps the goods came alongside other goods which may have tainted the kernels. Again, these kernels were put in various warehouses under rather bad conditions, and that has rather affected their quality.

5054. Did not their proximity to undesirable cargo, and so on, exist just as much before the war as since its outbreak?—No, I understand that the vessels that took the kernels to Hamburg took kernels only as a rule, and therefore there was no chance of the kernels getting contaminated; and also, I understand, these vessels were specially ventilated in some way.

5055. And since kernels have come to this country they have not had the same advantages as were enjoyed by those that were shipped to Hamburg?—No, they have not.

5056. Do you see any reason to suppose, having regard to the conditions of import into this country from the West African Colonies, that in the future those conditions are likely to be better?—Yes, I do. I think they will be better.

5057. (*Sir G. Fiddes.*) You said in reply to Sir Owen Philipps that the natives are suffering at this moment from the absence of the German demand. Speaking generally, on what evidence do you base that statement?—I notice, even on the paper sent round to the members of this Committee, that since the war palm kernels have fallen to 7l. a ton, whereas the lowest price prior to the war was 14l. a ton. That is for kernels at the coast.

5058. When was the price 7l.?—Some time during the first three months of the war.

5059. Do you think that is sufficient evidence for asserting that the natives are suffering?—I judge that if the natives are getting a lower price for their produce than they formerly got they must be suffering.

5060. Similarly, did not Sir Owen Philipps remind you that they are getting a higher price than before the war? He suggested 17l., I think; whereas your price, which indicated prosperity of which they had been deprived, was 14l.?—14l. was the lowest price, but it started, I think, at 19l.

5061. But that was rather high?—They got 19l. at the coast at one time before the war, and it was as low as 14l.

5062. At any rate you are satisfied that the natives on the coast at the present moment are suffering?—Yes, I think so; that is, they are getting less money for the produce. Whether getting less money is a good thing for them I do not know; it may be they are buying less gin.

5063. Do you know the price that is being paid on the coast to the natives at the present moment?—No, I do not.

5064. Yet you are sure they are suffering. Which natives do you refer to—all over the coast?—Speaking generally, the kernels are fetching a lower price now than before the war. They fetch a lower price in England, and the freight is much higher since the war than before; so the net return the native gets for his kernels must be smaller than it was before the war.

(*Mr. L. Couper.*) The price in Lagos at the end of September was 8l. 15s. a ton.

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(Chairman.) What is that as compared with two years ago?

(Mr. T. Walkden.) Before the war it went up to 18l. or 19l.

(Mr. G. A. Moore.) That was only just for a short time. On the Liverpool market to-day the price is 17l.

5065. (Sir G. Fiddes.) You told us that an export duty on kernels was, in your opinion, inadvisable, because, by the operation of supply and demand, it would mean that there was less demand for the natives' produce?—That is so.

5066. Would that apply if the measure was successful and produced a demand for the whole crop from English millers?—Yes. If you cut off one market from the natives you must slightly affect the price, certainly in the earlier years. It would probably right itself in the course of a few years.

5067. Even although you replace it by another market, or rather by the extension of an existing market?—But you only extend that existing market by artificial assistance.

5068. Is it artificial so to increase the mills in England that they are able to take and do take the whole crop from Nigeria, say?—What is artificial, I think, is that England has a premium on getting these palm kernels 2l. cheaper, say, than a foreign country.

5069. Then it seems to me your argument is that it is more valuable to the natives to have a German buyer than an English buyer. Is that your view?—It is most valuable to have both; but, on the other hand, it is also most valuable to the native that in time of war he has a buyer who can take all his kernels.

5070. Do you not agree that, *ex hypothesi*, he cannot have both, and, if nothing is done there will not be the English demand, and he will be left for his main outlet to Germany, as before. You agree that Germany took at least three-quarters of the crop before the war?—Yes. But after the war the Germans will not get such a large proportion as they have had. I am sure of that.

5071. That is a matter of speculation, is it not?—Take my firm, for example. We are bound to get to England the kernels that we require.

5072. Because you have started mills do you mean?—Yes.

5073. If that process is slightly extended cannot an outlet very easily be found in England, assuming crushers have some inducement to open mills?—Yes, but I still think we are penalising the natives with the view of benefiting English millers.

5074. But if there is a demand for a given number of tons, does it matter one halfpenny to the native whether that demand come from Germany or from England?—No, provided prices are equal.

5075. You spoke of the law of supply and demand. Surely that is satisfied if the demand is there?—Yes, but the price moves. As soon as ever the demand is slightly larger than the supply, up goes the price; if on the other hand the supply is over the demand, down goes the price.

5076. I may take it from you that even though the effect of not putting on an export tax was to prevent the establishment of new mills in England, still it would be an advantage to the native to go on finding his outlet in Germany; in other words a German buyer is better for the native than an English buyer?—Yes, he is, except in time of war, when he is *non est*.

5077. In reply to Mr. Wiles you said you were in favour of putting a duty on all oil. In reply to another member you confined it to palm kernel oil. Which do you mean exactly? Do you mean all oil including the palm oil? Perhaps you did not realise it but the answers were inconsistent.—Yes; I think you might put it on copra oil as well because the two things are so identical; but still it is a big question to say it should be put on every description of oil.

5078. Still it is an essential part of your remedy, because I understand you intend this as an indirect means of ensuring that the palm kernels shall be crushed in England?—That is so.

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5079. In order to do that would you put an import duty on oil imported into this country? Can you stop at palm kernel oil or must you include palm oil?—I should not include palm oil under present conditions of palm oil. I would include copra oil. The main object I have is to make it pay the Dutch margarine manufacturers to establish works here, and then I think the object of this Committee is attained.

5080. Indirectly. Your idea is that the presence of margarine manufacturers in England makes it desirable that crushing mills should be established in their neighbourhood to supply them with oil?—That is so.

5081. But are they coming over here before the crushing mills are established?—Certainly.

5082. Or simultaneously or afterwards?—They would probably come over and establish crushing and refining mills as well as margarine works.

5083. The same people would do both?—Yes, they are doing both to-day. The tendency of things is for one firm to do everything—to take it from the hand of the native to the public.

5084. You are satisfied that a duty on palm kernel and copra oil would be sufficient to produce that result?—I am.

5085. And you would not find it necessary to put a duty on margarine or on palm oil?—I think I should put a small duty on margarine as it contains such a large quantity of this oil.

5086. But not on palm oil, which might come in free?—Yes, because the palm oil at present is not of any interest to margarine manufacturers.

5087. And is not likely to be?—Yes, it is very likely to be.

5088. It is a question of fatty acids again?—And getting it in fresh condition.

5089. If there is a mill capable of producing fresh palm oil on the coast and sending it to you would you take it and be glad to have it?—Yes, we should welcome it with open arms.

5090. I have one last question which goes to the root of the whole matter. Do you consider it is worth while taking any Government action of any sort or kind in order to divert this trade from Germany to England?—Not if we can ascertain that Jurgens or Van den Berghs or the two together are going to establish their factories here. If they do that I am satisfied in my own mind that we shall crush the kernels the produce of which is eaten in this country, at all events.

5091. I am afraid that you missed the point of my enquiry. Do you think it is advisable to have any Government action, and is it worth it—because imposition of a duty would be Government action?—Yes, it is advisable.

5092. You would not leave things just as they are?—I would not, because I think it is very wrong that an important article of food where the raw materials are produced in our Colonies should not be manufactured in this country or in the Colonies.

5093-8. (Chairman.) You said that you were a little apprehensive now as regards the question of extraction here, and that was linked up with the comparative unsuitability of meal as compared with cake?—That is to say its unsaleability.

(Mr. T. H. Middleton.) Farmers may have a difficulty in using palm-kernel meal for sheep which are fed outside, and sometimes for cattle, but for pigs, I think, they use it quite freely.

5099. (Chairman.) Do you know whether it is chiefly used for pigs or for cattle when mixed with sliced beet?—That I do not know.

5100. With regard to the export duty I understood that your position was that for the sake of the West African producer he ought to have the demand big, and have more buyers than one. That is what it comes to?—That is so.

5101. Otherwise he cannot get his full price?—Yes. If England got an advantage it would be quite possible for English buyers to put their heads together and depress the price unnecessarily.

5102. That pre-supposes a ring in England for the purpose?—Yes.

5103. If you have a ring in England, considering the state of affairs in Germany, would not it be almost

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equally easy to have a ring in both countries?—Yes. But there is a difficulty in getting a world-wide ring; in England and Germany you might get it.

5104. But I am talking about England and Germany. Do palm kernels go anywhere else at present?—There were a few shipments to the States before the war. Some will go to Denmark shortly, I think.

5105. Then Denmark comes largely under the same ring as England and Germany?—Yes.

5106. Therefore if you had a ring and got over the difficulties in England you would not have much difficulty in getting that ring in Germany?—No.

5107. Therefore the ring argument does not quite apply?—I agree.

5108. As regards the question of demand and supply, is not the whole point that, given a certain amount of supply, if you have a demand, you want a demand for the sake of the producer equal to and, if possible, a little above the whole of the supply?—That is so.

5109. Once you get that, all your desires as to what is suitable as regards the law of demand and supply would be fulfilled?—That is so.

5110. Therefore if the English crushing mills had a demand which was really equal to the supply, then your ideals would be fulfilled?—Yes, but demand is entirely ruled by the price. With food, I think, given low enough prices, there is an unlimited demand. On the other hand, if the supply is not sufficient, up goes the price.

5111. You have got, more or less, a price set for margarine?—Oh, dear, no!

5112. Is not the price set by Jurgens and Van den Berghs?—Yes, it is set by competition; but I thought you meant a fixed price.

5113. In other words you as an English maker really have more or less to work to the price which is otherwise set. You may work to a sixpenny level regularly, but you would really have to work to a price which is set by the Dutch makers, and you have to take that into account?—I would rather say that it is set by competition, not necessarily of the Dutch makers, but of all makers.

5114. Set by competition. Therefore, supposing you had more demand in England than there is supply of palm kernels, the competition could not go above that competitive level of price for the ultimate product. I am speaking of the competition for getting the palm kernels.—Unless we have a cheaper oil. If we had not enough we should raise our price until we attracted it or found some cheaper oil.

5115. Then you would not benefit the native in West Africa if your competition made you go to something else?—No, but if we could not get anything else suitable or of equal value we have to go on with palm kernel and follow it up.

5116. In other words, when you have more or less a competitive level fixed of prices for margarine, your merchants who would be buying kernel here to go through all the manufacturing process afterwards, if they have capacity enough to treat all the palm kernels, would have competition for sending up the price of kernels as effective as if there were more people from other places in the bidding ring?—But if you eliminate one large buyer you are bound to depress the price. That is my firm opinion.

5117. Supposing you and I were buyers, and there was a third party out of the room, if there is not enough to satisfy both you and me, and we bid up to the total that we can possibly afford, looking to the price of our products, would it affect matters if the third party came in?—It is a difficult proposition. The quantity that you and I as buyers would require would be dependent upon what price we could buy it at. I am always prepared to buy 50 per cent. more of an article if the price goes sufficiently low, because I know I can increase my consumption of that article to a very great extent if I get it 50 per cent. cheaper.

5118. You are assuming that we can buy the palm kernels in England. We really could not increase the quantity by 50 per cent. if we have the total?—No. If I found that I could possibly deal with a larger pro-

portion I should increase my price and try to get some that you would otherwise buy.

5119. Therefore your competition and mine—to use the old illustration—would have the whole possible effect from the point of view of the price to the producer without the third party coming in?—No, it would not. The third party would make a material difference. If we knew that the third party was out of it you and I could get the quantities we respectively wanted.

5120. You mean that we might combine?—Not necessarily combine. But supposing there were 1,000 tons, and you and I wanted 500 tons, and this man who was out of it also wanted 500 tons, we have to try to bid a higher price in order to get as near the quantity we want as we can if we get the third man in.

5121. That is not the condition. I do not want to get into anything too abstract. I am supposing that there may be 1,000 tons of stuff to be supplied. The amount that we can consume in England, or that the crushing mills can take, is rather more than 1,000 tons. Therefore we are all bidding to get rather more in the total than can be supplied. Under those circumstances how can anybody else by coming in put the price up any higher?—The quantity we consume in England is not a fixed quantity. If the crushing mills were deficient or defective that might affect it, but under normal circumstances you have sufficient mills to deal with all the kernels there are. The quantity consumed is regulated by the price at which margarine is put in the hands of the public. If we could put it at 4*d.* instead of 6*d.* we could sell 60 or 100 per cent. more. So you must not assume that the price of margarine is fixed. The capacity of the crushing mills may be fixed, but the amount I can do with, given the right price, is not a fixed but an expansive quantity.

5122. But the output of palm kernels, if not absolutely fixed, is at any rate not expansible in the degree you talk about the consumption being expansible?—Then the price will not go down. I can only take a fixed percentage at a fixed price, but if the price goes down I can take a larger quantity. If the price goes up I can take a smaller quantity.

5123. But you assume that any quantity of palm kernels can come to Europe. I do not say that we have a fixed quantity, but we have a more or less stable amount from Africa. If with our expansion we can take all those and more, shall we not give them the maximum price without additional buyers?—I should imagine the quantity of palm kernels coming from Africa could be doubled if the price were doubled. These gentlemen from West Africa will be able to say if that is so.

5124. (*Mr. G. A. Moore.*) No.—Not in the course of years?

5125. No.—I thought it was going up rapidly.

5126. (*Chairman.*) You say that the freight on oil coming here is 30*s.* a ton, roughly speaking?—Yes, the oil from England to the Continent.

5127. In your memorandum I see you say that difficulties of transit might make people come and put up margarine factories here. If that is the case you would suggest both a duty on oil and on margarine coming into this country?—That is so.

5128. If the freight on oil is such a handicap in itself where is the need for a duty on oil as distinct from a duty on margarine? You say that we need a duty on oil and a duty on margarine?—Yes.

5129. Yet you say the freight itself constitutes a handicap on oil. Then supposing you bring the margarine maker here is there any need for a duty on oil?—It would be a protection for the British oil miller against dumping. That is why I would have a duty on oil.

5130. But you say he has a 30*s.* protection in any case?—Yes, he has. But oil is often dumped and sold at a good deal below the cost of production.

5131. Would your extra 1*l.* a ton be sufficient on top of the 30*s.*?—That plus the freight is 2*l.* 10*s.*

5132. Therefore you think 30*s.* might not be enough but that 2*l.* 10*s.* would be?—Yes, that would be better undoubtedly.

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5133. Do you consider that that amount of 30s. is likely to continue? Could not a person have a tank steamer from Rotterdam here and ship it across and, if need be, heat it on this side?—I think the large maker could, but even then he would be handicapped to the extent of 10s. to 15s.

5134. His freight would be 10s.?—Yes.

5135. But you have a certain amount of freight from your mills at Erith to Southall?—Yes, it would be 2s., perhaps, to set against 30s.

5136. So it might be 8s. instead of 30s.?—Yes.

5137. You were asked whether there would not be an increase in price on account of the duty, and you said after the first year you did not think it would increase the price to the consumer?—No, I think not.

5138. Is that based on the fact that we really can produce as cheaply once we are started going?—In every respect.

5139. And that there would be sufficient internal competition to prevent the putting up of the price artificially?—Yes.

5140. Therefore all you want is to get it started?—Besides, when you only have a duty of 1s. or 2s. a cwt., you also have the external competition, if necessary. It would not prevent anybody from bringing some over.

5141. You could not put up the price effectively?—No.

5142. But you think our production here with competition would enable us to produce cheaply when once started?—Yes.

(*Mr. G. A. Moore.*) That duty on oil would operate against the native of Ceylon, who actually has to pay it. We contend that an export duty on palm kernels would have no effect at all, and would simply throw the Germans on to copra instead of palm kernels.

The witness withdrew.

After a short adjournment.

Mr. JAMES BIBBY called and examined.

5143. (*Chairman.*) You represent the firm we all know of, Messrs. J. Bibby and Sons, Limited, in Liverpool?—Yes.

5144. I want to ask you about oil generally and about palm kernels, but in particular about feeding stuffs. Had you used many palm kernels before the present war?—Not very many. Our principal crushing industry is linseed, cottonseed, rapeseed, and ground nuts, and palm kernels and coco-nut occasionally.

5145. Have you crushed some palm kernels since the war?—Only a small quantity.

5146. The industry as a whole is a big one when speaking of what Germany does?—That is so.

5147. Have you had much difficulty with regard to disposing of the produce of the palm kernels?—We use it mostly in compound cakes.

5148. Do you extract it all?—Yes.

5149. You have no experience, then, of palm-kernel cake as a cake by itself?—Do you mean practical experience?

5150. Yes.—Yes, just a little.

5151. Do you find that it is taken by the farmers?—The experience we have had is in connection with making certain tests with it on our own farm. We have not sold it as a single food to the farmers. Our experience is that if you use a fair quantity of palm-kernel cake it is not taken very readily by the stock, especially at first.

5152. That is partly the reason why you make it into compound cake, I suppose?—Yes.

5153. With the meal, do you find much difficulty, after extraction, in making it into compound cake. Is it fluffy?—We have only used a very little, because it is too fluffy and too light.

5154. In Germany, before the war, the price of extracted meal for feeding purposes was almost equal to the price of crushed cake?—I think it is used there with molasses, and they make a molasses food. It is very good in absorbing molasses, perhaps the best of any food. They have plenty of molasses there, and I think that is how it is used.

5155. Do you know if they use it with the beet slices?—I should think probably so.

5156. Have you any knowledge of that?—No, only indirectly—just what I have been told.

5157. But the meal itself you do not think would be of much use for feeding purposes?—It is all right so long as you get cattle to eat it and get it into a suitable form for eating. If it is fluffy and fed in a meal form, the cattle do not care for it, as it gets up their noses; but if mixed with molasses, that gets over the trouble.

5158. If you mix it with molasses, in what form would you feed it? What would it look like? Would it be a cake?—No. If you mix molasses with palm-kernel meal, it makes a dark brown meal.

5159. And it is not so fluffy or so light as the original extracted stuff?—No.

5160. Either in that form with molasses or in compound cake, what is your idea as to the future of it in this country? Would it be a valuable element? Could you get much market for it in this country after the war?—It all depends upon the price.

5161. You know what prices have been before the war, and if we reverted to anything of that kind, if people could crush it here, would you find it a thing that it was possible to use?—Yes, at a price we should probably use it all the time. It has a certain value to us for compounds, and if it is that price or below it, we could use it, but not otherwise.

5162. Before the war nobody did much in it?—Very little.

5163. Was that because of the price?—Farmers used it and the cattle did not care for it, so they went off it.

5164. I am thinking of those who make compound cakes. Here was a trade of which there was a very large amount and which nearly all went to Germany before the war?—Yes.

5165. Even if not so particularly liked as a plain cake it ought to have been of use in compound cake because of its composition, and yet very little was used in this country?—Very little.

5166. What do you think was the reason?—The Germans generally put a higher value on it than we did.

5167. Was that, so to speak, a fancy value put on it by the Germans because they happened to have a fancy for it, or was all their general range of prices higher?—The Germans all along have put a higher value on it for feeding than the English farmers have.

5168. I am talking now of compound as distinguished from simple cake?—Yes.

5169. Surely you both were guided by analysis, were you not?—Not altogether.

5170. Not in making the compound cake?—No. Analysis is one thing, but the principal thing is practical results.

5171. Do you not sell your compound cake on what it contains?—We sell it on analysis because we are compelled to do so by law, but that is to some extent misleading as to its real value.

5172. In what way?—It does not give the actual feeding results. It gives the value from an analysis point of view only. Take linseed cake, for instance, which is perhaps 11*l.* a ton at the present time, and soya cake, which may be worth 8*l.* The latter has a higher analysis than linseed, yet it is 2*l.* to 3*l.* a ton cheaper.

5173. In other words, you mean whether it is for fattening or for whatever it is?—It does not matter. Analysis gives a certain estimate of the value, but it is only secondary, in my opinion. The more correct value is given by the actual results in feeding.

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5174. You have carried out lots of experiments yourself on feeding, as we know?—Yes.
5175. If it is not the contents of it as shown by analysis, what is it that makes the one much more valuable than the other?—It is the adaptability of the food for the purpose for which it is required.
5176. You mean the proportion digested?—Yes, to some extent. Some kinds of foods, leguminous foods, for instance, are adapted for milk, while others are more adapted for fattening; some foods suit pigs, some sheep, and so on.
5177. Is that not just stating the same thing? Leguminous foods are adapted for milk because they have such a lot of albuminoids in them in proportion?—Yes, to some extent.
5178. To that extent the use of which is shown on the analysis. This which you mention is something different from the contents as shown by analysis?—Palm-kernel cake or meal is very fair food for milk, though comparatively low in its analysis, say 18 per cent. of palm kernel compared with 40 per cent. of decorticated cotton.
5179. And yet there is not that difference in the actual value?—No. As I have stated before, you cannot get the value of the food by its analysis. You must have the practical test as well.
5180. You do feed it to the cattle that you keep experimentally?—Yes.
5181. And also to sheep and pigs?—We make special foods for sheep and dairy and also for fattening.
5182. Do you simply go by experience in the end?—Largely.
5183. Then all that that comes to in the end is continual experiment and testing?—Yes. That is the true test of the value of food; it is the results and not the analysis solely.
5184. With regard to pigs, I am told that this meal in Germany was found to be very good for pigs.—Yes.
5185. Have you tried it at all?—Yes, for pigs.
5186. Palm kernel meal?—Palm kernel meal as a mixture. We have tried it by itself, but you cannot get them to eat it very freely unless as a mixture.
5187. It is fluffy?—It is a fairly good food, and at a relative price might be an economic food.
5188. As between the crushing and extraction of palm kernels in this country, have you made up your mind which is the better?—As to palm kernels I think if I could crush and get down to 5 or 6 per cent., I should crush.
5189. Is that partly because of the quality of the oil produced?—Yes. You can make edible oil from the crushed and it is more difficult to make it from the extracted kernels.
5190. It needs more refining?—Yes.
5191. It may lose certain things in the process?—Possibly.
5192. Here we have a trade which was a very large one in Germany before the war, and, as we know, as regards palm kernels a great deal of it has come to this country?—Yes.
5193. I do not know if you would say it was worth while trying to retain it in this country. We have, at any rate, imported a lot of oil from Germany before the war.—It is a question of brains and enterprise. If the Germans have more of that commodity than we have they will get a big portion of it back. If they have not we shall stick to some of it, but not all of it. One factor against us is that they can work considerably more cheaply than we can.
5194. In what ways?—To start with, it would probably cost 50 per cent. more to erect mills now in England than it has cost the Germans to put down their mills. That is a considerable handicap. Then the charges are less.
5195. Less for what—taxes and rates?—The dock charges, I think, are less, and the workmen will work longer hours for probably the same wages to start with.
5196. We have had that denied.—That is my impression.
5197. We will take it as an impression.—Quite so.
5198. You think on the whole we should have to meet those facts if we were in competition after the war?—Yes, I think the Germans will make a very hard struggle to get their trade back again.
5199. On the other hand, they have been selling oil to us, or margarine, as the case may be, and that has got to bear freight to this country, and so on?—The freight is not very much in normal times.
5200. At how much do you put the freight?—I have no definite information, but should say 10s. to 12s. per ton.
5201. But that has not come within your knowledge?—No.
5202. (Sir F. Lugard.) With regard to the question of keeping values, what is your experience as to the length of time that pressed cake or meal will keep without turning either mouldy or rancid?—It is largely a question of moisture. At 14 per cent. it would probably go mouldy; at 9 or 10 per cent. it would keep fresh for any reasonable time.
5203. Can you keep it down without additional cost?—In extraction you can, because you have to dry the meal. When the meal is extracted it comes out at about 20 per cent. of moisture. It can be dried down to 4 or 5 per cent., if you like.
5204. From that point of view the meal is more easily dried than the crushed cake?—Yes. In crushing, with care you should get the moisture down to 8 or 10 per cent.
5205. Then on the question of rancidity, the crushed cake is more liable to turn rancid than the meal, because it contains more oil?—Yes, naturally so.
5206. Then with a crushed cake it is purely a question of moisture?—Mostly, but the cake should not be packed or bagged warm.
5207. (Sir Owen Philipps.) You have very large mills in Liverpool, have you not?—Fairly large.
5208. Have you any mills at other ports?—No.
5209. Have you machinery at Liverpool for extracting the oil from palm kernels?—Yes.
5210. Before the war have you actually extracted oil from palm kernels?—Yes.
5211. And you have also used your machinery for expressing the oil?—Yes. We have not expressed very much. Our principal handling of palm kernels has been in connection with extracting and not crushing. We have crushed a little, but a very little.
5212. I suppose for expressing you would want slightly different mills with more pressure?—We are not quite sure about that. We are making some experiments now, but, so far, have no definite results.
5213. You think your machinery would deal with it?—We are not quite clear on that point, but as I have just stated, we cannot speak definitely until we have investigated further.
5214. We have been told by Mr. Pearson, of the British Oil and Cake Mills, that he had examined the price at which you could buy palm kernels and the price at which you could sell oil or cake many times in the last fifteen or twenty years, and that never, or hardly ever, during that time did the price show a profit?—I should say that is not far from the truth.
5215. Have you made similar tests?—Prior to the war I should think that palm kernel crushing has been one of the worst paying industries in the crushing line.
5216. You know your late neighbour, Sir Alfred Jones, who had some mills at Liverpool?—Yes.
5217. Can you give the Committee any reason why it has never been profitable to other people in Liverpool to do it in a bigger way. He put up quite a small mill.—I should think he put the mill up not for the purpose of crushing but just to help his freights. That is my impression.
5218. And to help to bring the trade here?—That might be one reason, but I think the predominant one would be to ensure a certain amount of freight for his steamers.
5219. But you have been crushing for all these years and you are an old-established firm in Liverpool?—Yes.
5220. Why is it that the crushing of palm kernels in England has not, taken over a series of years, been

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a profitable undertaking?—The principal reason is because of the German competition.

5221. We have had it in evidence that it costs about 30s. a ton, including the cost of casks or drums, to get oil to England from Germany.—Do you mean prior to the war?

5222. Yes, including the cost of the casks.—I am surprised to hear that.

5223. We have had it in evidence from several witnesses that it was between 25s. and 30s. prior to the war, including getting the drums back again.—I have no personal knowledge on this question, but it is much more than I thought.

(*Sir W. G. Watson.*) That is freight only. This includes either the return carriage on the drums or the difference in the price you pay for the barrels and the price at which they have to be sold.

5224. (*Sir Owen Philipps.*) It costs an appreciable amount to bring oil from Germany to England?—Yes.

5225. You say, notwithstanding that, that the Germans have been able to sell it in England at prices which really made it not worth your firm's while taking up the question of crushing palm kernels?—Yes. We naturally crush those seeds or nuts which show the best margin, keeping in mind also the residual cakes or meals which would be most helpful to our compound foods.

5226. Therefore one of the principal difficulties is the cake difficulty?—Yes.

5227. Supposing there are new mills put up in England now for crushing palm kernels, do you consider that, after the war, they will be able to stand the German competition without Government assistance?—It is very doubtful. I would not put sixpence into a mill for crushing palm kernels only.

5228. You mean they will drift off on to crushing something else?—If it is palm kernels or something else, that is another matter; but so far as regards palm kernels solely, it is very probable that the Germans will get a considerable portion of their trade back again.

5229. To avoid their getting it back again, would you put a duty on oil or on the article for which the oil is used, which is margarine mostly?—That is opening up a large question. The fiscal policies of the two countries are so entirely different. The Germans foster your industries and develop your workshops; we say: Let us have everything cheap, never mind your industries, but if necessary enlarge your warehouses.

5230. But without some Government protection of some sort, you think the man who puts his money into palm kernel mills at the present time will have a very bad time after the war?—Yes, probably.

5231. (*Sir W. G. Watson.*) You say that the Germans foster their industries. Do you not think it is wise to foster an industry in its infant stage, so that it can grow up strong and then, with all the facilities in England, it should be able to stand by itself?—I think it wise at any time to foster it against unfair competition.

5232. In other words, you think it would be wise to foster an industry in its infant stage?—Yes.

5233. That would apply to the palm kernel oil crushing industry?—Yes.

5234. Before the war, if you had produced palm kernel oil you would have had to sell it to soap-makers?—Yes.

5235. I suppose you realise that the Germans have this advantage, that they have customers who use it for edible purposes after it is refined in Germany to whom they can transfer the oil at a very small rate of freight?—I think we can refine oil just as well as they can.

5236. But prior to the war we had nobody in England who refined palm kernel oil for edible purposes?—I could not say about that, but we have been refining for edible purposes in an experimental way for some time; but it is only in the last eighteen months that we have developed that branch of our business.

5237. But you did not, as a matter of fact, in any quantity?—We ourselves made very little edible oil prior to the war.

5238. I think you crush a good many ground nuts?—Yes.

5239. I believe you crush them undecorticated?—Both decorticated and undecorticated.

5240. Do you take the nuts in the shells and then decorticate them?—No.

5241. You know for edible purposes, that is for the best quality, it is necessary to take them in the shells, and then decorticate them and then crush them?—I am not so sure on this point.

5242. My firm, I think, bought ground nut-oil from you at 38s. or 39s. within the last fortnight?—That is quite likely.

5243. It being the case that we bought at that price why is it that we give 50s. and 52s. to a Dutch maker for refined oil for edible purposes?—That is what I cannot understand.

5244. The reason is that to make the best ground nut oil you must take the nuts in an undecorticated state from the Gambia or Senegal—the Gambia for preference because it is British—and you must decorticate them here, take that brown skin off, and then crush them and refine them, and then you get a nice quality. Apart from that if you take undecorticated nuts and crush them you will not get the highest quality.—The finest oil is no doubt produced when the nuts are crushed cold; but for making an ordinary fine oil I do not think it is necessary to go to the expense of preparing the nuts in the way you mention. The difference between the two qualities of oil is now, I should say, about 10l. per ton.

5245. It is now. I do not think it was in the old times before the war.—I have no knowledge as to relative prices before the war.

5246. Then you said that in your practical experience the results shown by the cattle were more important than the chemical analysis?—Yes.

5247. I have been told that the Germans say the same thing, and that is how they explain why they buy so much of this palm kernel cake and use it when the analysis is against them.—Yes.

5248. (*Professor W. R. Dunstan.*) Your principal business is the manufacture of compound cakes?—Not exactly our principal business, but a very important branch of it.

5249. What would you say is your principal business?—I should put our crushing business and our compound food trade as of practically equal importance.

5250. I gathered from your answer to Sir George Watson just now that the residues from your seeds were used in the manufacture of cakes?—Yes, principally. We sell linseed cake and cotton cake as single cakes. But there are other seeds, such as ground nuts, palm kernels, soya beans and others, where it is the residue we chiefly have in mind.

5251. The lesser known seeds you make into compound cakes rather than simple cakes?—Yes.

5252. Do you find that the British farmer is inclined to use compound cakes to a greater extent than was the case some years ago?—I think the prejudice that formerly existed against compound foods is gradually dying out.

5253. You think it is a growing industry?—Yes, I think so.

5254. (*Chairman.*) Do you say that you crush 2,000 tons a week?—Between 1,500 and 2,000 tons, according to the kind of seed we are working.

5255. (*Professor W. R. Dunstan.*) You have referred to the value of chemical analysis as a guide to the value of a food. You will admit that the value of a food is determined by its constituents. I mean the intrinsic value of a food must depend upon the materials that the feeding stuff contains?—Yes, but its value cannot be determined by the analysis solely. It depends principally upon the adaptability of the food for the purpose for which it is required.

5256. I am coming to that, but I want first to remove what, I think, is a misapprehension with regard to this matter. The only method known to determine the composition of a feeding stuff is by chemical analysis. That gives us the ultimate composition of the material and shows us how it is built up. From that we can make certain inferences as to the

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feeding value, not the monetary value, of that material as a food for animals or men. If I apprehend you rightly, your point is this: that for other reasons than reasons of composition the food may not be of great monetary value?—Yes.

5257. I think it is very important to get that point clear. A food may not taste well?—Yes. Palatability is undoubtedly an important factor, but, to illustrate my point about the analysis being the sole factor in estimating the value of a food we will take oatmeal, which 40 or 50 years ago was very largely used in fattening cattle. This food is low both in oil and albuminoids, say, about 4 per cent. oil and 12 to 14 per cent. albuminoids, yet as a fattening food it has few equals.

5258. At a price?—Apart from price.

5259. (Chairman.) You are really illustrating the difference between chemical analysis and other things. Weight for weight, you would take oatmeal even though the chemical analysis was low?—For fattening, oatmeal will probably give results equal to, if not better than, most other foods, and this in spite, as I have already said, of its comparatively low analysis.

(Professor W. R. Dunstan.) I have not the figures in mind, but the Scotch nation for generations has fed itself very largely on oatmeal. It is a well-known food for man. Perhaps Mr. Middleton may remember what I do not, that is, the actual units for oatmeal, but I should be very surprised to find that it had a low calculated value as a feeding stuff.

5260. (Mr. T. H. Middleton.) Mr. Bibby stated the analysis about correctly.—I think I am right.

5261. (Professor W. R. Dunstan.) Taking it in comparison with other feeding materials, you put oatmeal, from a practical point of view, in a very high place?—Yes.

5262. But it may be that a feeding cake or material has a very satisfactory composition as determined by analysis, but may not be attractive to an animal on account of peculiarities of smell or taste?—Yes.

5263. That is why you consider, and I think rightly, that in addition to chemical analysis you want an actual feeding trial?—Yes.

5264. You know that in the case of palm kernel cake these feeding trials in confirmation of the calculated value have been carried out very extensively?—Yes.

5265. I gather your experience is that extracted oil is not as satisfactory as expressed oil?—Not for edible purposes.

5266. Is that your own extracted oil?—Yes.

5267. And you have extracted the same palm kernels?—Yes.

5268. The same parcel of seeds has been expressed as has been extracted?—Well, perhaps not exactly the same parcel, but from the same class of seed. Our experience is that the crushed oil is more easy to refine than the extracted.

5269. Do you put that down to the use of a solvent?—It may possibly be due to the solvent.

5270. We have had a good deal of evidence on the subject, and it does not all agree with the view that an extracted oil is inferior. We have had evidence to the effect that it is about the same.—I can only give you our experience.

5271. Can you say which solvent was used?—Benzene.

5272. That is to say the light petroleum?—Yes, we have used both petroleum spirit and trichlorethylene.

5273. You find that it gives an unsatisfactory oil, too?—Yes.

5274. With regard to ground nuts, I gather from your answer to Sir George Watson that you crush them with the shells on?—Yes.

5275. What is the exact reason for that rather than crushing the kernels?—We find we can make quite a satisfactory oil by crushing with the shells on. There is, consequently, no reason for going to the expense of taking them off.

5276. What they told me in Marseilles was that for the purpose of soap making a quite satisfactory oil could be made by expressing with the shell on, but for edible purposes it was necessary to use a decorticated

nut, which also gave a more valuable cake?—That may be so.

5277. Do you press cold or hot with the shell on?—Hot.

5278. And you have not used any refining process afterwards?—Yes, the oil is refined afterwards.

5279. Then the oil that Sir George Watson has been speaking of was refined ground nut oil?—Yes, I presume so.

(Sir W. G. Watson.) Yes.

5280. (Mr. G. A. Moore.) You said that the palm kernel cake or meal would be useful to you at a price. Can you mention a comparative price? I am not asking you for actual prices, but in comparison with other feeding stuffs. For instance, is it more valuable to you than an undecorticated cotton cake?—For our purpose I should prefer undecorticated cotton cake to palm-kernel cake at equal prices.

5281. Consequently we cannot expect in this country to get for palm kernel cake a price exceeding the price of undecorticated cotton cake at any time in the market?—Not from compound cake merchants.

5282. Could we from the farmers?—I could not say.

5283. Have you had any experience on your stock farm in feeding palm kernel cake or meal by itself?—Yes.

5284. Do you find that there is any value in it there which would indicate that it was worth more to the farmer than undecorticated cotton cake?—We have not tested one against the other, but my impression, speaking as a farmer, is that I should prefer undecorticated cotton cake to palm kernel cake at equal prices.

5285. Even for milk-producing purposes?—No, not for milk-producing purposes.

5286. Would you prefer the palm kernel cake?—Yes. Cotton cake is unsuitable for milch cows unless fed in strict moderation, and palm-kernel cake would, I think, be a more economic food if fed as a mixture.

5287. For fattening purposes, have you any experience of it?—Yes. I should not consider it a good food for fattening, unless used as a mixture.

5288. It is not as good as linseed?—No.

5289. Then, generally speaking, as long as the English farmer is of the same opinion as you are generally, there is no chance of our being able to sell the cake in this country at the same price as the Germans would pay for it?—That I could not say. It is being boomed at the present time, and farmers are trying it and being persuaded that it is the very best food they can use, and so on. It is quite likely that for a time it may have a fairly good trade, especially if the price keeps reasonable.

5290. Is it not at present far and away the cheapest food in the country?—What is its value?

5291. 6l. 12s. 6d.?—Yes, it is relatively good value.

5292. Cake with 7 per cent. of oil in it?—Compared with undecorticated cotton cake at 8l. 10s., palm-kernel cake at 6l. 12s. 6d. is certainly cheap, but if cotton cake gets down to, say, 4l. 10s., its normal price, then it will be another matter.

5293. Any conclusions based upon the present demand for palm kernel cake would be misleading if you leave out of the question the comparative cost. It is so much cheaper than anything else, which quite accounts for the demand that makers are experiencing now.—Exactly.

5294. (Mr. T. Walkden.) We have it in evidence that palm kernel oil used for margarine purposes since the war is not so good as that which was obtained before the war. Can you account for that?—I can hardly think that this is so.

5295. If it is so, is it possible that the quality of the kernels has anything to do with it?—I do not see why it should be so.

5296. We do know there are different qualities of kernels from different parts of the coast. Is it likely that they mix the kernels at all before crushing? In some cases you pay 1l. to 30s. a ton for one more than for another kind?—Yes. That depends not upon the special kinds of kernels but more on the quantity of oil that they contain.

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5297. And also probably on the quantity of dirt and shell?—Yes.

5298. I thought probably it might have something to do with the making of the cake. Do you mix the different kernels, some that may have plenty of shell and dirt and others that are probably soaked?—We only buy one quality, that is what is called the fine kernels, and we judge of the value of them not by where they come from but by the quantity of oil they contain.

5299. Therefore, it is to the interest of the country to have brought home as pure and good a quality as possible?—Decidedly.

5300. You do not think that has anything to do with the oil? It has been thought that this oil not being so good the kernels might have been kept in store or contaminated on the way home. You have had no experience that the oil is not so good for making margarine?—No. Our experience of edible oils is only of recent date.

5301. The Germans have taken great care about the crushing of the kernels by grading them and keeping the qualities separate?—I was not aware of that.

5302. (Mr. T. H. Middleton.) You mentioned the fact that palm kernel meal would be useful as an absorbent for molasses?—Yes.

5303. Is it the case that there is a very large demand for an absorbent?—A fairly large demand.

5304. You would agree that there is great need for a good absorbent?—I would not say a great need, but there is a need.

5305. Would you prefer the palm kernel or peat moss as an absorbent?—Palm kernel certainly.

5306. So should I. At the present time I think you agree that peat moss is the chief absorbent used for molasses?—I believe it is largely used.

5307. So that gives another suitable material?—At the same price.

5308. At a suitable price there ought to be a large demand for it?—It is a good absorbent, but a mixture of palm kernels and treacle would not be an ideal food, being too low both in oil and albuminoids.

5309. We agree, but I should like to have your reason for considering them a poor food.—As I have stated, the oil and albuminoids are too low.

5310. That is to say it would require blending with other foods?—Yes, preferably a food rich in albuminoids.

5311. Assuming it to be suitably blended with material composed of palm kernels and molasses, it would be a very useful foodstuff?—Yes.

5312. You mentioned experiments made by yourselves in cow feeding or cattle feeding?—Both.

5313. Mr. Knowles, who is not here to-day, indicated that you had paid a good deal of attention to the effect of feeding stuffs on the composition of milk?—Yes.

5314. Can you give us any information on that point?—In what respect?

5315. Mr. Knowles indicated, I think, that you had some information with regard to the effect of palm kernels on the composition of milk?—No. We made some tests some years ago with palm kernels, and there was practically no difference between, say, an ordinary mixed food and an ordinary food with a fair proportion of palm kernels in it.

5316. We have had it in evidence here that the palm kernel may possibly increase the percentage of butter fat in the milk.—Not to any extent.

5317. That is not your experience?—Our experience is that, under ordinary conditions, a change of food will not affect the butter fat more than 0.25 per cent.

5318. You will agree that this improvement is possible?—Yes, to about the extent just mentioned.

5319. In any case there is no evidence that you can adduce in favour of palm kernel cake as compared with any other feeding stuff in the effect on the percentage of butter fat?—No.

5320. Has it any other specific effect upon milking properties?—I do not think so. There used to be an impression, but I cannot say I have any evidence for it, that it was what the farmers called a hungry food; that is to say it had a wearing effect on the animals.

5321. What is your general method of experiment? How many cows or cattle do you employ in each lot?—We generally test them in groups of eight; four in each. We take eight cows of equal lacterial period and put them a fortnight on one food; then give them a week's rest and then a fortnight on other food, and then change about again.

5322. What is the usual period for which you continue these tests?—A fortnight or three weeks.

5323. For how many fortnights? What is the general length of the experiment? Is it three months?—We should not probably test them any further than, say, six weeks.

5324. Three fortnightly periods would be your usual test?—Yes.

5325. You mentioned that the keeping quality of palm kernel cake was affected chiefly by the moisture?—Yes.

5326. Would it not be the case that even a dry cake would absorb moisture if sent out and kept in an ordinary store?—No, I think not. If it is kept in a moist room it might do so, but ordinarily it would not.

5327. You do not think it would take up moisture from the air in an ordinary farm-steading?—Very little.

5328. Now with reference to the value of analysis, you pointed out that analysis was not the only thing to be considered in valuing feeding stuffs?—Yes.

5329. Professor Dunstan has asked you several questions and I should like to have, in some detail, as you have had great experience in feeding, the points that in your opinion give a feeding stuff its value. First you will agree, I think, that we must take the digestibility into account?—Yes.

5330. You instanced oatmeal as being a feeding stuff of high value?—Yes.

5331. Would you agree that the digestibility of oatmeal might have something to do with the value?—It is possible that it might.

5332. Have you any other explanation to suggest?—I do not agree that the digestibility is the reason, though it might be. In my opinion, it is more the suitability or adaptability of the food for its purpose than either digestibility or analysis.

5333. Would you agree that a food which contains a high percentage of indigestible substance is of less value than any similar food with a low percentage of indigestible matter. Take, for instance, two cotton cakes, an undecorticated and a decorticated; in the undecorticated you have a high percentage of indigestible substance. Does that lower the value of the food in your opinion or not?—Yes, it lowers the value of the food.

5334. But assuming that you have a certain percentage of oil and albuminoids in the undecorticated cotton cake you would agree that the value of those constituents is reduced by the presence of the fibre?—No, I would not say that.

5335. Then you are rather arguing for the chemical analysis as being the measure of value?—No, I do not think I am. A certain amount of indigestible fibre is essential for good feeding.

5336. I agree, but you can get it in straw very easily?—You can. If you were to feed decorticated cotton cake freely with straw, I should hardly expect good results.

5337. I agree, if so much is fed.—But with undecorticated they might do well.

5338. But going back to the discredited chemical analysis, assuming you were to give half the quantity of decorticated cotton cake?—I do not discredit analysis, but what I say is that analysis solely is an unsafe guide as to the true value of a food.

5339. We agree there. I merely want to know your reasons for discrediting analyses.

(Chairman.) I think you are a little at cross purposes. I do not think Mr. Bibby discredited analysis. All he said was analysis is one means of ascertaining its value, but that it was not adequate as ascertaining its only value. I do not call that discrediting it.

5340. (Mr. T. H. Middleton.) I want to get at the credit attached to the other means of valuing. In reply to Professor Dunstan you made a strong point o

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the value of palatability and general wholesomeness?—Yes. If a cow does not relish its food it will make less headway.

5341. There is, perhaps, another item to be taken into account in valuing these foods. We had this morning some very interesting evidence showing that the human animal values its food partly by the price which it costs. Sir George Watson indicated that margarine at 1s. was more valued than margarine at 6d. Do you think that this consideration could enter into the valuation of a feeding stuff?—In testing a feeding stuff you weigh the animal every fortnight, and you do not weigh the human animal.

5342. I think you missed my point. Does imagination play any part in valuation?—In feeding cattle?

5343. No, in the valuing of a feeding stuff.—I do not know—I am afraid I hardly see your point.

5344. Are you aware of the fact that farmers like certain things to which they are accustomed?—Certainly.

5345. And to that extent, of course, they are prepared to pay more for them?—Exactly.

5346. And therefore imagination does play a part?—Some farmers have a preference for one food and some for another, perhaps without any definite reason. You will go into districts where they use hardly any cake but undecorticated cotton cake, whilst in other districts hardly a pound is used, and the same with other cakes.

5347. Therefore you agree with me that imagination does affect the value of feeding stuffs?—Yes, probably it does.

5348. Will you give your reason for the statement that you did not think cotton cake was a suitable cake for cows?—I think you will find that where decorticated cotton cake is largely used for dairy stock, the calves are difficult to rear. I cannot give the reason, but this, I think, is generally recognised among dairy farmers.

5349. I supposed you were referring largely to stalled cattle, and that you might modify the statement if you were referring to cows on pasture in summer?—You do not feed the same quantities. It is not good to feed seven or eight pounds a day to an in-calf cow.

5350. It is quite unsuitable in such quantities?—Quite unsuitable, in my opinion.

5351. Then you expressed the opinion strongly that palm-kernel cake was not equal to undecorticated cotton cake?—What I said was that I preferred undecorticated cotton cake to palm-kernel cake.

5352. Why?—Undecorticated cotton cake blends better than palm-kernel cake.

5353. Your point is the mechanical difficulty of pressing the cake?—Yes, mainly.

5354. Then your reply as to the relative values of palm-kernel cake and cotton cake referred to the value to the manufacture of compound cakes?—Yes, principally.

5355. You do not pass an opinion as to the feeding value for general purposes?—No.

5356. I should like you, if you will, to state what in your opinion are the great advantages of compound cakes as compared with the single cakes which you also deal in.—For one thing, they are usually more palatable; and, speaking generally, I should say a mixed food, assuming it is mixed judiciously, will give a better result than any one single food.

5357. But the farmer himself can mix the food?—He cannot very well make a cake.

5358. I have questioned a previous maker of compound cakes on the subject, and he pointed out that the single cake had a great sale among the larger farmers, but that the smaller farmer preferred the compound cakes because of the difficulty in buying separate kinds and mixing. Would you agree that that is generally true or not?—I think there is some truth in it. There is a certain amount of suspicion against the compound cake, but with well-established brands this prejudice is gradually dying out.

5359. This prejudice, however, you still experience?—To some extent.

5360. Even although the analysis is stated?—Yes.

5361. (Mr. L. Couper.) Your firm entered into the Gambia trade to any extent for the first time last year, I think?—Yes.

5362. Did you also make purchases in Senegal of ground nuts?—Yes. We purchased all down that coast.

5363. You have a personal knowledge of certain of the conditions applying to the purchase of these ground nuts?—Yes.

5364. Why I want to make that clear is that I am very glad we should have a witness here with regard particularly to ground nuts and the Gambia. The Gambia is a colony which has very few friends.—Yes.

5365. I think it is very important that it should get some of the attention of this Committee, and I would ask permission to make a short statement, if I may, as to the Gambia Colony. It is known to all, no doubt, that here is a colony in which British interests have existed ever since the time of Queen Elizabeth, at the time when Portugal and Spain were our rivals in Africa. The colony, as you know, geographically is a peculiar narrow tongue of land stretching into French territory. Apart from the Bank of British West Africa, which was established in Bathurst in 1901, there is only one English company in the Gambia as compared with, perhaps, half-a-dozen French concerns. Therefore, you can understand that we as a bank interested in the Gambia were very pleased to think there was another British concern going to that territory. Even as it is, two-thirds of the cash taken from our bank at Bathurst for the purchase of ground nuts is required to be provided in French silver. I know, too, that, while the British tonnage serving the port is in excess of the foreign tonnage, the number of steamers and sailing ships in 1913 which entered and cleared at Bathurst was only 226 British as against 357 foreign. So it is not to be wondered at altogether that there have been questions from time to time as to the probable transference of the Gambia Colony to the French.

(Chairman.) I think you have wandered very far from examining the witness.

5366. (Mr. L. Couper.) I wished to make that short statement. (To the Witness.) Do you know that the Gambia Colony depends to the extent of about 20 per cent. of its revenue upon an export tax on ground nuts of 6s. 8d. per ton?—No, I do not know that.

5367. Are you aware if there is any similar tax in Senegal?—No, I do not know.

5368. If you are not aware of its existence you have not, consciously at all events, paid that tax?—Evidently not. We buy through a French house.

5369. Have you any difficulty in buying ground nuts in Senegal?—No.

5370. And you do that through a French house also?—Yes.

5371. You do not know of any English house in Senegal?—No.

5372. What is the maximum price you could have paid for ground nuts in normal times before the war?—I really cannot tell; it is practically a new trade with us. I should think it would be 12l. or 13l. per ton perhaps.

5373. That would be the maximum you would pay?—I could not say exactly. That is c.i.f.

5374. Do you think the ground nut is likely to be more in demand in the United Kingdom as time goes on?—I think it is quite probable.

5375. You are not afraid that after the war the French firms will again purchase the whole crop?—France will probably take more ground nuts this coming season than last year, but we hope to get a fair share.

5376. Why?—We expect to be able to pay as good prices as competing countries, and the edible oil trade is developing in this country.

5377. And it fetches a higher price than other oils?—Yes.

5378. I remember a year ago writing to one of the large Bordeaux firms and they replied that they had no difficulty, even after the war had begun, in selling the ground nut oil. Their difficulty was to find a market for the oil cake. They said that their chief

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[Continued.]

market formerly had been in Germany and Scandinavia?—I believe that was so.

5379. Is that difficulty still in existence?—Yes, to some extent.

5380. But the French firms have shown some sign, without giving away any secret, of making larger purchases this coming season than last year?—As I said before, I think they will require more than last year.

5381. You think you can account for the cake finding a market?—This country could take their surplus cake at a fair price.

5382. (Chairman.) With regard to the ground nuts do you find the residue is good for compound cake?—Yes.

5383. It is very high in many of its qualities?—I should put its value somewhere between undecorticated and decorticated cotton cake.

5384. That is undecorticated ground nuts?—Yes.

5385. (Sir Owen Philipps.) The ground nut crushing business has really only come to this country since the war?—Practically.

5386. Before that it was practically all done in Marseilles?—Yes, and other parts of the Continent.

5387. (Chairman.) Delft in Holland?—Yes.

5388. (Sir W. G. Watson.) And in Germany?—And in Germany as well.

5389. (Sir Owen Philipps.) I think it was mostly at Marseilles?—Yes, Marseilles is the centre of the crushing industry on the Continent.

5390. Do you think we shall be able to retain that business in England after the war, or will it drift back to Marseilles?—I think we shall retain a good portion of it. At any rate we shall make a good try.

5391. Have Marseilles any advantage from Government support that we should not get in England?—They have this advantage, that we cannot ship oil to France without paying about 5*l.* a ton duty. Their oil can come into this country free.

5392. Therefore they could ship the oil here and we could not ship it there if nuts were crushed here?—Not without paying the duty.

5393. (Sir F. Lugard.) I think you said that cake made from decorticated ground nuts was more valuable than that which was made from undecorticated ground nuts?—Yes.

5394. I understood from a previous witness—perhaps wrongly—that it was very strongly the other way—that it was better made from an undecorticated nut, the shells being ground up with the nut, and even if not so, the shells were sometimes ground up

separately and put back again. Your evidence is exactly the opposite.—I do not quite see how two cakes made from the same seed, one containing about 38 per cent. albuminoids and the other 45—both having the same percentage of oil—can be of equal values.

5395. But purely as a feeding stuff apart from price, you think without the shell it is better?—Yes, it is a more concentrated food.

5396. (Chairman.) Does the size of a ground nut make much difference as regards the comparative desirability of decortivating it or not?—I do not think so.

5397. Take the Northern Nigeria ground nut, which is, I should say, three times the weight of the smaller ground nut from up the coast—I mean the best kind of Nigerian ground nut—would that mean a difference in regard to decortication owing to cost?—No, I think not.

5398. (Mr. T. H. Middleton.) In Mr. Moore's examination of you he indicated that palm kernel cake was at present one of the cheapest cakes in the market.—Yes.

5399. I do not think that is so?—It is certainly cheaper per ton than ground nut cake at the present time.

5400. Is ground nut cake not a cheaper cake?—No.

5401. What is the present price of ground nut cake?—The price of undecorticated is nearly 8*l.* a ton.

5402. And what is the price of palm kernel?

(Mr. G. A. Moore.) It is about 6*l.* 15*s.* or 6*l.* 12*s.* 6*d.*

5403. (Mr. T. H. Middleton.) That does not take into account the great difference in the composition of palm kernel cake and ground nut cake. Do I understand your answer referred to the actual prices and not to the values?—To the actual prices; according to Mr. Moore it is the cheapest in price.

5404. (Mr. G. A. Moore.) The object of my question was to show that we could not draw conclusions from the present fairly brisk demand for palm kernel cake, because it is relatively so much cheaper than anything else in the market; it is cheaper in money, and otherwise, I believe, relatively cheaper than anything else.—There is no doubt that at the present time palm kernel is good value.

(Sir Hugh Clifford.) Relatively and actually?

(Mr. G. A. Moore.) Relatively and actually.

5405. (Mr. T. H. Middleton.) If I were buying just now I should prefer ground nut cake at 30*s.* more per ton.—But you are speaking of undecorticated ground nut.

The witness withdrew.

Adjourned to Wednesday next at 11 o'clock,

ELEVENTH DAY.

Wednesday, 27th October 1915.

Colonial Office, Whitehall.

MEMBERS PRESENT:

MR. A. D. STEEL-MAITLAND, M.P., Under-Secretary of State for the Colonies (Chairman).

SIR G. FIDDES, K.C.M.G., C.B., Assistant Under-Secretary of State, Colonial Office.

SIR HUGH CLIFFORD, K.C.M.G.

MR. L. COUPER.

Professor WYNDHAM R. DUNSTAN, C.M.G.

MR. T. H. MIDDLETON, C.B.

MR. G. A. MOORE.

SIR OWEN PHILIPPS, K.C.M.G.

MR. T. WALKDEN.

SIR W. G. WATSON, Bart.

MR. T. WILES, M.P.

MR. T. WORTHINGTON.

Mr. J. E. W. FLOOD (Secretary.)

Mr. EARLE W. J. TREVOR, M.I.M. and Mech.E., F.R.G.S., called and examined.

5406. (Sir George Fiddes.) You have been good enough to come here to give us some of your experience with regard to the manufacture of edible nut products. I think you have acquaintance both with British

colonies and with foreign colonies, have you not, on the West Coast?—Yes.

5407. At one time you were in Sierra Leone?—No, my cousin was there.

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[Continued.]

5408. You do not know Sierra Leone?—I do not know it very well myself. I know the Gold Coast very well.
5409. Were you concerned in the nut industry in the Gold Coast?—Yes.
5410. As a practical man from a manufacturing point of view, I mean?—Yes.
5411. And since then you have been engaged with some company operating on the West Coast, I believe?—Yes.
5412. At Grand Bassam?—Yes.
5413. It would greatly interest the Committee if you told us something about the conditions of the nut industry there. What is your concession? Is it a large one?—Yes, but everything touches the question of the land laws at once.
5414. I mean about what size; I do not want much detail? Is it a concession?—We do not get concessions; we get contracts.
5415. You have no control over the nuts?—Yes.
5416. They are not your property?—Yes, they are our property. We have absolute control over them.
5417. Can the natives not pick any themselves?—Yes. It would be unfair to make a contract by which a native could not take all he wanted for his own domestic use or for manufacture.
5418. Inside your area, if he sells at all he is bound to sell to you under the French law?—Yes, under our contracts with them which are enforceable by the French law. We are entitled to all the fruit not required by the natives for domestic purposes.
5419. Do you manufacture the nuts entirely or export them to Europe for manufacture?—We produce the same two products that the native produces—the oil and kernels.
5420. You do not export the raw material?—No.
5421. You work up all you get?—We call the pulp pericarp; we depericarp or depulp the fruit, and pass the pericarp on to the presses, express the oil and ship it in casks, dry the nuts, crack them, and ship the kernels in sacks exactly as the native does.
5422. You ship kernels in sacks?—Yes.
5423. You do not express oil from kernels?—No.
5424. As far as you are manufacturers of oil, you merely manufacture from the pericarp?—Yes. I am interested in business for the future extraction of oil in this country from the kernels.
5425. Is the oil which you extract from the pericarp fit only for soap manufacture, or is it fit for edible purposes?—It is fit for edible purposes.
5426. Margarine, for instance?—Yes, you can make margarine from it. I brought two samples, because I thought you would like to see them. (*Bottles produced.*) It is very difficult to get a sample of the real fruit home. *That* is the pericarp. *That* is the pulp after it is removed.
5427. Is your oil expressed from the pericarp by a machine peculiar to yourselves—your sole property?—Yes, our sole property. The depericarper is my design and is patented. I am able in my presses to do without cloths or serviettes, and the presses are strengthened in the right places.
5428. Is the oil free from fatty acid?—No; but we produce oil less than 2 per cent. of free fatty acid.
5429. That is an advance on anything the native can do?—An extreme advance.
5430. What is the amount of your output, and what do you suppose it is likely to be in a year's time after the end of the war?—A year from after the war?
5431. A year from now, or now, if you like.—I expect to be producing from this one small plant 100 tons of oil a month after the 1st of January next. It is a very small plant.
5432. It is already in existence and working?—Yes. It is very small. I had to build it with a very small amount of money, and could not have everything I wanted.
5433. Is there a larger amount of nuts available in the French possessions than in the Gold Coast?—No, It is the British colonies we want to work in; there are unlimited quantities there.
5434. There are not unlimited quantities in the French possessions?—No.
5435. Future developments in the French colony, you think, will not seriously affect, by increasing the supply too much, the prices that British firms can obtain?—No. I think that if a hundred companies worked like mine it would not affect the supply.
5436. In the French possessions?—Anywhere. It is such a big question.
5437. Yes, I see.—I do not think that the supply would affect the market price.
5438. You do not think that the French supply, even if thoroughly developed, can seriously influence the world's supply?—No.
5439. Or even the West Coast supply?—Well, that is the only place where we get palm fruit in large quantities from.
5440. What is?—The West Coast—tropical West Africa.
5441. Including that?—We want to go back to British colonies. We only went to the French coast to prove our machine, because, according to the conditions which exist in the British colonies, we had not sufficient money to get a concession. The cost is prohibitive. You cannot do your surveys under 3,000l. or 4,000l., and you get no title.
5442. On the other hand, you do not consider that on the French coast there is a sufficiently big field for anything on a large scale?—Not for my machine.
5443. Can you tell me whether the French Government have inspection of produce; do they provide inspection of produce? Is produce inspected before you buy it?—You are speaking of palm oil entirely now?
5444. I am speaking of the raw material, the kernels. You say that you ship kernels home?—Yes. No, they do not inspect in that way.
5445. They do not inspect before shipment?—No. What they do is to check us on our measurement with the native to see that we do not cheat the native.
5446. That is another matter. I refer to shipping home kernels that might contain an undue proportion of shell and dirt?—No, there is nothing of that kind.
5447. There is no French Government inspection at all on the coast?—No. You just ship your kernels; they only charge you by weight. All shipments must pass through the French Government's hands and be weighed as they go to the ship.
5448. They are only concerned with weight and not with grade or quality?—Not with grade at all. They leave that entirely to the merchant.
5449. (*Professor Dunstan.*) I am afraid that it is some time since I read your report, and perhaps you would tell me if I am right, but my recollection is that you were not very well satisfied with the way in which the Government Departments in West Africa looked after what I may call the interests of the oil palm. Am I right in thinking that that is the general trend of your report?—It is the Law Department that I am up against.
5450. But, apart from the Law Department, may we take it that the Forestry Department and the Agricultural Department have not looked after interests relating to what I may call the life of the tree and the sanitary condition? I thought you referred to the necessity for pruning. I have a note about it.—That comes in the actual practical working of the tree.
5451. But there is nothing of the kind enforced. Is not that your point?—What I want to convey is that they cannot enforce it; it is too great a thing. The native does not touch 10 per cent. of the trees of the forest.
5452. What exactly do you mean by pruning a palm? You cannot prune a palm, because there are no branches, are there? Is not that the case?—You can tell when you walk through a forest if a tree has been harvested any time within the past two or three years. You can say: "This tree was harvested last year." "This tree was harvested two years ago," or "This tree was harvested three years ago," by the great fronds that hang down from the tree. You go by the state that they are in—whether they are rotting at the roots or part way down, and so on.

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[Continued.]

5453. You mean you go by the removal of the fruit?—Yes, and the great leaves. They take up the sap of the tree and prevent it going into the fruit.

5454. Have you data to show the effect of cutting off the fruit? You do not mean the leaves, do you?—Yes.

5455. Have you anything you can put in to show the effect? I do not think there was any evidence produced in your report, and the matter is important.—I had one point in view in my report, and that was to be able to come back to work in a British colony. To answer the question I made experiments with 15,000 trees numbered, and I had a peculiar way of numbering. I had a stick on each one. The boys cut a notch for each head they took off the tree and the heads of fruit (the French call them régimes) weighed 16 lbs. each the first cutting, at the second cutting six weeks later they weighed 32 lbs., because I had trimmed those trees and taken absolutely every dead piece from the trees. They went on increasing until I found régimes on some of the trees up to 80 lbs. and 90 lbs. each.

5456. Is it your suggestion that what you call the trimming, the pruning, should be done throughout the year?—Well, it is throughout the year, because you have four seasons; every time they cut a head the boy must trim all the way round.

5457. Have you been in communication with any of the Government Departments in West Africa on the point? Have you discussed the question with the Forestry Department of Nigeria at all?—No, but I have read their book.

5458. Mr. Farquhar's book?—Yes, and most of your publications.

5459. But have you discussed the question of attending to the trees with experts on the Gold Coast, or in Nigeria?—No, because they have never had a chance of cutting like I have. I have had to carry out my work in the field and have seldom come in contact with them.

5460. With regard to your machine, I am afraid that I do not know anything about it at present. I do not know whether you are prepared to tell us generally how your machine differs from other machines, of which there are several, or is that going too far?—I have seen most machines.

5461. Could you tell us in a few words the essential points of difference?—I should like to show it to you, Professor Dunstan, in two or three weeks' time, if you care to come to see it.

(Professor Dunstan.) I should like to see it very much.

5462. (Sir George Fiddes.) It is patented?—Yes. It is exactly the same as if you took a nutmeg grater and rubbed the nutmeg on the grater. I agitate the grater, which is the opposite of moving the nut up and down. It requires to pass over several rolls to grate it. The fruit is fed into the machine at the rate of 1 cwt. per minute, and remains four seconds in the machine. The fruit is entirely cleaned; the pericarp comes off exactly as it looks in the sample. The nuts are absolutely cleaned. My machine takes a hundred-weight a minute—that is, three tons an hour or 30 tons a day.

5463. Does it actually go through the small perforations?—In the grater it is thrown off by centrifugal action.

5464. What comes through?—Absolutely pure pericarp without broken nut.

5465. Is there no fibrous material?—The pericarp is fibrous material.

5466. This requires further treatment?—Yes, by hydraulic pressure.

5467. You use, I suppose, perfectly fresh fruits?—I try to.

5468. What is the average quality of the oil? What sort of percentage of free fatty acid is there?—I cannot say.

5469. From mere inspection, one can see that there is apparently a variation in the quality?—You see the red or the yellow from the outside of the nut. The inside is more dark in colour.

5470. You claim that your machine will very readily deal with large quantities, and turn out a palm oil

which is low in fatty acid?—Very low. It is suitable for margarine.

5471. For edible purposes?—Yes.

5472. (Mr. L. Couper.) Where do you ship your kernels to from the Ivory Coast?—Wherever we can. During the war it is very difficult.

5473. Prior to the war?—We have done all this business since the war.

5474. Does your knowledge of the French Ivory Coast enable you to say where kernels are shipped to mostly from there?—The Ivory Coast kernels are shipped when Elder Dempster's will take them. The other fleets are taken off the service, and those ships that are running are fully loaded up when they get to our port from lower down the coast, and do not care to take Ivory Coast produce. I have been sixteen years in the country, and I have been cracking kernels during the rainy season, and I have been shipping right along. We ship to Liverpool or Bordeaux. We prefer Liverpool and Marseilles.

5475. Since the war?—Since the war.

5476. Before the war was the shipment to Hamburg?—Everything nearly—75 per cent.

5477. Is there any duty imposed by the French Government on exported kernels?—No, I expect there will be after the war. They are going to put a little duty on everything, they say, but that is only talk so far.

5478. Do you think that an export duty on kernels would influence the price paid to the natives?—No. I think it would influence the price at this end.

5479. The duty you think would be paid by the consumer in Europe?—Yes, the native sells in such small quantities here and there to middlemen that they could not pay him less than they pay him now.

5480. Does the barter system apply on the Ivory Coast?—In some places.

5481. How far from the coast? The farther you get from the coast the more likely you are to find barter, I suppose?—Strange to say, within three or four hours' journey from the coast only, they are still using manilla bracelets. They were introduced by an ancient English firm which has been on the coast now for two hundred years. They are worth 2d. each.

5482. (Sir George Fiddes.) On the French Ivory Coast 2d. each?—Yes.

5483. (Mr. Couper.) Which firm introduced them, may I ask?—I think it is King. They are the old house. They were there quite a hundred and fifty years before the French.

5484. Do you know whether the importation of manillas is still permitted?—No. They are trying to stop it; (it is hard to tell), but there must be 50,000l. worth of these manillas in circulation now.

5485. And they circulate freely?—In one or two districts.

5486. What is the medium of circulation?—French money.

5487. Silver?—All silver.

5488. Do you see notes in the interior?—They are used only by white men. The native does not understand notes.

5489. (Mr. T. Walkden.) Sir George Fiddes has asked you about the inspection of the kernels, and whether it was under Government control. I think you said it was not, but you meant, I suppose, in the Ivory Coast?—Yes.

5490. Have you had any experience in Dahomey or French Guinea?—In Togoland.

5491. Not in Dahomey?—Not in Dahomey.

5492. In Dahomey it is really arranged amongst the merchants I know. It is sanctioned and supported and protected by the Government, so that there shall not be an excessive amount of dirt and shell in the kernels exported. What is your idea with regard to the Ivory Coast? Do you think that it should be so there?—It should be.

5493. And it would be better under Government control than if the inspection were done by the merchants themselves?—Yes. The finest kernels that ever reached Africa I am sorry to say came from a German colony where they did inspect, and they sent the entire sack of kernels back if they found two with

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[Continued.]

a bit of shell adhering to the kernel. They made them sort the whole sack over.

5494. We had the same thing in Nigeria, where the kernels are very clean. The machine you have for depericarping is a power machine, is it not?—Yes.

5495. Can you collect sufficient fruit to keep that machine going?—It is a hard proposition.

5496. Do you think that it would be better if some satisfactory hand machine could be invented?—I have tried every hand machine, and I have made hand machines.

5497. One was patented by a native, Phillips, of Lagos. Have you ever seen it, or had experience of it?—I do not think that I have seen it.

5498. That is a photograph (*handing the same to the witness*).—Yes, I have seen this. He has the grating in the bottom and beaters inside.

5499. It was invented by a native minister named Phillips; it is spoken of very highly in Lagos.—I saw it at Accra.

5500. You do not think it is really satisfactory?—It may do the work satisfactorily.

5501. It is cheap; it costs about 10*l.*—May I explain what I think?

5502. Certainly.—I have tried many means of doing even the simple work of cracking nuts. Messrs. Miller have one of the finest hand crackers, I suppose, that it is possible to produce.

5503. I am not speaking about cracking, but of depericarping.—You cannot get a native to work it continuously after a few weeks. I have made a hand pericarp. I offered about 30 natives a shilling a day to work our small hand machine 40 revolutions a minute, but you cannot get natives in great numbers to keep regularly at the work. That is the great difficulty.

5504. (*Mr. G. A. Moore.*) You told us that you have had oil with only 2 per cent. of free fatty acid. Where was the test made—on the Coast?—No; at home.

5505. Has that been the minimum, or is it an average?—I have no average, because I am not working under normal conditions yet.

5506. What quantity of oil have you imported so far?—I cannot answer that; that is not my business; it is my company's business.

5507. You say that you expect to get 100 tons of oil per month by January?—Yes, I hope to.

5508. Over what area do you expect to collect that oil—how many square miles?—I do not work to square miles; I am working on a river, a lagoon 100 miles long.

5509. You expect natives to bring you in a sufficient quantity of fruit to turn out 100 tons of oil in a month?—May I put it in this way: I expect to get that quantity in. I do not expect the natives to do it.

5510. You think that you are sure to get it?—I will get that quantity.

5511. What area will it be drawn from, even if you do not control the area. Can you give us any idea?—That is a hard question to answer. It takes 50,000 trees to produce sufficient food for the native and what he manufactures and to give 10 tons of drupes per day.

5512. What weight of fruit will it require to make that 100 tons of oil?—It takes from 5½ to 6½ tons of fruit to produce 1 ton of palm oil.

5513. You crack the nuts by steam machinery after you have used the depericarping machine, I presume?—Yes; a ton in ten minutes.

5514. What quantity of kernels do you get to a ton of oil out of this 5½ to 6½ tons of fruit?—It requires 10 tons of drupes to produce 1 ton of kernels.

5515. (*Sir George Fiddes.*) That is the weight taken after cracking?—Yes.

5516. (*Mr. G. A. Moore.*) It takes about 4 tons of nuts to make a ton of kernels in Nigeria. Is that about your figure?—Nigeria has the largest palm fruit. As you come up the coast it gets less and less and less. With us it is roughly 4½ and in Freetown 5 tons of nuts per ton of kernels.

5517. We have had some evidence as to the percentage of oil and kernels to a ton of fruit, and I wanted to see how yours compared with it. You say there is 1 ton of kernels to 10 tons of fruit?—Yes.

5518. And 1 ton of oil to 5½ or 6 tons of fruit?—5½ tons to 6½ tons.

5519. So there is considerably more oil than kernels?—It depends. You can get small districts where 4½ tons of fruit will give a ton of oil, but I give the real average that you get through the season.

5520. But even taking the figure you have given me there is roughly 16 per cent. of oil and only 10 per cent. of kernels?—Well, you have the figures. I have given you the base.

5521. (*Chairman.*) To prevent a little misconception, you said 5½ to 6½ tons of fruit?—Yes.

5522. (*Mr. G. A. Moore.*) You are not talking of cones?—No; I am talking of the drupes as in *that* bottle. Every head of fruit has a core which weighs on an average 4 lbs. 10 oz.

5523. We are talking entirely of the fruit, as in *that* bottle?—It takes 5½ to 6 tons of that to make 1 ton of oil, and 10 tons of the fruit to make 1 ton of kernels?—Yes. You may say 6½.

5524. (*Sir Hugh Clifford.*) Do you mean that it will produce so many cwts. of *this* stuff or of actual oil?—I am not speaking of oil now; I am speaking of kernels.

5525. But as regards the pericarp?—Six tons about of those drupes will produce sufficient pulp or pericarp like you have there to produce 1 ton of oil.

5526. That is quite clear, thank you.

5527. (*Mr. G. A. Moore.*) You gave Professor Dunstan some particulars of your machine. I do not want to ask you anything you do not wish to tell, but this nutmeg grater that you spoke of is in the shape of a long drum, is it not?—Yes, a series of drums with a correct periphery.

5528. That takes the pericarp off the nut, which is held in a kind of a claw?—As a matter of fact, it is a steel brush; you can describe it as that.

5529. Does it throw the nut clean out at the other end?—It delivers the nuts clean at the end and sends the pericarp out through the top in a heap. It is never touched by hand from the time the fruit enters the machine until the oil is in the cask. No dirty hand touches it.

5530. The pericarp does not go inside the nutmeg grater?—No; it is brushed off. Do not call it a nutmeg grater. I hope that my machine will not be called a nutmeg grater.

5531. It is a steel brush?—The machine is my baby, I have worked years on it.

5532. Somebody else happens to have invented exactly the same machine, as far as I can make out from the description. There is a steel brush?—You are quite mistaken. It is not a steel brush that does the work.

5533. I think you said so?—No. There is a steel brush conveyer to the knives.

5534. What sort of machine have you for nut cracking?—I have a centrifugal machine. I do not know how to describe it. It runs a 4-inch stream of nuts through it at a high speed.

5535. Is it a fan, or does it throw the nut against anything?—It is a fan. It is not a roller.

5536. It breaks the nut inside the fan?—Inside the centrifugal drum.

5537. I think you said that you were anxious to work again in a British colony. Why do you not go to a British colony?—Because of the land laws. It costs too much. A small man cannot do anything there.

5538. Your grievance is that you cannot make any arrangement for the supply of fruit under the present law?—I cannot make an arrangement which is enforceable by the law. The Government will not protect one.

5539. (*Sir W. G. Watson.*) I think you said that you hope to produce after January 100 tons of oil per month (I take it that that is 100 tons of palm oil) in which you hope to have not more than 2 per cent. of free fatty acid?—It will be higher this time.

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5540. What you first produced was better?—I am collecting a lot of fruit just now, and it will be pretty rancid.

5541. The quantity of free fatty acid is a very important consideration, if the oil is used for edible purposes?—Yes. I am in touch with a great expert on free fatty acids, and he keeps me pretty well informed with regard to that.

5542. Do you know the melting point of the palm oil that you hope to produce or have produced up to the present?—Yes, about 34 centigrade. Sometimes it is 39.

5543. If the quantity of free fatty acid increases, it tends to rise higher, does it not?—I cannot tell you. You know, do you not?

5544. Yes; we have that in a book issued by somebody who would know. Have you sold any of this oil up to the present in the United Kingdom to refiners to be used for edible purposes, or is it merely a question of a sample?—No, I have not sold any in the United Kingdom yet.

5545. (Sir W. G. Watson.) You will let us know more about it, perhaps?—Certainly.

5546. (Mr. T. Wiles.) Do palm trees grow entirely wild in West Africa?—Never.

5547. They never do?—No.

5548. Are they usually cultivated?—It is very peculiar. Away in the deep forest you may find one tree growing, and if you examine it you find that it is very, very old and very short and stunted. Probably a bird in its flight dropped a fruit. The natives cultivate here one year and there another. They employ shifting cultivation and do not return for about six years. When they leave any part of the forest, the fetish is that they must throw palm nuts over it. Wherever you find palm forests you can tell by the trees that they are a secondary growth and not the original virgin trees of the land. The land has been cleared and farmed. I have never seen a place yet in the whole of Africa where palm trees grow wild. There has always been evidence of shifting cultivation by the native.

5549. They grow wild, and after they are picked for a certain number of years they are left by the natives, who throw nuts or kernels about and pass on to a fresh plantation?—They plant foodstuffs and then they sow the palm nuts. They may start 10 or 20 feet away, and do it again and again, to get to virgin soil.

5550. Does the Government of West Africa take much interest in the cultivation?—The Forestry Department or the Botanical Department, I do not know which they call it, is the most perfect and most helpful of the kind in any colony in the world.

5551. (Chairman.) Which colonies do you refer to?—British Colonies.

5552. (Mr. T. Wiles.) You cannot suggest any improvement in the management of the British colonies, as far as the cultivation of palm trees is concerned?—No, only as far as putting in a law which will protect new industries.

5553. I take it that these palm trees grow on public land?—You have touched the fountain point of the whole question. The British Government does not claim the ownership of one foot of land. The native says that all land has an owner, and when you want any you have to find the owner. It is the native; it is not the Government. If the Government made a native pay a farthing or a tenth of a farthing an acre per annum for the land, nine-tenths of the land would at once revert to the Government. The native only claims it when a white man wants it. He does not work the trees or touch the land at all until the white man wants to do something.

5554. (Mr. T. Wiles.) Is it in the hands of families?

(Chairman.) That has been decided to be outside the terms of our reference. There is a committee which is considering the precise question. We considered the subject at some length here, and decided that we could not really enter into the question of the tenure of land.

(Sir Hugh Clifford.) Before the discussion ceases might I enter a protest against the use of the term

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“revert to the Government”? it is something which has never belonged to the Government.

5555. (Mr. T. Wiles.) What is the proportion of what I call cultivated palm trees, for want of a better term—trees which are attended to and which have the fruit taken from them from time to time? Can you give a rough estimate?—Less than 10 per cent. are worked or gathered or harvested.

5556. Taking the whole of the palm trees in West Africa?—It is difficult to say, but it is less than that—less than one to nine, taking the last few years.

5557. Do you mean in the whole of West Africa?—The Gold Coast and the Ivory Coast. The other 90 per cent. of trees will not be available in 15 or 20 years.

5558. Why not?—They are growing to waste—growing high and deteriorating.

5559. How are they to be attended to, do you suggest?—By being let out to British companies to work.

5560. You think that districts of the colony should be let to companies to work?—Yes. When a tree becomes over 53 feet high it is not worth climbing; there is too much risk.

5561. What would happen then?—A man may fall. As the tree grows up there is no tap root. We have very little tertiary; it is mostly secondary formation in the Gold Coast. The roots go away to a long distance. They commence to shrink or rot away and after a time you can lift the tree right out of the socket.

5562. If there is such an excellent Agricultural Department, does it not make regulations for dealing with matters of this kind?—The Government does everything that a grandfather can do for an unruly child. It works for the native day and night. It plants cocoa trees for him this week and the native pulls them up next week. The Government has everything on earth against it, but still continues. The Government has the native intellect against it.

5563. I was going to ask what schoolmasters could be given to assist with the unruly children?—There could be a small tax per acre.

5564. (Sir Owen Phillips.) You told the Committee that your new patented invented machine produces oil from the pericarp with only 2 per cent. of fatty acids?—May I state it in this way? The machine (I am not trying to advertise it, because we do not want to sell it) simply removes the pericarp from the fruit. After that we all have our own methods of extracting the oil.

5565. I do not want to know any secret process, but have you a secret process for extracting oil from the pericarp after its removal by your machine?—The palmitic acid, the free fatty acid, is produced by what I might call a chemical germ, although there is no such thing. It is called an enzyme. The host is the bruise of the fruit. I need to get the fruit to my machine within eight or nine hours after harvesting before the enzymes have come into being. It takes four seconds to go through the machine and fifteen minutes to express the oil and in less than an hour I have pure oil with the arrestation of the fermentation of the enzymes—that is a process of my own. This machine is the missing link which has been wanted all this time in this manufacture.

5566. This is intensely interesting. Have you ever shipped 10 tons to Europe?—Yes, nearly 100 tons. I have put over 1,000 tons of fruit through my machine.

5567. Of the oil which you brought to Europe was the 2 per cent. limit of fatty acids a fair average?—No; I have had some with 80 per cent., 60, 40, and 30.

5568. How much has come with only 2 per cent. out of the 100 tons?—I could not give an answer fair to myself.

5569. Have you had 10 tons with only 2 per cent.?—I cannot give an answer: it would not be fair. I can produce 10 tons or 100 tons a month from now on with less than 2 per cent.

5570. Was the small quantity that you brought to Europe that had only 2 per cent. brought in drums or casks?—Casks.

5571. Have you tried bringing palm oil in drums?—Do you mean iron drums?

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5572. Yes.—No. The trouble of anything of that kind is that it has to go back empty and there is excessive freight.

5573. But apart from that, would not the free fatty acids increase, if it was brought home in iron drums?—I cannot say that. I am not a chemist. I have never thought of it, even. Professor Dunstan could answer that.

5574. You have not tried it?—No.

5575. I have heard that that is one of the drawbacks.—It would deteriorate only by the oxygen getting to it.

5576. I am not a chemist.—Coopering is an art with the native. He can cooper a barrel absolutely air-tight. If there are broken staves he can put new staves in quite easily.

5577. The process you employ is a patented process?—No, only the machine.

5578. If it is not divulging any particular secret, could you tell us at what price (the Committee is interested in the development of the trade) the machines could be supplied?—My directors and I have fought on that. I should say 2,000*l.* It requires about 6-horse power. That is the principal thing that people want to know.

5579. You could do 100 tons per month?—No; that machine would do more. That does not include all the plant. It is the one missing link you are asking about. You can buy hydraulic presses and engines and boilers and shafts and pulleys, &c.; but this machine depericarpes the fruit. It is my machine put down in the middle of everything else.

5580. Could you tell us anything about nut-cracking machines? From your experience in West Africa, what is the best?—The best machine is the Miller machine.

5581. Is it fairly expensive?—No; I think it only costs 10*l.* or 12*l.*

(Mr. G. A. Moore.) 15*l.*

(Witness.) There is no machine equal to Miller's machine.

5581a. (Sir Owen Philipps.) From your experience you do not think that, even if it were improved, the natives would ever use it?—My experience is that they would not. I have used it many times.

5582. (Professor Dunstan.) In answer to Sir Owen Philipps you have been referring to Messrs. Miller's machine as a very excellent machine for the purpose of shelling the palm nuts?—Yes, for the natives.

5583. The real difficulty has not been so much the cracking of the nut, I think, as the separation of the shell completely from the kernel?—It is only a question of money to build effective machinery. It is too expensive for a native. There must be power-driven machinery.

5584. That is the difficulty at present, is it not?—I have no difficulty myself.

5585. Not with Miller's machine in getting completely rid of the shell?—Miller's machine is only a nut-cracker.

5586. I am not thinking of your machine, but of Miller's, at the moment. Is it not difficult to get rid of the shell from the kernel?—They do have difficulty, I believe. I have not much difficulty.

5587. They use brine, as you are aware, for the purpose?—Yes, but you have to make separation afterwards. You can separate dry or with brine; there is not much difference in either.

5588. You have a nut-cracking machine of your own?—Yes. It is not patented.

5589. In using your machine, have you any difficulty in getting complete separation of the broken shell from the kernel?—I do not do that with that machine. I crack with a machine somewhat similar to Miller's and use big jig tables as they use in mines.

5590. You use a jig instead of brine?—I might use either. There are certain things that are difficult to contend with—the flat nuts. It is no trouble with the round nuts.

5591. You have nothing to say about the difficulty of getting separation?—No, I am not making any statement about that.

5592. (Sir Hugh Clifford.) You are familiar with both the Ivory Coast and the Gold Coast?—Yes.

5593. In the Ivory Coast you have what is called a contract with the French Government?—With the natives, approved by the Government.

5594. How do you get the contract in the first instance?—With the native.

5595. You arrange it by yourselves with the native?—Yes.

5596. And then get it ratified by the Government?—Yes.

5597. Under the contract the native has to sell to you any palm produce that he does not require himself?—No, any palm fruit that he gathers in excess of his own requirements. He can make all the oil he wants for himself or for sale.

5598. And he need not sell that to you?—No; we do not want it.

5599. It is important to clear that up. As originally stated, it sounded as though it had all to be sold. He has to sell to you any palm heads that he picks and does not use?—Under the Gold Coast Palm Oil Ordinance they give you an area, in which no one else can put a machine; but suppose that Jones put his machine there, Trevor can come and put his here, and send his clerks to buy; he might only buy a ton a day, but raise the price to such a prohibitive figure that Jones cannot get the quantity he requires at any price. If the Government will give one the right to buy from the native the fruit that he does not use, and that he usually leaves to rot, or to collect at a very small royalty what he leaves on the trees, work can be carried on.

5600. The native has the right to pluck any fruit he requires for himself or for sale as oil?—Yes.

5601. The French native, I mean?—Yes.

5602. What you desire is the right to gather on your own account or to get the natives to gather for you?—Yes.

5603. No restriction is placed on the native?—No. He has to make it in the native way; he cannot put up a machine.

5604. He is not allowed to?—No.

5605. Even one of Miller's cracking machines?—We should not object to that.

5606. But could you technically prevent it?—I do not know whether we could with regard to what he made his own stuff from.

5607. What is the wording of the contract?—I cannot say; the solicitors could tell you.

5608. It is not quite clear whether it is only a power machine that you have the exclusive right to?—I should say that it was a power machine. We should not object to anything else. We are glad when the native does anything to keep the forest clean and keep the paths open.

5609. One of your difficulties is the insufficiency of labour?—We want to collect our own fruit. I have no trouble in getting labour. When you investigate the question of the insufficiency of labour you find it comes from the mines. The natives like this work and do not like the mining.

5610. That is true, but when you came to work a large area in a place where the population is comparatively sparse, as in West Africa, there might be difficulty with regard to labour?—We help the natives to bring the fruit over a greater distance than three-quarters of a mile. We put in a Decauville line.

5611. You cannot keep a mill making 100 tons a month going and only have an area of a small radius?—It is not the radius, but the native has three quarters of a mile to bring it to the tramways.

5612. That is another thing. You work on the river?—Yes.

5613. A good deal of your transport is entirely by water, I take it?—Entirely just now.

5614. That is the cheapest form of transport?—Yes; they bring it in canoes and so on.

5615. In the Gold Coast that is impossible?—There are about 16 miles where you have no water. You want four radiating lines and then you are all right.

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5616. Conquering the difficulty by tram lines?—Yes.
5617. Have you done that yet?—No.
5618. Have you surveyed the line on which you will run trams?—Yes.
5619. What gauge will you use, 20-inch?—No, 24-inch light Decauville rails.
5620. Locomotives?—No. Two natives can bring in two tons a day from the far end.
5621. Simply by hand power. You want 550 tons a month, I suppose, to get the 100?—Yes. Say 600 tons a month.
5622. You think you will have no difficulty in providing for that?—I could take any plantation and do that with my 16 miles of line.
5623. You can maintain that supply absolutely regularly, you think?—Yes, I want 120,000 trees to do that, letting the population make all the oil they like.
5624. 120,000 trees in order to supply you with 100 tons of oil continuously?—I want 50,000 trees for every 10 tons of drupes a day.
5625. 18 to 20 tons a day?—I require 50,000 trees for every 10 tons of drupes a day and I work 200 days in a year.
5626. You require from $5\frac{1}{2}$ to $6\frac{1}{2}$ tons for every ton of oil that you get out?—Yes, call it six tons.
5627. (Chairman.) One hundred thousand trees (which is two units) would produce 20 tons of drupes daily, and would produce 600 tons of drupes a month, that would give you 100 tons of oil a month, roughly?—You must always add 10 per cent.
5628. (Sir Hugh Clifford.) How many men do you reckon would be required for that to keep it going? What labour force, roughly, would you require? I do not want to tie you?—I cannot give that off-hand. I should have to calculate it out for you.
5629. In the past what sort of labour force have you been accustomed to utilise?—Seven men can bring a ton of fruit in a day. I will put it that way.
5630. You have to have it picked?—Seven men will cut a path through the forest, harvest the heads, collect them in piles, and bring them to your tram line three-quarters of a mile distant.
5631. How much?—One ton a day.
5632. One ton of fruit that is?—I am always talking of drupes.
5633. Have you any special arrangements with regard to your labour over there, or is it purely voluntary? Have you any indentured labour?—It is a French colony. I work my labourers on piece work. It is no trouble.
5634. By contract principally?—They call it contract.
5635. Are they the local natives or where do they come from?—From the interior.
5636. Are they specially recruited and brought down, or are they like the natives who come to the Tarquah mines and so on?—We are not big enough yet to have to recruit.
5637. There are other plantations, I take it, in the Colony, or is this the biggest?—Nothing else of importance is being done there.
5638. At the present moment you have practically no labour question there?—No, except that in Africa generally you always have palavers.
5639. You have no acute labour trouble?—No, but we should have if we got too big.
5640. How would you meet that?—I should go to the interior myself.
5641. And recruit under French auspices in the interior?—Yes.
5642. Would the French Government assist you?—Yes, they always help. It is a white man's colony.
5643. When you say a white man's colony what do you mean?—They treat you absolutely fairly.
5644. And the native gets similar treatment?—Absolutely, but in a British colony the white man has no chance.
5645. Do the natives go in for making oil on their own account much since the establishment of the machine in their midst?—They make more. I will tell you why. When the large heads fall from the tree they bound and shake off some of the fruit and the native takes all that come off. Every little family now is making a gallon of oil where they made none before.
5646. For their own use?—Yes, and to sell. One little district made over 10 tons last year, where they never made any before. They get the nice luscious fruits. There is no use quarrelling with that. I prefer the half-green drupe for my business. It gives the best oil.
5647. (Sir George Fiddes.) It does not bound out?—No. You can hang half-a-ton weight on it for three days.
5648. (Sir Hugh Clifford.) Is the fruit perfectly fresh when brought to you?—No; we have trouble in that respect. We shall overcome it, but we are not sufficiently advanced yet.
5649. You confidently anticipate that 100 tons of oil a month will be made out of fresh ricarp or a large proportion of it?—I am going to try.
5650. I know. Everybody has been trying for a long time, but do you see a reasonable prospect of success?—Yes; three chances in four of succeeding.
5651. And of succeeding in, comparatively speaking, a short time?—I am after producing an oil for the manufacture of margarine.
5652. You made the statement that except when a seed is dropped by a bird practically the palm trees on the Gold Coast never grow wild?—On the Gold Coast or the Ivory Coast or anywhere I have never seen them.
5653. Do you know that that statement is opposed to everything said on the subject by any person with whom I have discussed the matter up to date?—No. I can only give you my personal experience.
5654. You say that a native custom exists of the nuts being thrown as a ceremonial business before they leave?—No woman dares to abandon a plantation without throwing nuts there.
5655. What we call a farm?—It is like a farm. It is their farm.
5656. It is much more like a cabbage patch. Do Mate Kole's people, the Krobos, do that?—No. That is the only one place in Africa that I know of where the palm fruit has been selected from generation to generation and the best fruit sown.
5657. You may say that the Krobos' plantations are what their name implies. They have been planted there?—Yes.
5658. Whereas with the palm belt all through the central province spreading into Ashanti it is just the other way?—Yes.
5659. It is the custom among the Twi-speaking people?—Yes.
5660. This is interesting to me, and I would like to inquire into it.—I know every foot of Mate Kole's land.
5661. When you said that the Government planted cocoa trees and the natives pulled them up, were you using the language of picturesque hyperbole?—No; I have had trouble in that way. I have had to make them put the cocoa trees in again.
5662. What were they pulling them up for?—I am speaking of the Ivory Coast.
5663. I thought you meant a British colony?—On the Gold Coast the native has taken to it very well.
5664. Not only that, but he has developed an enormous industry. We have given him the necessarily casual visits of a very small band of agricultural experts who have explained the question to him. That is the only aid we have given.—They have worked very hard with him.
5665. Yes. You know the number of men, the very large area they have to cover, the difficulty of travelling, and the imperviousness of the native mind to new ideas?—I do not know any band of men in the world that has worked as hard as they have done.
5666. I am glad to hear your tribute. They have to cover an enormous area?—They cannot make them prune the trees and keep the disease down, which is terrible.
5667. No, they cannot, but there is improvement?—Yes. I have not been there for two or three years.

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[Continued.]

5668. (*Chairman.*) You say $5\frac{1}{2}$ to $6\frac{1}{2}$ tons of drupes to a ton of oil. If we call it roughly six, 600 tons of fruit would make 100 tons of palm oil?—Yes.

5669. Sixty tons of kernels, roughly speaking. About 30 tons of palm kernel oil?—I do not know that. I think that palm kernel oil runs from 45 to 53 per cent., speaking from memory.

5670. Roughly speaking, it is just about half?—Yes.

5671. Therefore one would get three times the amount of palm oil as of kernel oil from the same fruit?—I must take your figures.

5672. What is the company you are working for?—The Pericarp Syndicate.

5673. You have given us a lot of interesting information with regard to the way in which you work your fruit. You try to get it as fresh as possible?—Yes.

5674. You work 200 days in the year. Does that mean to say that you miss days continually, or that there are certain months when you practically cannot get your fruit?—The rainy season and one month in the height of the dry season.

5675. You work consecutively while you are on, but there is a month or two off, which reduces your working days?—Yes, but it is a question of management entirely.

5676. Do you foresee that you can get your fruit sufficiently fresh to have a very low percentage of free fatty acid?—Yes.

5677. You think that that is a possibility?—Yes.

5678. You could not tell us how many days' waiting would give you fresh fruit? What is the maximum wait?—I do not want to answer that.

5679. Apart from that, you think that you could get enough to work. What is the area, roughly speaking?—You cannot work trees profitably if they are less than 40 to the acre. They occur in patches. I cannot give an area. You do not want over 200 to the acre.

5680. Roughly speaking, 100 tons of oil a month needs 100,000 trees, according to the basis you have given. I only want to know the size of the plantation or the size of the area which would make a business proposition?—An ideal is 80 trees to the acre and 50,000 trees for the one unit, and so on, but you will not get it in one simple area. You find intrusions of the virgin forest coming in and out. You must lay your tram line to touch the big districts where you come to an ancient plantation, and so on. You may have to cover twice the area to get the quantity. To estimate palm trees is really a bit of an art. I can tell within 15 per cent. of the number of trees by walking through a forest. I know by the touching of the leaves how far they over-touch and how far they fail to touch. I take a cycle wheel and cyclometer and thus get the area, and know that I am not 15 per cent. out, but I must go in daylight.

5681. I take it roughly that 100,000 trees (taking my figure worked out on the figures you have given us), 80 trees to the acre would occupy 1,250 acres?—That is very small.

5682. You have to add a goodish percentage for pieces of virgin land. You might double it?—It is more than that. You have a native plantation, and it is policy to allow as exempt a few hundred yards round each village and not touch the trees there. You do not want trouble with the natives. You want them all contented.

5683. Often you would not get 80 trees to the acre?—A piece of land where you had a radius of three miles would answer all requirements in a real palm country.

5684. Roughly speaking, 30 square miles or a little under?—I said a radius. You would get 36 square miles. You might have enough for four companies in that, or not enough for one.

5685. I only want a mere approximation. What do you think would be a business proposition?—The Gold Coast law is exactly right in that. It gave you a ten mile radius, and you there could get all the fruit you wanted.

5686. You want it to take the place practically of the more expensive oils at present on the market, palm

kernel and copra. You think it could. If it is used for margarine it must compete successfully with the oils at present used for that?—It is better oil, better fat than copra. Copra is not inclined to spread, and palm oil is. It has a higher melting point and allows the mixing of the other oils which are necessary (I will put it in that way) before you neutralise your fat.

5687. How does it compare with palm kernel oil?—I do not know.

5688. Have you not compared it with palm kernel oil as well?—No; when I speak of butter I am speaking second hand.

5689. You speak second hand when you compare it with copra?—No.

5690. With coco-nut?—You asked about kernel oil.

5691. I want you to compare it with both?—I cannot.

5692. On the whole you think it can be produced at a price which will compete successfully?—I have made very excellent butter with it.

5693. I am thinking of the use of these other oils which will not interfere with copra?—I do not think that the demand for copra will ever be any less, and the supply of palm oil will be greater. I think however great the supply it will never equal the demand.

5694. You think that the demand will grow sufficiently?—Yes.

5695. Now as regards the nature of the trees, you have examined into that pretty closely from what you have said about the pruning and cutting, and all that?—Yes.

5696. Have you made any inquiries as to the different varieties of trees?—Yes.

5697. You have given us statistics— $5\frac{1}{2}$ to $6\frac{1}{2}$ tons to 1 ton of oil. Surely it must vary enormously according to the variety of tree. You have read Mr. Farquhar's book?—Yes. His book is very accurate. There is nothing like it except the Imperial Institute books.

5698. Have you noted what the variation may be according to the different varieties?—No, I am only working on the practical side. I have produced a ton of oil from a $4\frac{1}{2}$ ton sample of weighed fruit. That was fruit gathered immediately after the rainy season when it is very luscious. The natives themselves will eat it. It is like a cherry. The same tree at the end of a dry season will produce a fruit and it may take a considerable quantity more of the drupes to make a ton of oil.

5699. I want to know whether you have any knowledge of the different varieties of trees. You have gone into it thoroughly?—I do not believe in all the statements—or I cannot confirm them (I will put it that way)—as to the different varieties. I am inclined to think that the variety may be found to be a difference in age, or a difference in soil.

5700. Not a staple variety which would reproduce itself?—I do not think it would.

(*Chairman.*) We have no evidence that it would.

5701. (*Sir Hugh Clifford.*) Having practical experience as you have, do you think that transport of the oil in tank steamers is likely to be widely adopted?—It would be fine if it could.

5702. Most of the oil you get is more or less solid?—When it gets here.

5703. It is solid in the early morning there, is it not?—Sometimes.

5704. It is frequently in a semi-solid condition and will not flow easily?—The real oil is not solid in that latitude.

5705. The native-made oil is?—That is adulterated with bananas and anything else in it.

5706. But before they have begun making chop of it?—I cannot give that information. I should put it in tank steamers.

5707. Do you think that it would require to be artificially heated?—Yes, or else it would take too long to load the steamer, but there is no mechanical difficulty about it.

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Mr. E. W. J. TREVOR, M.I.M. & MECH.E., F.R.G.S.

[Continued.]

5708. (Mr. G. A. Moore.) What fuel do you use?—Nutshells.

5709. You have had no difficulty in using them?—I have overcome the difficulties.

5710. Did you notice that in Mr. Farquhar's pamphlet he never gave any percentage as high as that

you give now?—I am going to beat them all in practice.

5711. He gave about 10 per cent., I think?—Practice is becoming ahead of the laboratory.

(Chairman.) Thank you very much. It has been most interesting evidence.

The witness withdrew.

Adjourned to Wednesday next at 11 o'clock.

TWELFTH DAY.

Wednesday, 10th November 1915.

Colonial Office, Whitehall.

MEMBERS PRESENT:

MR. A. D. STEEL-MAITLAND, M.P., Under-Secretary of State for the Colonies (Chairman).

Mr. L. COUPER.
Professor WYNDHAM R. DUNSTAN, C.M.G.
Sir G. FIDDES, K.C.M.G., C.B.
Mr. C. C. KNOWLES.
Mr. T. H. MIDDLETON, C.B.
Mr. G. A. MOORE.

Sir OWEN PHILIPPS, K.C.M.G.
Mr. T. WALKDEN.
Sir W. G. WATSON, Bart.
Mr. T. WILES, M.P.
Mr. T. WORTHINGTON.

Mr. J. E. W. FLOOD (Secretary).

Dr. THOMAS ANDERSON HENRY called and examined.

Memorandum handed in by Dr. T. A. Henry.

The Scientific and Technical Research Department of the Imperial Institute has had over 20 years' experience in dealing with the chemistry and technical applications of oils and oilseeds, and has been in constant communication with merchants and manufacturers interested in those materials.

Oil Palm Investigations at the Imperial Institute.

In 1908 the Imperial Institute undertook an investigation into the position and prospects of the oil palm industry in British West Africa. This investigation was carried on in co-operation with the Departments of Agriculture and Forestry in the British West African Colonies and directed to four main points: (1) the extent to which existing oil palms are being used as sources of palm oil and kernels; (2) the relative values as sources of these two products of the different varieties of oil palm known to occur in West Africa; (3) the distribution of these varieties in British West Africa; (4) the extent to which machinery was then being used for the extraction of palm oil and kernels. A great deal of the information thus obtained, together with the results of the examination in the Scientific and Technical Research Department of the Imperial Institute of a large number of palm fruits of different varieties is the basis of the article which was published in the "Bulletin of the Imperial Institute" in 1909, entitled "Investigations in connection with the African Oil Palm Industry."

These investigations showed that—

- (1) Certain varieties of oil palm are more valuable than others as sources of palm oil and kernels.
- (2) Native methods of production of palm oil and kernels need improvement.

In the article referred to a number of suggestions were made as to steps which should be taken in West Africa to safeguard and develop the whole industry. The most important of these were that:—

- (1) Experimental plantations of the different varieties of oil palms should be made, in order to ascertain (a) whether the better varieties of oil palm could be raised from

seed without deterioration, and (b) which varieties under different conditions of soil and climate would afford the best yields of palm oil and kernels.

- (2) Central factories should be installed to which the natives could sell fruit for extraction of oil and kernels, instead of continuing to prepare these products by their own primitive methods.

Since then the Department has from time to time, at the request of the West African Colonial Governments examined and reported on fruits of little-known varieties of oil palm, and has dealt with various other questions affecting the industry. These later investigations are described in the "Bulletin of the Imperial Institute" for 1913.

Palm-kernel Oil and its Competitors.

Palm-kernel oil is now chiefly used for the manufacture of edible fats, including (1) margarine, (2) cooking and baking fats, and (3) chocolate fats. With the exception of coconut oil, palm-kernel oil is the only fat immediately available in large quantities, which can be easily used for the manufacture of all these kinds of edible products. For chocolate fats it can be replaced by the fat from illipé nuts, which resembles cocoa butter, *i.e.*, the fat naturally present in cocoa beans, more closely than either palm-kernel oil or coconut oil. Unfortunately the supply of illipé nuts is small and irregular.

There are other vegetable fats known to be suitable for edible purposes, but they all present difficulties mostly in connection with supply. Among these are shea butter, mowra fat, grugru kernel oil, wild nutmeg fat, cohune nut oil, and certain oils closely allied to cohune nut oil obtainable from Central and South America. The chief difficulty in the way of a more extended use of the cohune nut and the nuts closely related to it, including the babassu nut of Brazil, is that the kernels are small in relation to the thick, hard shells, which are difficult to break. Machines have been devised and set up in Central and Southern America to shell these nuts and consignments of the kernels have been placed on the market from time to

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[Continued.]

time, but none of them has yet become a regular article of trade. On the whole there is at present no reason to suppose that the kernels of any of these will be able to menace seriously the position occupied by palm kernels and copra as sources of edible fat.

There are, however, two other substances which may be serious competitors in the near future, viz., palm oil and artificially hardened oils (*i.e.*, hydrogenated oils).

It has been stated by Dr. Hupfeld, Director of the Togogeseellschaft, who came to England just before the war to attend the Third International Congress of Tropical Agriculture, and who has had some experience in making "edible palm oil" in Togoland, that if palm oil free from water and dirt and containing not more than 6 per cent. of free fatty acids can be placed on the market regularly in large quantity it will be accepted by German margarine manufacturers. Dr. Hupfeld stated that his company exported 40 tons of palm oil, answering these requirements, from Togoland in 1913.

It is worth noting that it is quite possible to prepare "edible palm oil" answering Dr. Hupfeld's requirements by native methods in West Africa, and oils so prepared, under supervision, by natives in the Gold Coast and in Nigeria have been received and examined at the Imperial Institute. Out of ten samples from the Gold Coast only one contained more than 6 per cent. and three contained less than 3 per cent. of free fatty acids. It does not therefore seem to be beyond possibility that natives might be taught to make "edible palm oil." Moreover, experiments already made in West Africa seem to indicate that with simple machinery the native may be taught to make "edible palm oil" well and cheaply. It is possible, therefore, to hope for a supply of "edible palm oil" from two sources in West Africa, viz., from central factories owned by Europeans and also by native manufacture; the latter implies the instruction of the natives in making the oil, and an improvement in their usual procedure. Most of the central palm oil factories so far established in West Africa by Europeans seem to have experienced difficulty in obtaining supplies of fruit from the natives. In this connection it may be noted that Dr. Hupfeld is understood to claim only technical as distinct from commercial success as yet for his company's factory in Togoland. Dr. Hupfeld's remedy for the difficulty in obtaining supplies of fruit is the establishment of plantations controlled by the factory owners. There can be very little doubt that this and other difficulties experienced by central factories will be surmounted in time. It seems certain, therefore, that palm oil suitable for edible use may be produced in quantity in West Africa in the near future. If this does happen it is unlikely to interfere with the position of palm kernels as a source of edible fat, as in any palm oil factory the kernels will certainly be recovered and utilised. Palm oil of edible quality is not therefore such a serious menace to the trade of the tropical colonies as the second new competitor, viz., artificially hardened or hydrogenated oil.

Hydrogenated or hardened Oils

Most oils and fats of commercial importance are compounds of glycerine with fatty acids. In the liquid oils, such as cotton-seed oil and ground-nut oil, the glycerine is chiefly combined with liquid fatty acids such as oleic acid, whilst in the solid oils (or better fats) it is chiefly combined with solid fatty acids. It is a curious fact that seeds yielding liquid oils are produced both in temperate and tropical climates, whilst those yielding solid fats are nearly all confined to the tropics. The greater abundance of seeds yielding liquid oils and their occurrence nearer to manufacturing centres results in liquid oils being cheaper than fats. It is for this reason that chemists have for many years past sought a method of converting liquid oils into solid fats. The difference in composition between the two products is very slight. Thus the liquid oleic acid and its natural glyceride, olein, only differ in composition from the solid stearic acid and its natural glyceride, stearin, by less than 1 per cent. of hydrogen. It has

long been possible to convert oleic acid into stearic acid in the laboratory, but a cheap and practicable industrial process of conversion only became possible within the last 12 years, owing to the discovery by the French chemist Sabatier of a simple and inexpensive method of adding the missing hydrogen. This discovery meant that the very cheapest liquid vegetable oils such as linseed oil could be converted into solid fats and that these cheap liquid oils lost most of their disagreeable characteristics in the process. This made it possible to use not only liquid vegetable oils but also fish oils, which up to that time had not been used for edible purposes and could only be used to a small extent in making cheap soft soap. In principle, the process of hydrogenation consists in heating the liquid oil with hydrogen under pressure in presence of specially prepared nickel, iron, or some other metallic substance technically known as a catalyst. The process has not proved quite so easy to carry out commercially as was hoped at first, but it is already being worked on a large scale both in this country and abroad, and the difficulties are being gradually overcome, so that it seems probable that hardened oils of edible quality will be available in large quantity in the near future.

All kinds of oils are being hardened, but chiefly linseed oil and whale oil. When it is remembered that whale oil (1st grade) is worth about 27*l.* per ton and linseed oil about 32*l.* per ton, and that the cost of hardening was estimated in 1912 at 5*l.* per ton of oil and is now presumably less, it will be obvious that these hardened oils are serious competitors with palm-kernel oil at 43*l.* and coconut oil at 47*l.* per ton. There are, however, certain limiting factors in the competition of hardened oils with natural fats. The large demand for liquid oils, which the development of the hardening process involves, will mean a rise in the price of these oils and bring the cost of hardened oils nearer to that of natural fats. Further, it is understood that, for the present at all events, hardening can only be advantageously undertaken with certain oils, and that even with these oils the lower grades cannot be used with success. Too much weight must not, however, be given to these limiting factors, because this industry is making rapid progress, and as regards the first the supply of liquid oils of the right kind can probably be increased considerably, and as regards the second, which is mainly a matter of technical difficulties, the range of suitable oils is certain to be increased because those interested in the hardening processes are sparing no pains in investigating the possibilities of this new industry, which has only been in existence a few years.

The Oil-Palm Industry in the Future.

In view of this competition, it is important that those interested in the production of palm oil, palm kernels, and copra should realise that if these products are to maintain their position, they must be prepared for export more efficiently and cheaply than at present. This is particularly the case with palm oil and palm kernels. The best remedies appear to be the improvement of native production and the establishment, wherever possible, of a central factory system under European control. Means should also be found for removing the difficulties which at present seem to be encountered by such central factories already established in West Africa. Such factories would obtain a larger yield of better quality palm oil and kernels than is obtained now, they would find means of utilising the by-products of the industry which are now largely wasted, and they would probably be able to undertake systematic planting of oil palms where this is necessary.

As regards the working of palm kernels in England the principal technical difficulties seem to be (1) that most of the British factories are equipped with machinery not specially designed for palm kernels and copra, and (2) that it is necessary to create a new and permanent market for the cake or meal. There is reason to believe that these difficulties are being gradually surmounted.

It is understood that a number of crushers are installing machinery suitable for crushing or extracting

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palm kernels and copra, and it has been stated that makers of palm kernel and copra cakes cannot cope with the demand for these materials. In the last three months over 300 inquiries have been received at the Imperial Institute from farmers and others for information as to the feeding value of, and for the names of manufacturers and dealers in, palm kernel and copra cakes. The demand for palm-kernel meal, it is understood, is not quite so good, but in view of the large market which existed for this meal in Germany before the war, there seems to be no reason why it should not eventually sell freely in this country, once farmers are taught how to use it.

It is important to secure that this market for palm-kernel cake and meal should be permanent. It has been created, no doubt, owing to the fact that palm-kernel cake and meal, even at their present prices, are relatively cheaper than those of other feeding cakes and meals which have risen greatly in price. There still remains a good deal to be done in discovering means of making the cake and meal more palatable to animals, and in conducting feeding trials designed to determine the precise value of the cake and meal, in comparison with the feeding materials commonly used by farmers in this country. It is, for example, not yet certain whether or not palm-kernel cake gives a better yield of milk, or produces milk containing more cream, than does linseed cake or undecorticated cotton-seed cake.

The question as to whether palm-kernel cake and meal keep as well as other feeding cakes and meals also needs investigation.

Experimental Work in connection with the Oil-Palm Industry.

It is clear that if this industry is to be developed satisfactorily, a great deal of experimental work is still required both in West Africa and in this country. Attempts have been made on a small scale both in the Gold Coast and in Nigeria to raise the different varieties of oil-palm from seed, but these experiments are on too small a scale to be useful. Plantations of the different varieties should be established at different points in each of the colonies producing palm oil and kernels. These plantations should be utilised for observations on the yield of the different varieties as affected by soil and climate. Careful analyses should also be made of the fruits furnished by these plantations in order to ascertain exactly what yields of oil and kernels are obtainable from the different varieties. Further, a careful study should be made of the native processes of preparing palm oil, and of the possibility of increasing the efficiency of the best of these by the introduction of simple machinery.

In this connection it is worth noting that the process used for making edible palm oil at Agu in Togoland by the Togogessellschaft is merely a mechanical adaptation of the native process, used in the same district.

Another matter which needs attention and is now being investigated at the Imperial Institute is the discovery of a simple means of distinguishing between "hard" and "soft" palm oils. If the native is to be encouraged to make edible palm oil, which is the best quality of soft palm oil, he must receive a better price for this article than for hard oil. This cannot be done until the merchant is in possession of a simple means of distinguishing between the two classes of oil.

The utilisation of the by-products of the industry, especially the fibrous waste from the heads and fruit and the shells of the nuts is also worth attention.

Means of preventing the deterioration of palm kernels during transit to the coast and to Europe also need to be devised.

Finally the statement freely made that palm-kernel-cake and meal do not keep well needs investigation, and further feeding trials of the cake and meal in comparison with the standard British feeding cakes should be undertaken.

Part of these investigations will have to be undertaken in West Africa by the Agricultural or Forest Departments, and the staffs of these Departments will need to be strengthened if they are to undertake this

work. The expense entailed will, however, be quite small in comparison with the value of the industry to the countries concerned.

The remainder of the work, especially the investigation of the oil-palm fruits, palm oils, palm kernels, waste products, palm-kernel cake and meals, will have to be done in Great Britain, since it is not possible to undertake the chemical and technical work required in West Africa. All this work can be undertaken at the Imperial Institute in extension of the work on the oil-palm industry already done there.

Industrial research work required in connection with oil-palm products in Great Britain is, however, only one instance. Similar work is needed in connection with other oil-seeds, including shea nuts and ground-nuts in which this Committee is interested. These seeds are new raw materials so far as the majority of British oil-seed crushers are concerned. The oil-seed crushing industry of Great Britain is so important that it is of the first importance that systematic industrial research on oil-seeds should be now properly organised. Plans for such an organisation in connection with the Imperial Institute were drawn up some years ago, but so far funds for the necessary plant and staff have not been available. With Government assistance and with the co-operation of merchants and oil-seed crushers these operations should not be further delayed.

5712. (*Chairman.*) You are the Superintendent of the Laboratories at the Research Department of the Imperial Institute?—Yes.

5713. In that connection you have had a great deal of experience with regard to practically all the products of our colonies, and amongst others this question of oil nuts and seeds?—That is so.

5714. I will ask you one or two questions about the notes that you have given us, and perhaps you would wish either this précis or some amplification of it to stand at the head of your evidence?—Yes.

5715. Palm oil and palm-kernel oil in particular were previously used for soap purposes before ever they were used for edible purposes such as for margarine making?—Yes.

5716. Many people are of opinion that the margarine question forms really the crux of the inquiry, to which this Committee is devoted, of the importation and working up of palm kernels in this country, but it has been argued by more than one that it is not wise to attach too much importance to margarine because some alternative use for palm kernels is quite possible in the future, just as its use for margarine has supplanted its use for soap. Can you think of any other uses for palm-kernel oil on a big scale, or coconut oil, as the case may be, than for margarine?—No, I think not. Of course it may be used for the manufacture of other edible fats, but the demand for those is much smaller than it is for margarine.

5717. One knows that there is a use for all edible fats for cooking purposes, just as there is for margarine?—Yes.

5718. At one time, when palm-kernel oil was still used for soap-making, it was quite clear that there was another fatty product, namely, margarine, to which edible oils could be devoted. Is there any other product of greater value than margarine in existence that you know of which could possibly consume palm-kernel oil in the future?—No, I do not know of one.

5719. Therefore, to that extent, it looks as if the principal market for palm-kernel oil, as for copra, in the future is likely to be for margarine and similar edible fats?—Yes, I think so.

5720. You do not think that there is the likelihood of it being placed to some more valuable use?—No, I cannot think of any other more valuable use to which it could be placed.

5721. Then to that extent it would look as if its use for margarine and for edible fats of a similar kind for cooking were really the crucial point in the question of the use of palm-kernel oil in this country?—Yes, I think so.

5722. You refer in part of your précis to the question of possible or potential competitors. What

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are the different points which would have to be borne in mind in the matter of possible competition—price, of course?—Yes, price is the main consideration.

5723. And taste?—Yes.

5724. And, of course, the modern methods of the refining of oils and fats are so improved that the taste of the improved product is not a very serious matter—It is not so serious as before.

5725. Then there is the melting point?—If the melting point of the natural fat is similar to that of butter, that gives a distinct advantage over a fat which has a lower melting point.

5726. But you may get over that by hydrogenating it?—Or by mixing a harder fat with it.

5727. If you mix a harder fat with it, the melting point of the compound is not necessarily the mean between the harder and the more fluid fat?—No; under certain circumstances it may be lower than that of the softer fat.

5728. So that it is a question of the composition of the two fats that you mix?—Yes; it must have the right chemical composition, of course.

5729. Have you made any experiment with regard to texture?—No.

5730. Do you know what I mean by "texture"?—Yes, certainly.

5731. Texture must play a considerable part, and I did not know whether you had made any experiment?—No, I have made no experiments in that direction.

5732. Bearing in mind those points, have you had any experience with regard to babassu nuts?—Quite recently we got a small sample which we are examining at present, but we have not finished the examination yet.

5733. What is your opinion of them as regards the various points mentioned? First of all, what do you say as regards taste?—I might explain that the babassu nut appears to be derived from a species of tree which is closely allied to the cohune nut. I expect that it will yield an oil quite similar to that of the cohune nut, and probably to the same extent, say 65 to 70 per cent. If that turns out to be correct, then babassu oil ought to be quite suitable for edible purposes.

5734. What do you say with regard to the melting point of babassu oil?—The melting point I expect will be something like that of cohune nut oil, which is about 24 degrees centigrade.

5735. It is 22 to 24 degrees?—Yes. That is, very similar to the melting point of palm-kernel oil and coconut oil.

5736. Therefore it is quite a possible competitor in that way?—Yes.

5737. As to taste, would it compete?—I have not seen a sample of the oil yet, but I quite expect that it would do so.

5738. Therefore, do you think it probably would depend upon the price more than anything else?—Upon the price of the babassu nut?

5739. And its ease in working?—Yes. There is a serious difficulty about the use of the cohune nut and also the babassu nut. I can show you a sample. As we get the cohune kernel in the market in this country it is very much like a palm kernel except that it is a good deal larger. It is produced in this form—the nut containing the kernel (*samples produced*). I have had one of these cut open, and you see how very thick the shell of the nut is, and the consequent weight of material you have to collect in order to get at the kernel. In addition to that, the shell is exceedingly tough and very difficult to crack.

5740. How does the babassu nut compare with it?—I have only seen one specimen of the babassu kernel in the nut, and the case there is, you see, just about as bad (*sample produced*).

5741. (*Mr. C. C. Knowles.*) That is a very small babassu nut; most of them are at least double this size?—Yes. Here are some kernels of the average size (*samples produced*). There are usually two kernels and sometimes three in each nut.

5742. Sometimes there are five kernels?—In this one only one has developed. The number varies a great deal.

5743. There are quite a number with five kernels?—Yes.

5744. (*Chairman.*) Do you know of any other nuts at present which are likely to compete?—Not on a large scale. There are certain nuts like mowra seeds and illipé nuts, and so on, that come into the market in small quantities. The number is comparatively small, and they have certain uses such as the manufacture of chocolate fats, but they are not likely to compete on a large scale with palm kernels or copra.

5745. With regard to shea nuts, I know you have experimented with those?—Yes.

5746. What drawback do you find in the use of the shea nuts for this purpose?—The production of shea nut at present is not very large, and it is very doubtful whether it will be enormously extended. The supply is not very large. In addition to that, the fat from the shea nut contains a considerable amount of unsaponifiable matter which is difficult to digest and for that reason there is a great objection to its use in edible compounds.

5747. You are assuming that unsaponifiable matter is the same as indigestible matter?—I am not making the assumption, but the people making the fats say that that is a distinct objection to its use. Of course, if it is unsaponifiable it should be indigestible.

5748. With regard to palm-kernel oil itself you say that certain varieties of oil palm are more valuable than others as sources of palm oil and kernels. Is there any direct evidence on that score? We have often tried to get it, and as far as I know there has been nothing positive obtained so far?—First of all, the oil-palms in West Africa can be divided into two great groups. The common oil-palm is the one which yields a nut with a shell about one-tenth of an inch in thickness. The other group yields nuts with shells about one-twentieth of an inch in thickness. The group that yields those thin-shelled nuts occurs to a very small extent, so we have to depend on the ordinary variety yielding thick-shelled nuts for our supply of palm oil. We have examined samples of the fruits from those two varieties of oil palm from the Gold Coast and Nigeria. Taking the Gold Coast, the yield of palm oil from the fruits yielding thin-shelled nuts is something like 44 per cent. of the whole fruit, and in the case of the thick-shelled nut it is about 20 per cent.

5749. (*Mr. C. C. Knowles.*) That is the yield of palm oil?—Yes. I am not talking of the yield obtained by native methods, but the content of palm oil in the fruit is 44 per cent. of the total weight of the fruit. That is in a particular variety, yielding these thin-shelled nuts, which is very scarce; it is said to form about 0.2 per cent. of the total number of oil-palms in Nigeria, for example.

5750. (*Chairman.*) That is exactly the result given in that book by Mr. Farquhar. The information perhaps came from you?—Yes; it is our result which he is quoting.

5751. Do you count that a distinct variety?—Yes, I think there is no doubt about it.

5752. Do you know if there is any likelihood of being able to breed a variety like that?—That is difficult to say. In 1909, when we reported these results to the Governments of the Gold Coast and Southern Nigeria, we suggested that plantations should be formed with these two varieties so that these various points could be settled. A number of seeds were sown and a few trees have been raised, but in the Gold Coast the results have been disappointing. The trees have come up badly and no results are available yet. It takes between seven and eight years to bring an oil palm into bearing, so no results will be available for some little time yet. When this thin-shelled variety was first discovered in the Cameroons the German Agricultural Department there made experiments, and I think about 50 per cent. of their trees came up true to seed.

5753. As much as that?—Yes.

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5754. You say there is further investigation needed in collaboration with the Governments of West Africa and with merchants and manufacturers regarding (1) the value of different varieties of oil palm; (2) simple tests for quality of palm-oil; (3) improvement of native methods of extraction. Do you think if palm oil was obtained pure it could be used for edible purposes; for instance, for margarine?—On that point I am depending chiefly on a statement made by Dr. Hupfeld, Director of the Deutsche Togo-Gesellschaft, who has been making palm oil at the Agu factory for the last year or two before the war. At the Oil Seeds Commission, Berlin, in 1913, he stated that he had been informed by margarine manufacturers in Germany that if he could produce palm oil containing less than 6 per cent. of free fatty acid, they would accept it as raw material for margarine manufacture. At the same meeting I think Mr. Herz stated that German margarine makers were actually using about 5 per cent. of edible palm oil at that time—he means oil containing less than 6 per cent. of free fatty acid.

5755. Apart from palm oil, which needs the existence of the oil-palm as much as the palm-kernel oil, do you foresee any competitor that is likely to take the place of the palm fruit one way or another, so as to endanger the future of the West African trade?—I do not see any natural competitor apart from copra, which will always compete with palm kernels.

5756. But you would have no information as to whether there is any such possible extension of the trade in copra as to really cut away the trade from the oil-palm?—We have seen a good deal of it in the last ten years. There has been almost a boom in the cultivation of coconuts for the production of copra, but as far as we can tell, the extension of coconut plantation has dropped to a very considerable extent.

5757. Therefore, looking to the increase in the consumption of fats, the demand for palm kernels is likely to be as great, or, at any rate, not likely to decrease?—I think so.

5758. Even with the introduction of hydrogenation of other oils?—That is a difficult point. It was considered at the Berlin Commission that I have mentioned, and most of the people there were under the impression that although hardened fat would be a competitor with these natural fats, the prospect of increase in the demand for edible fats was so large that they thought for a long time to come, at any rate, it would not have any serious effect.

5759. In other words, supposing it were decided, in order to keep the trade in this country, to put an export duty on kernels from the Coast so far as they went, say, to Germany, the increase in the demand would be so great that the trade itself would not suffer in volume. Would you like to express an opinion off hand upon that point?—It is rather outside my province.

5760. (*Professor W. R. Dunstan.*) The Chairman asked you just now about the possibilities of other uses for palm-kernel oil and copra oil. Your reply was that there was not likely to be any more valuable use than the use for edible purposes on a large scale?—Yes.

5761. You cannot think of any other technical purpose which is likely to be more valuable?—No.

5762. With regard to the other nuts to which you referred, do you look upon them at present as serious competitors with palm-kernel oil?—No. We have had a good deal of experience of people trying to work cohune nuts. I have known two or three small syndicates who started out to work them, and, as far as I know, they have all come to grief. There is great trouble about getting labour in Central America. An enormous amount of material has to be collected to get a small amount of kernels, and there are difficulties about machinery, and so on. So I do not think the cohune nut is, at any rate, a serious competitor with palm kernels.

5763. That is to say, as far as our information goes, it does not seem likely that within the near future there will be any serious competition from the nuts that we at present know of?—No.

5764. Then turning to palm oil, I think we may say it is generally recognised that if palm oil is well prepared and the percentage of fatty acid in it is low, it is a very suitable fat for edible purposes, and for the manufacture of margarine?—Yes.

5765. You know it has been suggested—in fact, I think it is in the Imperial Institute Report of 1909—that it might be well worth while to consider the question of establishing central factories in West Africa under European supervision, for preparing palm oil of a better quality than that which is now prepared by the natives?—Yes.

5766. You know something of the enterprises which have been started since in West Africa, and which up to the present have not been very successful? What are the prospects, in your opinion, of so improving the native methods of production by instruction from competent people, that the natives could prepare palm oil of a quality that would be suitable for edible purposes?—I think there are considerable prospects of improving the native process. We have had about 18 samples of oil, principally from the Gold Coast, prepared by native methods, and also prepared in the Gwira machine, which has been specially made for native use, though I believe it has not been very successful so far. All those samples of palm oil contained less than 10 per cent. of free fatty acid, and 14 of them contained less than 6 per cent. (so that they would come into Dr. Hupfeld's class of edible palm oils), and several less than 3 per cent. So it is possible at present by native methods, if worked under careful supervision, to obtain palm oil of edible quality. As to the efficiency of the native process, the estimates vary very considerably. Mr. Kemner, President of the West Afrikanischen Pflanzungs-Gesellschaft, Victoria, stated at the Oil Seeds Commission to which I referred that one man by the native process can produce about 3½ lbs. of palm oil per day and 14 lbs. of kernels. That is a very low efficiency. With the Gwira machine a course of trials was carried out by Mr. Evans on the Gold Coast. The makers of the machine claim that one man can produce with it about 70 lbs. of palm oil per day, but in Mr. Evans's trials the yield was between 23 and 25 lbs. If a simple machine of that kind could be adopted the native production would be improved and increased at least eight-fold. That machine was then in not very satisfactory condition, and Mr. Evans made various suggestions as to ways in which it could be improved. In Mr. Kemner's factory at Victoria in the Cameroons, equipped with European machinery, the output per man each day is claimed to be between 75 lbs. and 90 lbs. of the oil; and the output of the kernels is between 70 lbs. and 80 lbs. Judging from these figures, and allowing for the cost of European supervision and machinery, there is not such a tremendous lot of leeway to make up between the efficiency of the Gwira machine worked by natives and this factory which is run with up-to-date European machinery. From facts like that it seems to me that it ought to be quite possible with technical advice to improve considerably the efficiency of the present native methods of manufacture.

5767. (*Chairman.*) What is the size of the Gwira machine?—In its original form it took about 150 lbs. of fruits at a time.

5768. What is the weight of it? Is it easily transportable?—It can be carried by about two men.

5769. What is the cost?—I am sorry; I have not got that figure.

5770. (*Professor W. R. Dunstan.*) We have the price; it is not very great. Having regard to the difficulties that are stated to prevent the successful working of a central European factory system in West Africa, it seems desirable further to investigate the possibilities of improving native methods?—Certainly.

5771. The figures that you have quoted in the results which you refer to were obtained purely in an experimental way in the Gold Coast; that is to say, Mr. Evans, a European, was actually supervising the natives at work and got what may be regarded as promising results?—Yes.

5772. Keeping to the question of palm oil, would you agree that palm oil, if properly prepared, would be

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a serious competitor with palm-kernel oil?—For the manufacture of margarine, yes.

5773. So that from the point of view of this Committee you would agree that it is desirable to pay attention to palm oil as well as to palm-kernel oil?—Certainly.

5774. In your précis you refer to hydrogenated or hardened oils. This is an industry which has only started within the last few years, but we have had a certain amount of experience of the products which this industry is capable of turning out. Is it true that the oil used for hydrogenation may be a fish or a vegetable oil?—Yes. The two most popular oils for hardening in this country and in Europe are whale oil and linseed oil.

5775. Will you tell the Committee generally the nature of the process just in outline? It is the subject of patents. From a chemical point of view it is not a very complicated process, and there is no great difficulty in carrying it to a successful issue as far as one can judge from the results obtained so far.—No; it seems to be quite simple. There are various little difficulties in working, but I think they are all being surmounted gradually.

5776. The sort of difficulties likely to occur in working any process of the kind on a big scale?—Yes.

5777. Will you show the Committee a specimen of the fat which is produced from whale oil by this method?—Here is a specimen of hardened whale oil (*same produced*).

5778. That is a hardened whale oil. In its natural state whale oil has a very disagreeable smell, but if you smell this sample of fat you will be hardly able to believe that it is prepared from an animal oil. I think you have also a specimen of a fat produced from linseed oil by the same process of hydrogenation?—Yes (*same produced*).

5779. Would you agree that that fat has no resemblance at all in smell or appearance to the linseed oil from which it is produced?—No. It has lost its characteristic colour, flavour, and smell.

5780. Would you agree that this is a process which has great possibilities in the future, especially with reference to the production of palatable and wholesome solid fats for margarine? There is at any rate a reasonable chance of these hardened oils being employed for the same purposes as palm-kernel oil and copra?—Yes. I have had no experience in working with them; but, as far as I can gather, there is no reason at all why they should not be used for edible fats.

5781. Apparently the cost of production is small as far as one can judge of a subject which is still, scientifically speaking, in its infancy?—Yes, I have seen two estimates of cost; one was published in the Society of Chemical Industry's Journal about a year ago. It is supposed to cost about 5*l.* a ton to reduce whale oil to hardened oil. An estimate was published in 1912 in Germany, and the cost was 7*l.* 10*s.* a ton; but the expert giving the estimate said he thought it would probably be reduced to one-third of that in a year or two, which brings it down to 2*l.* 10*s.* per ton.

5782. Can you state the present price of whale oil?—It is about 27*l.* a ton now.

5783. So it would appear that the hardened oil could be produced from the whale oil at about 30*l.* a ton?—Yes, between 30*l.* and 32*l.*

5784. With regard to linseed oil, the price is very high at present, is it not?—I think it is about 30*l.* a ton now, so that it is not quite so promising at the moment as whale oil.

5785. Then the hardened fat from linseed would work out at about 35*l.* a ton?—Yes, 35*l.* probably, or something like that.

5786. Looking at this possibility from the point of view of the palm oil and palm-kernel oil industry, it appears that one step that certainly could be taken with advantage to that industry would be to try and improve the method of production?—Certainly.

5787. That is to say, by scientific and technical research to try to improve the native method of preparing palm oil, to investigate certain difficulties that there are at present about the collection and

transport of palm kernels, and to take up the question of the utilisation of the by-products, especially the shells of the palm nut and the fibrous residue of the pericarp, so as not only to produce material of better quality, but also to cheapen the cost of production. That seems to be the most hopeful direction in which to meet the competition of the hardened oils?—Yes, I think so.

5788. Is there anything you would like to say about the further investigation which seems to be desirable in connection with the oil palm industry as a whole? You say in your précis that there is still need for further scientific and technical investigation on this side in collaboration with the Governments of West Africa. I suppose you mean the Agricultural and Forestry Departments of the Colonies?—Yes, the technical departments in West Africa.

5789. You state that collaboration should also be secured with merchants and manufacturers regarding the value of the oil from different varieties of palm. The Chairman asked you some questions about that. The main point is that at present we have not sufficient evidence of the possibility of breeding or growing these so-called different varieties?—That is so.

5790. And more evidence is desirable as to that?—Yes.

5791. You refer in your précis to "Simple tests for quality of palm oil." Can you make any statement with regard to that, as to the method used now in judging the native material from West Africa?—Recently there has been considerable difficulty in that way. Places which formerly produced soft palm oil, which brings the best price on the market, have taken to producing hard oil or oil which is half hard. A great deal of the difficulty seems to arise from the fact that there are no simple tests available on the coast to distinguish the two classes, so merchants get into trouble with their consumers over here by supposing that they are supplying soft oil when really they are supplying hard or mixed oil. We have been approached to try and discover a simple method of distinguishing between the two classes of oil and we have the work in hand now.

5792. What is the method at present adopted?—I think the usual method adopted over here by the merchants is simply a slate test. A pat of oil is formed on a slate, and from its appearance one judges whether it is soft or hard, but that is not very satisfactory in the case of a mixed oil. On the Coast the usual method is to judge from its consistence. If it is liquid it is put down as soft oil; if it is thicker it is put down as a hard oil.

5793. So it would be an advantage in connection with the improvement of the methods in West Africa if there was some simple test by which the quality of the oil could be determined approximately on the spot?—Yes, that is very important. It is also important from another point of view. It is stated that the natives have no inducements at present to prepare their oil by methods which would yield a soft oil, because they often do not get a better price for it. That difficulty is no doubt partly due to the fact that the merchant has no proper method of distinguishing between the two.

5794. Then you refer in your précis to methods of preparing and transporting palm kernels, with a view to no deterioration taking place during transit, I presume?—Yes.

5795. You refer also to the keeping qualities and other points in connection with palm-kernel cake and meal—about which we have a good deal of evidence—and to the utilisation of by-products such as fibrous residue and palm-nut shells. If it were possible to find some use for those residues, it would react favourably upon the industry as a whole?—Yes.

5796. And it does not seem impossible that some use might be found for those residues?—No, I think there are one or two directions in which they might be made use of.

(Chairman.) What directions have you in mind? (Professor W. R. Dunstan.) We are in the middle of an investigation which promises well, undertaken at the suggestion of a firm, and for the present we

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feel bound to observe a certain amount of reticence about it, but I can tell you generally if you like.

(Chairman.) We will leave it for the moment.

(Professor W. R. Dunstan.) It seems quite possible, or even probable, that we shall be able to find a satisfactory use for the shells, and perhaps also for the fibrous residue, but the matter is under investigation at the present time. It is an important point, and I brought it out merely to show that a great deal can be done to assist this industry by further scientific investigation both here and in West Africa.

(Mr. C. C. Knowles.) A use for the shells of palm kernels?

(Professor W. R. Dunstan.) Yes, and possibly for the fibre.

5797. (Mr. T. H. Middleton.) You mentioned two varieties of oil palm, one of which you said produced 44 per cent. of oil in the fruit?—Yes. In our experiments with a particular sample obtained from the Gold Coast we obtained 44 per cent. of palm oil by extraction of the fruit with solvents.

5798. What percentage did the other variety contain?—There is more variation about that. On the average, about 20 per cent. is the maximum amount.

5799. This therefore is a particularly valuable variety that you have referred to?—Yes, the oil palm yielding this thin-shelled nut.

5800. What percentage of the total crop did you estimate that variety to be?—I have not been in West Africa, so that I do not know anything about it at first hand. It is estimated that about 30 per cent. of the trees in the Eastern Province of Southern Nigeria consist of that variety, but the total amount in Nigeria itself is supposed to be not more than 0.2 per cent., so that the variety is extremely scarce.

5801. You yourself did institute experiments or you had experiments instituted in planting seeds of this thin-shelled variety?—Yes. We suggested that this should be done, and a certain number of plants have been raised, but at the present time no results are available to show whether it comes up true to seed, or what sort of yield it gives.

5802. You quoted a German result.—That was an experiment carried out at the Victoria Gardens, in the Cameroons. They planted the Lisombe palm, one of the varieties yielding thin-shelled nuts, in about the year 1906; as far as I know. It is stated in Farquhar's Report that 50 per cent. of the trees which came up actually yielded seeds of the thin-shelled variety; the others were a mixture of thick and thin.

5803. Would you consider that a satisfactory or an unsatisfactory result?—I should consider it unsatisfactory as a practical matter.

5804. I should rather like to suggest that it is a very satisfactory result. If you can get 50 per cent. true from seed it ought to be a comparatively easy matter to work up a stock?—Yes, it should not be difficult, but I should think that with greater care in the selection of fruits there should be no difficulty in getting 100 per cent. There seems to be very little doubt that it is a distinct species of palm which yields the thin-shelled nuts, and therefore, with fruits carefully selected, or properly selected trees, there should be no difficulty in getting a higher percentage than that.

5805. When I heard you make the statement I was surprised to find that the results were so good.—From a commercial point of view one would hope to be able to get them better, because it is a serious matter to grow trees for seven years and then find them to be of the wrong variety. So the selection would have to be very carefully made, and it is an important point to determine by experimental plantations whether the tree can be raised true to seed.

5806. As compared with many other plants we know, the percentage is remarkably high from seeds?—Yes, I think it is not bad for a first trial.

5807. As to the keeping qualities of palm-kernel cake and meal, have you yourself compared the keeping qualities with those of other cakes?—No. We have made no experiments yet, but a good many statements have been made that it does not keep so well, and it is a point that needs to be tested.

5808. Have you formed any opinion as to the reasons for it keeping badly?—I see no reason why it should not keep as well as any other cake if it is properly stored.

5809. Then there is nothing in the nature of the fat or oil which would cause decomposition?—The fat in palm-kernel cake and also in copra cake is distinctly different from that in linseed cake, but I do not think there is any reason to suppose that it will split up into fatty acids any more easily.

5810. (Mr. T. Walkden.) You referred to certain varieties of oil palms. We find in Nigeria near the coast we get the best oil and also the best kernel. Farther north or farther away from the Equator we find that the oil and kernels are not so good from a merchantable point of view. Do you think that the climatic conditions have anything to do with it?—Certainly. In the Gold Coast, for instance, the average weight of the palm fruits is about 7 to 8 grammes. In Nigeria they go up to about 11 grammes. So altogether Nigeria is a much better oil-palm country, I should think; its soil and climate are very much better suited to the oil palm than those of the Gold Coast. The same is true in comparing Togoland (which resembles the Gold Coast in the variety of oil palm produced) and the Cameroons. The Cameroons and Nigeria appear to suit the oil palm better than the Gold Coast and Togoland.

5811. The French Guinea Forest Department have planted a great deal to try and improve the quality of the palm oil; but that is quite a distinct oil from the Nigerian oil. It is a deep red and quite a different colour. That may be owing to the soil or climatic conditions?—That is quite likely. Although I divided these oil palms into two great groups, in those groups there are several sub-groups in which you get a certain difference in the colour of the fruit, but that seems not to be always constant. If those fruits of different colours are grown again they do not always yield fruits of the same colour; so I think it is merely a question of soil and climate affecting the yield and quality.

5812. The oil in the French Colony of Guinea is always the same deep red colour. I suppose it is used for colouring matter in confectionery, and that sort of thing. Do you think at present it would be feasible to erect any power factories over there?—I have no first-hand information, but all the results published seem to show that they have not been very successful. The most successful I suppose is the one at the Agu plantation in Togoland, and although Dr. Hupfeld, the director, suggests that they have made a technical success, he did not claim commercial success for it in 1914. It is found to be very difficult indeed to get the natives to bring in sufficient supplies of fruit to keep the factories going.

5813. Therefore even in Nigeria, where we get the biggest supply of palm fruit, it would not be feasible because the small amount of fruit brought in by the natives at any one point would not be sufficient for the work of a power factory?—Not unless you can persuade the natives to sell fruit instead of making the palm oil. I do not think that should be impossible, and, if so, the prospects of success would be greatly improved.

5814. You speak of collaboration of the Government and the merchants. We find with regard to palm kernels, that we have a certain inspection in Nigeria which has improved the quality of palm kernels. Do you advise that as being the right thing to do?—I cannot say exactly how that would work out on the coast, but anything that can be done to improve the quality of the kernels ought to be done if it is feasible.

5815. The merchants asked for this in Nigeria, and it is very successful. To take Sierra Leone, although the merchants ask to have the same control, the Government will not grant it, and the consequence is, that the percentage of dirt and shell is very much higher there than in Nigeria. That is proved by knowledge. You mentioned that you want palm kernels to be improved in quality?—Yes. Anything that can be done to improve the quality and get rid of dirt and pieces of shell ought to be done. It is very

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important to get rid of all the shell in the case of the manufacture of cake. The cake recently made in this country contains far less fibre than the cake formerly made in Germany, which is mainly due to the use of kernels free from shells.

5816. The merchants would only be too pleased to collaborate with the local government for the making of this improvement.

5817. (*Mr. G. A. Moore.*) Do you agree with the view that the hard and soft varieties of palm oil which come into the market here are so purely as the result of the method of preparation?—Yes. On that point I can quote some experiments that were made on the Gold Coast. These experiments were made in the preparation of palm oil from exactly the same set of fruits by the native process. When the fruits were treated fresh, the amount of fatty acid was less than 4 per cent. If it was kept for eight days it went up to 6 per cent., and when kept for six weeks it went up to about 50 per cent.

5818. Is the proportion of free fatty acid the only difference between hard and soft oils?—The hard oil has also lost its glycerine, but that is a necessary consequence.

5819. Is that a result of the increased free fatty acid?—It comes about at the same time. The soft palm oil, the neutral oil, consists of what is known chemically as a glyceride; that is a compound of the fatty acid with glycerine. In fermentation, this glyceride separates into fatty acid and glycerine. The glycerine is soluble in water, so that when the oil is treated with water, the glycerine is washed away, and the fatty acid is left with the oil.

5820. Then you do agree with the view that hard and soft oils are produced from the same fruit?—Yes. I think there is no doubt about that.

5821. In the Eastern Province, did I understand you to say, there was no less than 30 per cent. of the thin-shelled variety of palm fruit?—That is Mr. Hichens's estimate, and I think Mr. Farquhar agrees with it.

5822. I have been interested in nut-cracking machinery, and I have been buying uncracked nuts in Brass, New Calabar, and other parts of the Coast, for over forty years, and I have never come across this thin-shelled variety, so it appears to me that it must be very sparse indeed. I have bought a great many thousands of tons of these nuts and I have never come across the thin-shelled variety.—It would be a difficult matter to find out, because although one-third of the nuts had thin shells it would mean a very detailed examination of the shells to make certain.

5823. I think it would show in the cracking. I only point out that as far as my experience goes, the distribution of this thin-shelled variety is very sparse indeed.—It is agreed that over the whole of Nigeria, at any rate, it does not amount to more than 0·2 per cent., but the Forestry officers state that it is about a third of the palm population of the Eastern Province.

5824. With regard to the South American nuts, you mentioned, the babassu and the cohune, have you any idea how many different kinds of nuts there are yielding a similar kind of kernel and similar oils?—I should not like to say. We have had about ten different kinds submitted to us in the course of the last three years from Central and South America.

5825. Is not there a great number of these nuts both in Brazil and Uruguay?—Certainly.

5826. They are very similar, and they all yield over 60 per cent. of oil, so far as I know?—Yes, they are all very rich in oil.

5827. But in every case they have got a thick shell, and this soft fibre on the outside making it very difficult, indeed, to treat them?—Yes, all that we have seen are like that.

5828. Is the cohune nut distributed anywhere very thickly except in Honduras?—We have had statements to that effect, but I have no very satisfactory evidence that it is.

5829. Do you know the conditions of labour in British Honduras?—Only by hearsay from people who have been out there. They tell me that it is extremely difficult to get labour for this kind of work; labour is both expensive and difficult to get.

5830. Is this Gwira machine that you mentioned a German machine?—No; it was invented by a native in the Gold Coast.

5831. Does it use water?—It is a depericarping machine—a spindle carrying a series of knives working inside a drum. The fruits are fed into the drum and the spindle with these knives on it is rotated.

5832. And you pour hot water into it?—Yes, to melt the oil out.

5833. Is that not a very great drawback to the preparation of palm oil if you want to get it in a condition for the use of the margarine makers?—I think not, as long as the nuts are fresh.

5834. All the plantations that I am aware of have given up any machines which require hot water in separating the oil from the pericarp.—The essential point about the production of fatty acid from the oil is not so much the water as the ferment actually in the fruit.

5835. Does it not take the glycerine away?—Not if there has been no fermentation. There is no glycerine there to begin with, unless the fruits are fermented. The glycerine is still combined in the fat, and cannot be removed by water.

5836. It is important in all these things that the fruit should be used as fresh as possible in order to get a low free fatty acid?—Yes.

5837. Is there any chemical method that you know of by which fruit could be treated so that it could be stocked until there was a sufficient quantity to deal with on a large scale, without the free fatty acids accumulating or generating?—The only suggestion I can make on that head is the process they have practically adopted at the Agu Plantation. The first step in their working of all fruits is to treat them with steam.

5838. Is the steam at any special temperature?—No; ordinary steam under atmospheric pressure.

5839. In regard to hydrogenated or hardened fats, have you any idea whether the process is really successful in removing the smell altogether and preventing it from returning?—I have heard it stated by people who have tried to use these fats for edible purposes that in the earlier samples the flavour and smell did come back, but I do not think that is the case recently.

5840. Have you any idea what the actual cost is now, under the improved method, of this hardening process? Is it down to 2*l.* 10*s.* a ton or not? Have you any definite information to that effect?—I have no precise information on the point.

5841. With regard to these thin-shelled palm kernels, do you think they would be as free from disease as the ordinary palm tree is? One of the great advantages we have in the African trade is that we are certain of our crops. They may vary a little, but we never know what it is to lose a crop by disease. It would be a very serious thing for the industry as a whole if we were to substitute in any way a plant which was subject to disease.—I have no information on that point, but I do not think there is any reason to suppose it would be any less resistant to disease than the ordinary variety of palm.

5842. (*Sir W. G. Watson.*) I think you said that the suitability of certain nuts or oils for edible purposes was a question of taste. I suppose you really meant that it was a question of an absence of taste after it was refined, because I think margarine makers require as a rule a refined oil without any taste whatever?—Certainly.

5843. You showed us some samples of hydrogenated linseed oil and also whale oil. The linseed oil, speaking generally, is not so suitable for edible purposes as some other oils, owing to its being a quick-drying oil, and for that reason there is something on the tongue when it is eaten which makes it not quite so suitable as other oils. Have you heard that?—No, I have not heard that.

5844. The same remark applies to a less degree in the case of soya bean oil. With regard to hydrogenated whale oil I think you said you believe the flavour used to come back after a time. You think they have now got over that difficulty in the treat-

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ment?—I have heard no complaint recently of that particular difficulty.

5845. (*Sir Owen Philipps.*) With reference to this thin-shelled fruit which is borne by some palm-trees, do you happen to know whether the quantity of fruit that such a tree bears every year compares favourably with the quantity of fruit the ordinary tree bears every year?—No; that is one of the points we want established by these plantations that we suggested should be formed. It is a very important point. There are a great number of points to be settled by investigation before one could actually recommend this thin-shelled nut for cultivation.

5846. Do you think that those experiments you have spoken of will be sufficient to enable the Agricultural departments of the Colonial Governments to come to a conclusion two or three years hence or will they have to start planting fresh trees of this variety?—I think the results they will get may be definite enough. The number of trees planted is rather small, but supposing they get, say, 100 per cent. of these nuts coming up true to seed, and the trees give good yields in comparison with the ordinary oil palm, and they do not appear to be unsatisfactory in any other respect, then I think it would be quite safe enough to recommend them for plantations.

5847. (*Mr. C. C. Knowles.*) You referred to mowra and illipé oil as being a probable competitor with copra and palm-kernel oil?—On a very small scale.

5848. Is mowra of the same family at all?—No, that is quite a different family.

5849. I am connected with the soap trade and we generally put mowra oil in the tallow family. If we use mowra oil we use it instead of tallow, and we never use it instead of palm kernel or copra oil in soap making.—That would be quite correct, but we were talking entirely of edible fat manufacture. There is no particular reason why babassu, mowra, and illipé fats should not be used, as I think they are now, for certain edible fats.

5850. In mowra seeds, is not the residue that is called "cake" poisonous?—Yes, it is generally stated to be so.

5851. Then is it not rather unsafe to use the oil from a poisonous seed for edible purposes?—I think not, as the deleterious constituent remains wholly in the cake or residue. Exactly the same difficulty I believe occurs in the case of the shea nut.

5852. Yes, that cake is poisonous, too?—It has that reputation.

5853. And therefore cannot be used for feeding, but is generally used for manure?—Yes.

5854. Illipé oil, I suppose, you know is being made, but not in large quantities?—No. I pointed out that this can only compete on a small scale.

5855. But that illipé oil is being used for cocoon butter substitutes and is sold at at least double the price of palm-kernel oil?—Yes, it has greater advantages as a cocoon butter substitute.

5856. And therefore it is not at all likely to come into the market as a competitor?—No. As I said, these oils are produced on quite a small scale and are not serious competitors in any way.

5857. (*Mr. G. A. Moore.*) Where does illipé oil come from?—Illipé oil comes from Borneo and Java.

5858. (*Mr. C. C. Knowles.*) You have been asked some questions about the cohune nut and the babassu nut. With regard to those nuts with very thick shells you say the cracking difficulty is very great. You apparently do not know that that has been quite overcome, and that there are machines now invented that do the cracking quite well?—I have seen three machines; and I know of syndicates that actually started and took machines out to British Honduras, but they have not been successful.

5859. May I ask if that was the Drew machine?—No.

5860. I happen to know that there are machines that can deal with these nuts quite well and the difficulty of cracking has been quite overcome. As to this thin-shelled variety of palm you gave us the percentage of oil as 44 per cent. of the fruit?—Yes.

5861. Can you tell us the percentage of kernel?—The Gold Coast thin-shelled nuts are fairly good in

regard to kernel, and contain about 20 per cent. The Southern Nigerian nut gives about 9 per cent. in the thin-shelled variety.

5862. In the thick-shelled nut the kernel averages about 12 or 14 per cent.?—14 per cent. as a maximum in Nigeria.

5863. And the oil, I think, averages round about 18 or 20 per cent.?—Yes, 20 per cent.

5864. As a matter of fact I know, from factories that have been started on the coast, that it generally averages out at about 18 per cent. of oil and 12 per cent. of kernels.—Yes.

(*Chairman.*) Even if palm oil is worth less than palm-kernel oil it is obviously an advantage if you can get a fruit from which you get 50 per cent. of palm oil, even though your kernel is only about 9 per cent.

(*Mr. C. C. Knowles.*) Quite so.

(*Mr. T. Middleton.*) The weight of the kernel is 9 per cent., but what is the weight of the contents of the kernel—because it is thin-shelled?

(*Chairman.*) Just one-half in both cases. The oil content of the kernel varies very little, perhaps 1 or 2 per cent.

5865. (*Mr. C. C. Knowles.*) You referred to hydrogenation, and you said that the industry is only just started. You are evidently not aware that there are large factories for hardening fats in the countries of Japan, Canada, Australia, America, Italy, Russia, Germany, Austria, Sweden, Norway, Denmark, and the United Kingdom. In the United Kingdom alone do you know the quantity that is being hardened each week? Have you any idea?—I have no idea at all at present.

5866. There is a plant in the United Kingdom to harden about 2,000 tons a week, and in America there is a plant to harden very much more than that. In Norway alone there is a plant to harden about 2,000 tons a week. Would you call that an industry in its infancy?—It is in its infancy in this respect, that it is rather doubtful whether those things are being used to any large extent as edible fats at present, but I think their use as edible fats will probably increase enormously.

5867. You know the usual way of making compound lard in America?—Yes, by hardening cotton seed oil.

5868. No, I mean the common way before hydrogenation came in.—You mean the mixture of beef stearin and cotton seed oil?

5869. Yes. Do you know one firm of Proctor & Co. who make stuff which they call "crispo," which is a substitute for lard, and they just harden the cotton seed oil. That is a very large business?—Yes.

5870. All the large oil companies and packers are making compound lard from hydrogenated fat, and it is a very large industry. I only call the attention of the Committee to the fact that it is really a large business.—It is extending rapidly, certainly.

5871. It certainly is not in its infancy, but far beyond it. There are many millions sterling invested in it, anyhow.—Yes, and it has possibilities not yet completely realised.

5872. Can you tell us what country this oil was manufactured in that you submitted to us?—This hardened oil was made in this country, I think.

5873. Is it a secret as to who made it?—I would rather not mention it.

5874. Have you had any hydrogenated whale oil, manufactured by the Deno firm in Christiania, submitted to you?—No.

5875. I should like to point out that there is quite a smell in those samples you produced. Neither of those hydrogenated oils would do for edible purposes?—Perhaps not alone as they are.

5876. What would you have to do to them?—I understand that it is a difficult matter to refine them completely, but that it can be done.

5877. Then you would have to refine those oils before you could use them for edible purposes?—Certainly.

5878. I think you said that in your opinion there is very little hardened oil now being used for margarine making?—I have no opinion on the subject myself, but

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[Continued.]

from all the evidence one can get, one would gather that there is comparatively little, at any rate the use of which is admitted.

5879. I quite agree. I do not say that in this country there is a large quantity used, but certainly on the Continent a very large quantity is being used for edible purposes. In referring to the price I would like to point out that the price depends a great deal on the melting point?—Yes.

5880. The melting point of these samples is round about 48 or 49 degrees?—I have not tried them, but I should think it is about that.

5881. To-day it is quite easy to make in this country hardened fat with a melting point of 40 degrees, at 43*l.* per ton, and with a melting point of 50 degrees at 45*l.* per ton. When there is so much coming here (from Norway alone it is something like 500 tons to 1,000 tons a week), I think it proves that for edible purposes it can become, and has become a competitor with palm kernel oil, and a great competitor.—Yes, I think so.

The witness withdrew.

Sir OWEN PHILIPPS, K.C.M.G., called and examined.

[The witness handed in the following précis]:—

1. I am a steamship owner, controlling 295 steamers, with a total gross register tonnage of 1,520,000 tons; and am chairman and managing director of Elder Dempster & Company, Limited, founded in 1869 and incorporated in 1910. This firm has large interests in, and is charged with the management of, the following (among other) steamship companies:—

The African Steam Ship Company (established in 1852, by Royal Charter; chairman, since 1901, Lord Pirrie).

The British & African Steam Navigation Co., Ltd. (Inaugurated in 1866.)

The Elder Line, Limited. (Registered in 1899.)

2. *Steamers specially adapted for the Trade.*—These companies have, since their formation, been chiefly engaged in the ocean carrying trade between Europe and the West Coast of Africa; and the fleets of steamers respectively owned by them have been specially designed and equipped to meet the requirements of the West African trade, and the conditions of navigation, loading, and discharge peculiar to that coast.

3. *Nature of Trade, Services carried on, and general Principles followed.*—I may describe the West African shipping trade as a regular or "liner" trade, in contradistinction to a "tramp" trade; and I have put in (as an appendix) a statement of the services regularly carried on, immediately prior to the war, by the companies I have named, which will convey an idea of the complexities of the business and of the number and variety of interests served. In maintaining these services, the principles set forth in the Majority Report of the Royal Commission on Shipping Rings or Conferences (1909), as being to the general advantage of trade and furthering its development, have been adhered to, amongst which I may particularly enumerate the following:—

(a) *The provision of adequate Tonnage to meet the requirements of the Trade.*—In this respect the needs of the West African trade, both outwards and homeward, have been amply met in the past, and expansion suitably provided for. The outbreak of war, however, introduced an entirely new set of conditions, and created very difficult problems for the shipowner. At first the overseas trade of West Africa came almost to a standstill, but after a time it recovered, and for some months past cargo has been coming forward for shipment, both out and home, in considerable volume, though naturally still much below that of normal times. Meanwhile the steamers of the Woermann Line, the Hamburg-Amerika Line and the Hamburg-Bremer-Afrika Line (the German lines formerly engaged in the West African trade) had ceased to run. Three of our vessels were detained in the port of Hamburg;

5882. These figures of the cost of hydrogenation are only what you have heard. You have no proof of the cost?—No. Those are published figures that I have given, but I have no personal knowledge of the cost.

5883. You have no details?—No.

5884. We are going into the question of probable competitors with palm kernels. Have you any idea of the cost of producing copra in such places as the South Seas, or Java, or the Philippines?—No, I have no idea.

5885. You cannot tell us if copra could be a competitor, and could be grown much cheaper than the palm kernels could be collected from the natives in West Africa?—No, I have no experience of it.

5886. Do you think it probable? You have some idea of the bearing powers of coco-nut trees, and the cost of planting perhaps?—No doubt one could make a rough estimate, but I would not like to give a figure off hand.

others have been destroyed by enemy warships; others, again, have been requisitioned by the Admiralty for Government service; whilst the unprecedented congestion and consequent delays in our home port of Liverpool inevitably diminished the full effectiveness of the remainder of the fleet. Under these circumstances, as may be readily imagined, it has been no easy matter to maintain even such services as the reduced volume of traffic called for; but, though some inconveniences may have been felt here and there, the general needs of the West African mercantile community have on the whole been met, and I anticipate, with confidence, that the British shipping companies will be in a position to fulfil the demands which may be made upon them in the future.

(b) *Regularity of Services by despatch of Ships on advertised Dates, whether full or not.*—The merchants and shippers engaged in the West African trade have long enjoyed the advantages arising from the despatch of steamers on fixed dates, full or not full, according to the carefully pre-arranged time-tables. These advantages are so apparent, in meeting the requirements of traders, that I need not enlarge upon them.

(c) *Stable and reasonable Rates of Freight.*—The advantages derived from the maintenance of steady rates of freight, as compared with fluctuating rates, are also obvious, enabling merchants to frame their calculations accordingly. These are appreciated by traders, as much as are the advantages arising from regularity of sailings, and no less in the West African trade than in other regular ocean trades.

The closely-allied question, however, of the reasonableness of rates of freight is naturally one respecting which there may perhaps be more room for divergence of opinion, as indeed is the case in most commercial transactions whenever payment for services rendered is in question. In regard to this, I may say that, prior to the war, the rates of freight charged by the regular West African steamship companies compared very favourably with those obtaining in any other shipping trade of the world, bearing in mind the difficult and dangerous navigation and the peculiar conditions prevailing on the West African coast, as well as the exceptional number of small and poorly equipped ports to be called at. In the latter connection, I may mention that we have, in all, 99 ports to serve. Of these, 60 are open roadsteads, 9 are sheltered harbours, and 30 are up-river ports with bars to cross. Of these 30 up-river ports only 1 has permanently more than 20 feet of water on the bar, 22 have between 15 and 20 feet, and 7 have less than 15 feet.

Apart from the war surcharge (now 10 per cent.) to assist in meeting the heavy cost of the war insurance premiums on the steamers, the West African outward and homeward rates of freight remained at the pre-war level until 1st June 1915 and 1st July 1915, respectively, when an advance of 5*s.* per-ton was

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made, while a further revision was made on 1st October 1915, affecting the homeward rates only.

I have put in (as Appendix (ii)) a schedule showing the rates of freight charged over the past ten years upon such of the articles of West African export as are likely specially to interest this Committee, including the rates now in operation; and (as Appendix (iii)) a statement showing the percentages of the increases made in the rates of freight on these articles since the commencement of the war.

The abnormal conditions brought about by the war have enormously increased the cost of working steamers. At sea and on shore wages have advanced heavily, as well as the prices of coal, stores, victualling, &c., while the delays in port due to congestion have involved extraordinary expenditure; and when all these factors are taken into account, it will be realised that increases in rates of freight are inevitable. Such as have been made in the West African trade, however, when compared with the increases in rates of freight which have taken place all over the world, will be found to be extremely moderate.

(d) *Publication of Tariffs.*—It was represented before the Royal Commission on Shipping that many of the steamship companies refrained from publishing their tariffs of rates of freight, and a recommendation was made in the Report that this should be done in future. Since I became associated with the West African trade, a printed tariff containing the rates of freight has been drawn up and made available for all shippers.

(e) *Uniform Rules of Freight and equality of opportunity for large and small shippers.*—In the West African trade the rates of freight charged are exactly the same to all shippers, irrespective of the quantity of cargo shipped or controlled by them.

With regard to equality of opportunity for shipment, or, in other words, the allotment of space in the steamers, every endeavour is made to provide for the requirements of all shippers, large or small; but, since the war, with the reduced tonnage available, temporary difficulties have naturally sometimes arisen about the allotment of space in particular ships, and in these instances the principle followed has been, as far as practicable, to apportion the space to shippers *pro rata* to their average pre-war shipments over a period of twelve months.

(f) *Equality of Rates—United Kingdom and Continent.*—This raises the general question of the participation in the West African shipping trade of the German lines of steamers I have named, and of the former relations between the British and German shipowners. In regard to this, I may say that an agreement was made between the British and German lines in 1892, providing for equality in rates of freight, and subject to termination by mutual consent. While never formally terminated, this agreement had practically lapsed many years ago, and for a considerable period prior to the war only a general unwritten understanding was in force, concerning rates of freight and other cognate matters. Although differences and disputes arose from time to time as to the conduct of the trade, this understanding resulted generally in the arrangement of equal rates of freight and conditions as between British and Continental ports and West Africa.

I am not aware that the German steamship lines formerly engaged in the West African trade received any direct assistance from the Imperial German Government, in the form of subsidy or otherwise; but, as is well known, the German railways are owned by the State, and it was part of the policy of the German Government to encourage German overseas commerce in various ways by means of these railways. It is possible, therefore, that, through this channel, some advantages may have reached the German shipowners or shippers in the West African trade which were not enjoyed by their British rivals.

As will be observed from the statement of services I have submitted, the British lines, prior to the war, conducted regular services between Continental ports and West Africa, as well as to and from the United

Kingdom; but the German steamers did not carry cargo between West Africa and United Kingdom ports. This was part of our understanding, by reason of our having been engaged in the Continental West African trade before the German West African lines existed. For passengers, however, the German main line steamers formerly called at Southampton both out and home; and latterly they called at Dover outwards and Southampton homewards.

(g) *Cargo on Ship's Account.*—One of the complaints made before the Royal Commission on Shipping was that in the West African trade cargo had been carried on ship's account in competition with merchants' business. Recognising as I do that in a regular and well-organised trade it is not, under ordinary circumstances, desirable that the shipowner should encroach upon the province of the merchant, the practice of carrying ordinary cargo on ship's account has been carefully avoided since I became connected with the West African trade.

(h) *The Rebate System.*—This system has been in operation in the West African trade for many years. A percentage of 10 per cent. on the freight is credited to shippers as a return or commission, made up in six-monthly periods and payable at the end of a further period of six months, provided cargo has in the meantime been confined to the steamers of the regular lines. Exactly the same return was, according to our understanding, made by the German lines.

The measure of security thus afforded enables the shipowner to provide a specially equipped and constantly improving type of vessel, and in both good and bad times to carry out an elaborate itinerary according to a fixed time-table, serving the small ports as well as the larger ones. Merchants and shippers are further assured of stability in rates of freight according to a published tariff, which the Majority Report of the Royal Commission on Shipping describes as "a very important factor in the development of regular trades." Respecting the similar assurance of identical rates of freight to all shippers alike, the Report states:—"That the system has the effect of protecting 'the small man' is, we think, beyond doubt."

With regard to the rates of freight charged, it is, I think, obvious that the permanent interest in the trade of the regular steamship lines, together with the frequent and friendly discussions which take place between merchants and shipowners, form a safeguard against the imposition of unreasonable rates of freight; and there is always the possibility before the shipowners of competition from outside in the event of the trade being more than reasonably remunerative. A reference to the dividends paid over a number of years by the British steamship companies regularly engaged in the West African trade will suffice to show that the rates of freight charged by them have not provided the shareholders with more than a very moderate return upon their capital.

In a tramp trade, on the other hand, all the factors I have mentioned are uncertain and contingent upon changing circumstances. Tramp steamers seek cargo wherever trade is best at the moment, and follow the highest market in any part of the world; while they are under no obligation to study the special interests of any particular country. The supply of tramp tonnage is consequently irregular and spasmodic, and the rates vary from day to day; while the larger traders—by reason of the amount of cargo they can offer—would inevitably command preferential treatment as to rates and frequency of opportunity for shipment. The business, and possibly even the continued existence, of the smaller traders would thus become precarious; and the interests of the smaller ports would likewise suffer.

It is not necessary to go farther than the circumstances of the present war in order to estimate the effect upon a trade like that of West Africa of being dependent upon a tramp service, as—even had it been possible to secure anything like a sufficiency of tonnage, which is open to serious doubt—the rates which would have had to be paid, judged by the rates which have ruled in other parts of the world since the outbreak of

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war, would have been very much higher than those which have been charged by the regular West African lines, and possibly even prohibitive. A merchant has only to inquire on the market to-day for a steamer to load to or from West African ports in order to ascertain the extent to which the tariffs of the regular lines are below the open market rates.

While it is perhaps natural that some shippers should desire to enjoy all the advantages afforded by the regular lines, and at the same time to be perfectly free to avail of opportunities to support tramp steamers whenever the general state of trade makes it worth while for these to seek cargo in West Africa at low rates of freight, I submit that an unprejudiced examination of the question as a whole, must lead to the conclusion that to expect the enjoyment of the advantages of both these systems is unreasonable.

In past years this system of deferred rebates formed the subject of controversy, with the general course of which many members of the Committee will doubtless be familiar. After a very exhaustive investigation, however, by the Royal Commission already referred to, which was appointed more particularly to inquire into this matter, and into certain grievances which were said to exist under the system in particular trades, the majority of the Commissioners come to the conclusion, as expressed in their Report:—

“That if shipowners were forbidden to use any means to secure custom other than the excellence of their service, the maintenance of a service offering these advantages would become impracticable,” and

“The shipowners are justified in their contention that, in supplying the advantages required, it is essential for them to have some tie upon the shippers. The only tie brought to our notice in evidence which in our opinion would at the present day be effective both in binding the shippers and ensuring all the advantages of the Conference system in the degree in which they are now given, is the deferred rebate.”

In most of the great ocean-carrying trades of the world this system remains in force, and in my personal judgment is amply justified by results, when it is practised in such a manner as to secure the protection essential for a regular and highly specialised steamship service against the incursions of casual steamers, and at the same time consistently provides for the maintenance and development of the trade of the country where it is in operation. The advantages to which I have already drawn attention are all more or less bound up with, and are ensured by, the maintenance of the rebate system.

4. *Transit Options on Cargo.*—Before passing from this general resumé of the basis upon which the West Africa shipping trade is carried on, I may say a word or two with regard to the transit options which were allowed to shippers for many years. On homeward cargo, shippers to Liverpool have hitherto been given the option to declare, within four to ten days of landing, whether they would elect to have their cargo forwarded to another port, say, Hull or London, for which an extra charge, considerably less than the actual cost of on-carrying, was made. Shippers also had the benefit of the quay space rented by the steamship companies, pending the exercise of the options. Owing to the war, however, and the congestion of cargo at the port of Liverpool, which was augmented by the delay in removing goods on account of these options, it was found necessary to limit them in August 1914, but they were continued, as far as circumstances would allow, until found quite impracticable, and the options were withdrawn on the 7th May 1915.

5. *General Policy of British West African Shipping Companies.*—Apart from the particular considerations to which I have already referred, as to the conduct of the West African trade, I may add that in this trade (as in all others with which I am connected) it has been my consistent policy, and one continually impressed upon all the managers, to aim at harmonious working and cordial co-operation with all concerned in the trade, whether governments, merchants, shippers, or

traders. I fully recognise that it is in the vital interest of any shipping company to do all in its power to promote—by a broad-minded and far-sighted administration—the welfare and development of trade, if for no other reason than that the progress and prosperity of a shipping business are inextricably bound up with, and ultimately dependent upon, the progress and prosperity of the country or countries which it is its object to serve.

6. *British Shipping Companies and the Palm-Kernel Industry.*—The extent to which the primary article of export from West Africa, the palm kernel, was consigned to Germany rather than to the United Kingdom was a matter which for a very long time had been noted with concern by, and exercised the serious attention of, the British shipping interests, and various efforts have been made in the past in order to secure if possible, a larger share of the palm-kernel trade for this country. I will not elaborate at length what has been done, but may briefly mention the following:—

(a) *Erection of Mill for handling Palm Kernels.*—My predecessor, the late Sir Alfred Jones (who was for a quarter of a century head of Elder-Dempster & Company), with a view to leading the way in this matter, erected a mill in Liverpool in the year 1897, specially for crushing palm kernels, which I believe to have been one of the first of the kind to be established in this country. This milling business, which is known as the African Oil Mills Company, Limited, has a crushing capacity of about 30,000 tons per annum. It has experienced many difficulties and vicissitudes since its inception, more particularly in connection with the disposal of the cake and meal by-products, the greater proportion of which had to be exported to the Continent. It is at least probable, however, that the erection of this mill has had an influence in the direction of encouraging other milling companies in Great Britain to handle the palm kernel. Messrs. Elder Dempster & Company still retain an interest in this milling company, but as I am not directly connected with the business, or familiar with the details of its management, it will not be possible for me to answer questions in regard to its practical working.

(b) *Facilities for importing Palm Kernels to Hull.*—In order to provide the great oil-crushing district around Hull with opportunities for obtaining supplies of palm kernels on terms equal to those enjoyed by other centres, the British steamship companies made a special arrangement whereby, during the last three months of 1914, palm kernels were on-carried from Liverpool to Hull free of charge to the importer. Since January 1915 a direct service of steamers, West Africa to Hull, has been inaugurated and 13 vessels have already discharged cargoes of palm kernels at that port, charging exactly the same rate of freight as to Liverpool. This service will be continued according to the demand for direct shipment to Hull; and similar facilities will be afforded to other ports as circumstances require.

7. *Advantages in Transport enjoyed by German Importers.*—As I have already said, the rates of freight from West Africa to the United Kingdom and to Germany were on a parity prior to the war. In other matters of transport, however, the German importers possessed certain advantages over British importers, among which may be specified:—

(a) *Shipment in Bulk.*—By reason of the magnitude of the German imports of palm kernels, shipment of full cargoes, in bulk, was possible, thereby securing—

- (i) Lower cost of discharging, and more expeditious handling.
- (ii) Saving in cost of bags.

(b) *German and Dutch Waterways.*—securing—

- (i) Discharge into lighters and avoidance of quay dues, portorage, &c.
- (ii) Low cost of carriage from steamer to mills.

8. *Position of British Importers in relation to these advantages.*—It is quite practicable to ship palm kernels in bulk to United Kingdom ports, whenever

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sufficiently large quantities are forthcoming for one port of destination. Indeed, in the case of both Liverpool and Hull, large quantities of palm kernels, in bulk, have been discharged since the commencement of the war.

9. *Conclusion.*—To sum up, I have endeavoured to give an outline of the policy and methods adopted by the British steamship companies in carrying on the shipping trade of West Africa, in so far as these may have a bearing upon the questions which are under consideration by this Committee. It will be seen that, while, to the best of my knowledge and belief, the German importer of palm kernels had no advantage in ocean rates of freight over his British competitor, in other matters connected with the carriage of his raw materials the former possessed some substantial advantages. These advantages have undoubtedly contributed towards creating what the Chairman has described as the "vis inertia" of the situation, which must be overcome if the industry is to take permanent root in this country.

When the war is over, trade may be expected to return in course of time to normal conditions, and the British millers and manufacturers who have assisted their country and risked their capital in providing the special plant and machinery necessary for dealing with palm kernels and other West African produce, will then be exposed to unequal competition. It has to be borne in mind that there are sufficient mills in Germany to handle almost the entire output of these raw materials, and that these, having been erected for some time, will probably stand at very low values in the books of the various milling companies. Strenuous efforts will therefore be made, under advantageous circumstances, on the part of these companies to recapture the industry; and for these special reasons I have come to the conclusion that, in addition to the necessity for mutual co-operation in this matter between British merchants, millers, manufacturers, shipping companies and others interested, it will be essential, if success of a permanent character is to result from the efforts which have been and are being made, that Government assistance be given in order that the industry may obtain a firm footing in this country.

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APPENDIX I.

The services are altered from time to time to meet the general developments, but prior to the outbreak of

the war the following services were regularly maintained by us:—

From Liverpool:—

- (a) A weekly mail and passenger express service to Sierra Leone and the principal Gold Coast ports, and with mails, passengers, and cargo to Forcados and Calabar.
- (b) A fortnightly passenger and cargo service to Sierra Leone, the principal Gold Coast ports, Forcados, Akassa, Brass, Warri, and Sapele.
- (c) A fortnightly passenger and cargo service to Sierra Leone, Gold Coast, Calabar, Bonny, Okrika, Port Harcourt, and Opobo.
- (d) A fortnightly passenger and cargo service to Dakar, Bathurst, Sierra Leone, Liberian Coast, French Ivory Coast, and the smaller ports of the Gold Coast and Dahomey.
- (e) A monthly cargo service to Conakry, Sierra Leone, smaller Liberian ports, French Ivory Coast, and Gold Coast ports to Cape Coast Castle.
- (f) A monthly passenger and cargo service to Sierra Leone, Accra, and ports south of Calabar down to the Congo.

From London:—

- (g) A three-weekly service to Sierra Leone and Gold Coast and Nigerian ports to Calabar.

From the Continent:—

- (h) A service every 15 days from Hamburg and Rotterdam to Lagos and other Nigerian ports to Calabar.
- (j) A service every 15 days from Hamburg and Rotterdam to Sierra Leone, Gold Coast, Forcados, Warri, and Sapele.
- (k) A monthly service from Hamburg and Rotterdam to Bathurst, Conakry, Sierra Leone, French Ivory Coast, and the principal river ports in Nigeria.

From New York:—

- (l) A bi-monthly service from New York to all ports terminating at Calabar one month and South West African ports the next month.

In addition to these services about 30 steamers per annum were loaded with coal outwards and have been available homewards to deal with any pressure of cargo, e.g., timber during the timber season and palm kernels.

APPENDIX II.

TABLE A.

Rates of Freight from West Africa, 1905-1912.

Article.	Sierra Leone.	Axim, Seccondoo, and Accra.	Lagos.	Rivers.
	s. d.	s. d.	s. d.	s. d.
Palm kernels	21 6	32 6	30 0	21 3
Palm-kernel cake	No rate	No rate	No rate	No rate
Ground nuts (shelled)	45 0	45 0	45 0	40 0*
Shea nuts	21 6	32 6	30 0	21 3
Palm oil	32 6	43 6	40 0	27 6

* Reduced June 1909 to 30s.

NOTE.—The usual primage of 10 per cent. was added to these rates, and a rebate of 10 per cent. was made in respect of shipments of palm kernels, shea nuts, and palm oil.

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TABLE B.

Rates of Freight from West Africa, 1912 to 1st July 1915

Article.	Sierra Leone.		Axim, Secondee, and Accra.		Lagos.		Rivers.	
	s.	d.	s.	d.	s.	d.	s.	d.
Palm kernels - - - -	24	0	35	0	32	6*	23	6
Palm-kernel cake - - -	No rate		No rate		30	0	No rate	
Ground nuts (shelled) - - -	30	0	35	0	32	6*	32	6
Shea nuts - - - -	24	0	35	0	32	6*	23	6
Palm oil - - - -	35	0	47	6	45	0*	30	0

* Reduced by 2s. 6d. per ton January 1914.

NOTE.—The usual primage of 10 per cent. was added to these rates, and a rebate of 10 per cent. was made in all cases, though shelled ground nuts were included from 1st January 1914 only. These rates remained in force until 1st July 1915, when they were increased by 5s. per ton.

On 17th August 1914 a war surcharge of 25 per cent. was added to the freight, which was reduced on 5th September to 20 per cent., on 1st October to 15 per cent., and was again reduced on 17th December 1914 to 10 per cent.

TABLE C.

Rates of Freight from West Africa, 1st October 1915.

Article.	Sierra Leone.		Axim, Secondee, and Accra.		Lagos.		Rivers. 15 Feet Draught and over.		Shallow Rivers. Less than 15 Feet.						
	Rate per Ton of 40 Cubic Feet.	Or a Shippers' Option per Scale Ton of	Rate per Ton of 40 Cubic Feet.	Or at Shippers' Option per Scale Ton of	Rate per Ton of 40 Cubic Feet.	Or at Shippers' Option per Scale Ton of	Rate per Ton of 40 Cubic Feet.	Or at Shippers' Option per Scale Ton of	Rate per Ton of 40 Cubic Feet.	Or at Shippers' Option per Scale Ton of					
											s.	d.	Cwt.	s.	d.
Palm kernels - - - -	20	0	13	22	6	13	25	0	13	22	6	13	25	0	13
Palm-kernel cake - - -	20	0	17	22	6	17	25	0	17	22	6	17	25	0	17
Ground nuts (shelled) - - -	20	0	13	22	6	13	25	0	13	22	6	13	25	0	13
Shea nuts - - - -	20	0	13	22	6	13	25	0	13	22	6	13	25	0	13
Palm oil - - - -	29	0	14	31	6	14	34	0	14	30	0	14	31	6	14

NOTE.—The usual primage of 10 per cent. is added to these rates, and a rebate of 10 per cent. is made in all cases. They are also subject to the war surcharge of 10 per cent.

APPENDIX III.

STATEMENT SHOWING PERCENTAGES OF INCREASE IN WEST AFRICAN HOMEWARD RATES OF FREIGHT SINCE THE COMMENCEMENT OF THE WAR.

Article.	Pre-war Rate, 1st Aug. 1914.	Rate, 17th Aug. 1914.	Rate, 5th Sept. 1914.	Rate, 1st Oct. 1914.	Rate, 17th Dec. 1914.	Rate, 1st July 1915.	Rate, 1st Oct. 1915.	Increase per Cent. on Pre-war Rate.	Increase per Cent. on Pre-war Rate.	Increase per Cent. on Pre-war Rate.	Increase per Cent. on Pre-war Rate.	Increase per Cent. on Pre-war Rate.	Increase per Cent. on Pre-war Rate.
<i>Sierra Leone.</i>													
Palm kernels - - - -	s. d.	24 0	25	20	15	10	33	40					
Palm-kernel cake - - -	No rate.	—	—	—	—	—	—	—					
Ground nuts - - - -	30 0	25	20	15	10	28	12						
Shea nuts - - - -	24 0	25	20	15	10	33	40						
Palm oil - - - -	35 0	25	20	15	10	25	30						
<i>Axim, Secondee, and Accra.</i>													
Palm kernels - - - -	35 0	25	20	15	10	25	9						
Palm-kernel cake - - -	No rate.	—	—	—	—	—	—						
Ground nuts - - - -	35 0	25	20	15	10	25	9						
Shea nuts - - - -	35 0	25	20	15	10	25	9						
Palm oil - - - -	47 6	25	20	15	10	21	4						

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Article.	Pre-War Rate, 1st Aug. 1914.	Rate, 17th Aug. 1914.	Rate, 5th Sept. 1914.	Rate, 1st Oct. 1914.	Rate, 17th Dec. 1914.	Rate, 1st July 1915.	Rate, 1st Oct. 1915.
		Increase per Cent. on Pre-war Rate.	Increase per Cent. on Pre-war Rate.	Increase per Cent. on Pre-war Rate.	Increase per Cent. on Pre-war Rate.	Increase per Cent. on Pre-war Rate.	Increase per Cent. on Pre-war Rate.
<i>Lagos.</i>							
	<i>s. d.</i>	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Palm kernels - - -	30 0	25	20	15	10	28	41
Palm-kernel cake - -	30 0	25	20	15	10	28	8
Ground nuts - - -	30 0	25	20	15	10	28	41
Shea nuts - - -	30 0	25	20	15	10	28	41
Palm oil - - -	42 6	25	20	15	10	23	25
<i>Rivers, 15 feet and over.</i>							
Palm kernels - - -	23 6	25	20	15	10	33	62
Palm-kernel cake - -	No rate.	—	—	—	—	—	—
Ground nuts - - -	32 6	25	20	15	10	27	17
Shea nuts - - -	23 6	25	20	15	10	33	62
Palm oil - - -	30 0	25	20	15	10	28	57
<i>Shallow Rivers.</i>							
Palm kernels - - -	23 6	25	20	15	10	33	80
Palm-kernel cake - -	No rate.	—	—	—	—	—	—
Ground nuts - - -	32 6	25	20	15	10	27	30
Shea nuts - - -	23 6	25	20	15	10	33	80
Palm oil - - -	30 0	25	20	15	10	28	65

5887. (*Chairman.*) We understand from your précis that you are chairman and managing director of Elder Dempster and Company, Limited, apart from your other shipping interests.—Yes.

5888. I myself have comparatively few questions to ask you, but no doubt other members of the Committee will have a number of other matters to put to you on which they have more detailed knowledge than I. I want to ask you about some of the more general remarks which you place at the end of your précis. On page 8, under the heading "Facilities for importing palm kernels to Hull," you say that "palm kernels" were on-carried from Liverpool to Hull, free of charge to the importer. Since January 1915, a "direct service of steamers, West Africa to Hull, has been inaugurated." Of course, we cannot ask you to bind yourself in any way, but if the trade warrants it, would there be any expectation that that would be continued?—It will certainly be continued under all circumstances if sufficient cargo is offering to justify continuation, and even if there is not sufficient cargo to justify the service directly to Hull it might be combined with the London service. From all that I can gather, I feel that there will be sufficient demand for cargo to Hull to justify the continuation of the service after the war.

5889. Supposing the industry with regard to kernels in this country develops considerably—not merely to Hull, but take a port like London, or possibly a port like Bristol—would it be possible either to have a service to those places if there is a considerable trade, or to combine it with some farther port?—Yes. If the trade developed to the Bristol Channel (say, Avonmouth, where there is plenty of water), if there was not sufficient cargo to justify a regular service of itself it could be combined with Liverpool. We have always had a regular service out from London, and the difficulty in the past has been that there were no crushing mills in London to deal with the nuts. I may mention that I myself went into the question of erecting mills in London about two years ago on behalf of Elder Dempster and Company, because nobody else had done so, and I got as far as choosing our site and making all the preliminary arrangements, and it simply stopped because at that time the competition from Germany was so severe that the palm-kernel crushing industry in this country was from our own experience losing heavily.

5890. You made these inquiries with a view to the palm-kernel industry?—Yes.

5891. With your experience, would you say that the prospect of the continued demand for palm kernels is so assured that at any rate it is reasonable to expect that the trade will continue in the same bulk from West Africa, or will there be competitors? What do you think of the fear of possible competitors?—I think the palm-kernel trade will continue from West Africa in steadily increasing bulk. I think it will get bigger as time goes on, and very considerably bigger, but whether that trade will come to the Continent or here I do not know. I think that very largely it will revert to the Continent after the war.

5892. I am asking whether that trade is likely to continue, at any rate on an assured basis. When you were thinking of putting up mills, did you make any inquiries about the possibility of such a development of the trade in copra as to damage palm kernels?—I have watched the copra trade for many years, and know how it has been developed, but I have always been of opinion that there was a sufficient demand for the products of both, and that copra would not knock out palm kernels. That is the view that I hold.

5893. There is one point which is actually not in your précis, but which joins on to what follows, and I should like your opinion upon it. You not only carry the palm kernels home, but to a large extent you carry our export trade to West Africa?—Yes.

5894. In your experience, how far do the two go together? That is to say, if the import trade in kernels goes to a given country, to what degree does that benefit the export of goods from that particular country? There are goods, no doubt, carried from England *via* Hamburg to West Africa, but how far does an importer to a given country benefit an export trade in goods from that country?—It is a very intricate question.

5895. Does your experience lead you to any conclusion?—No, I would not like to be dogmatic about that, but anything that is exported has to be paid for, and the natural way of paying for it is to import from the country to which you export. The fact that more of the outward trade is in the hands of British merchants tends to bring trade here, but does not necessarily bring it here if there is a better market for the commodity elsewhere.

5896. Let me put it the other way round. You

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say that exports have to be paid for by imports, but it is equally true that imports have to be paid for by exports?—Yes.

5897. Therefore the more of the import trade which goes, shall we say, to Germany the greater the proportion of German made exports that go to West Africa. Would you say that that follows?—Certainly.

5898. Even though there is a little diverted from England through Hamburg?—Yes.

5899. As you know, on this Committee, we have had a great deal of statement, but no proof, as to greater advantages given by German shipping companies to German importers. I do not want to press you upon it if it is a question that you do not think you can answer, but have you any information which would enlighten the Committee on that score?—Allegations of this character have been made from time to time, but, as you say, and to my knowledge, they have never been proved. I do not believe that there have been any secret rebates from the German shipping companies—I mean as a general rule.

5900. It has been stated to me privately that advantages could be given in a method such as the following: that, the same bank that might stand behind a shipping company would also make advances to merchants and would be more free with those facilities given to merchants if the shipments were made by a given shipping company. Do you know if there is likely to be any foundation for that?—I do know that big German banks help German traders in a way that has never been customary in recent years in this country. I mean from all one hears the German banks assist trading concerns over and above what in England would be considered strict banking business.

5901. Do you know if, without making any strict condition, they exercise an influence in favour of German shipping lines?—I have not actually come across anything of that kind.

5902. With regard to shipment in bulk, which you mention in your précis, such shipment is, of course, from the same ports as shipments are made to the United Kingdom?—Yes.

5903. Therefore if shipment in bulk is made to Germany there is no objection, either because of terminal facilities or otherwise, against such shipments being made to the United Kingdom just as to Germany?—No, the only reason that shipments in bulk were not made to the United Kingdom was because palm kernels did not come here in great quantities.

5904. Is it not also because of the discharge? Is it possible to get over that question of the cost of discharge? Let me ask you with regard to Liverpool: If there is a smaller charge made at Hamburg the money must come from someone; it does not come like manna from Heaven, and therefore it has to be raised somehow, if it is not made as a charge. How is it collected in Hamburg or provided for?—The actual charges I think you have had already.

5905. We have a statement of the amount of the charges. It is quite clear that less charges are made in Hamburg than are made in Liverpool. But on the other hand, if money is not provided in that way in Hamburg, it has to be got by the port authorities somehow. It is difficult to see how the port authority can get it without it being a charge upon the industry through some method or other. Therefore is the industry of importing really benefited in Hamburg as distinct from Liverpool?—Yes, I think this particular industry is benefited as against Liverpool. Whether the port of Hamburg obtains the necessary revenue from the municipality of Hamburg, and whether it is altogether part of the town's revenues is a point that I am not personally conversant with; but at one time, you will remember, it was even proposed that the Port of London should be taken over by the County Council, and my impression is that the town and the port at Hamburg have some connection.

5906. If these other charges are paid from the general revenues of the town they are really obtained by rates, or whatever the German equivalent is, and therefore if not in the whole, at any rate in part, they

come back upon the industry?—Very indirectly on this particular industry.

5907. As regards the question of internal waterways, discharge into lighters, the avoidance of quay dues and portage, and the low cost of carriage from steamer to mill, they will be overcome, if mills and margarine factories, too, are established near the coast in England?—Yes, if established where either the steamer can go alongside the mill or barges can bring the goods from the steamer to the factory.

5908. Therefore, subject to certain charges which may differ in each case either to the Maypole Dairy Company or Messrs. Lever, or perhaps the new proposed mills of Messrs. Jurgens, those being all comparatively near the coast, and with water carriage, that discrimination against us is likely to diminish or disappear?—Yes, I think it will distinctly diminish if not disappear.

5909. Would you put the existence of the Hamburg market in palm kernels as distinct from the absence of such a market in England as a factor of great importance?—I think it is of considerable importance. A very small amount in the cost makes all the difference. The crusher works on a very small margin in normal peace times.

5910. These previous advantages taken together have really in your opinion tended towards the prevention of the establishment of the industry in this country?—Yes.

5911. I see at the end of your précis you come to the conclusion that some form of Government assistance should be given. Have you any particular idea as to what form of Government assistance should be given?—I have come to the conclusion that it will want some form of Government assistance to bring the industry here in the first instance. At present there are all these mills on the Continent, and after the war they will be run probably very cheaply, and I think to establish the industry here requires some definite Government assistance.

5912. In your opinion is that to overcome what I see you call the *vis inertiv* of the situation, or is it to set off a sort of permanent drawback. It makes a difference which it is, does it not?—If the trade was once established here there might or might not be the same need for assistance. It is rather difficult to say, but I feel that you want to do something to get the trade here.

5913. That brings me to the point that I want to put to you. Supposing that at the end of the war the margarine trade in this country had not been greatly developed, do you think there might be need for such assistance in one form or another?—That is my impression.

5914. On the other hand, supposing through circumstances possibly connected with the war it does get established here in the meantime, then the need for such assistance is diminished?—It is certainly diminished.

5915. Because once here as a going concern it is much more likely to keep going?—Much more likely.

5916. Would you place in the first rank of importance the question of margarine?—Yes. I think to get the margarine made here is the absolute crux of the whole situation.

5917. Perhaps you heard the question that I put to Dr. Henry a little while ago, that it has been suggested that one reason why it is not the crux of the situation is that these edible oils might very soon have some different use found for them. I can quite well imagine that while they were used for soap making the possibility of their use for edible purposes, for lard or margarine, was a thing of the future. Do you know of any other competitive use that could be found for them in bulk?—I cannot conceive of any new use that could be found for such large quantities that would be more valuable than edible purposes. For the quantity which is produced by West Africa I cannot imagine a use that could afford to pay a higher price than for these edible purposes.

5918. (*Mr. C. C. Knowles.*) You have dealt so fully with the matter in your memorandum, Sir Owen, that I have hardly a question to ask, especially after listening

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to the questions put by the Chairman. Just in a general way I think you will agree that the great thing for us to do here as crushers is to try to be able to crush as cheaply as the Germans?—Yes.

5919. That should be our first consideration?—Yes.

5920. We have heard of Messrs. Jurgens putting a mill alongside the water. It has always been our intention, and still is our intention, to put a large mill alongside the water, our principal reason being that we can have steamer cargoes in bulk alongside the mill, so that an elevator can be put down in the same way as in wheat ships and grain ships, and the cargo can be all pumped up very quickly. That, I think you will agree, would be a very great saving over the present way of handling the cargo?—A great saving.

5921. How much per ton do you think that would save?—It depends whether the facilities are also given in West Africa. To a steamer time is money. Any modern arrangements which enable a steamer to be loaded quickly and discharged quickly are worth money, because every hour that a steamer occupies anywhere means money.

5922. You do bring some cargoes in bulk to ports like Hull and even to Liverpool?—Yes.

5923. In the case of a 3,000-ton steamer, how long would it take to discharge in the ordinary way at Liverpool?—They all come in with miscellaneous cargoes, and it is very difficult to answer a question like that in a way which would not be misleading.

5924. (Chairman.) It really depends on the nature of the cargo and the sub-divisions of it?—Yes.

5925. (Mr. C. C. Knowles.) I am supposing that the cargo was all palm kernels in bulk to Liverpool, and you had to deal with it on the quay. Take it that the African Oil Mills wanted the kernels, and you had to deal with the cargo on the quays in Liverpool in the usual way, how long do you think it would take you to clear that steamer?—You want to know what is the saving by discharging entirely by elevator?

5926. Yes, right alongside the mill.—I take it you could discharge with a good elevator in forty-eight hours or twenty-four hours.

5927. In twenty-four hours you could do it very easily; perhaps you could do it in less?—I have a coal wharf on the Thames which will discharge a cargo of coal in sixteen hours.

5928. (Sir George Fiddes.) Sixteen hours actual working, or is it sixteen hours from start to finish?—We always go straight ahead to the finish. It lifts out 2½ tons of coal at every grab.

5929. (Mr. C. C. Knowles.) It might be possible to discharge that cargo of 3,000 tons in twelve hours with a very up-to-date grain elevator. If arrangements could be made to put cargo into the ship on the coast in about twenty-four hours there would be a tremendous saving?—There would be a large saving.

5930. A saving that might come to 10s. a ton?—I would not like to go into the actual figure, but it will be a large saving. I think that it is well worth while at one or two or possibly three places on the coast to have elevators erected, but if elevators are erected it is absolutely essential, in my opinion, that the trade shall grade the kernels; in other words mix the kernels so as to have them going in and coming out in a continuous run.

5931. I agree, and I think there would be no difficulty at all, certainly at a place like Lagos. Any way, you say there is no doubt that there would be a very great saving?—There would be a great saving.

5932. I think we have heard in evidence that in normal pre-war times the crusher would be quite satisfied with half-a-crown or 5s. a ton profit?—Amplly satisfied, I should think.

5933. That is to say, the saving in dealing with the loading and unloading of cargoes might go a long way towards making him that profit?—You are assuming that Germany would not at once do exactly the same. If we erected elevators on the coast the German ships going to Germany would have exactly the same advantage and therefore the crusher would have no advantage.

29720

5934. No. The German mills to-day are already erected, and I do not think they would be likely to erect new mills, but we in this country are trying to bring the industry here more than it has ever been here before. Jurgens propose, as the Chairman has told us, to erect a mill right alongside the water to which they could have a ship brought. We propose to erect a mill at Bromborough port where we can take a ship alongside. We feel that there would be a very great saving in elevating the kernels into the mill?—I am strongly in favour of the erection of elevators, and I think it will lead to a considerable saving; but I do not agree that that saving would benefit the crusher in this country as against the crusher in Germany, because I feel quite certain that the German would get exactly the same benefit.

5935. Not on this side. If he has not got an elevator system at his mills in Germany to-day and if the mills are not alongside the water he could not get the same system as we should get if we built new mills alongside the water with an elevator.—I understand the whole point is that all the German and Dutch mills have the advantage of water transit. They are so situated that that is one of the great advantages they have.

5936. Yes, but they do not take the steamers right alongside their mills.—Even when the steamer does not go alongside the mills the actual cost of discharge into lighters which go alongside is very small. For instance, the cost from Hull to Selby is only 1s. 3d. in this country, while in Germany it is probably nearer 6d. or 9d.; so I do not agree that what you propose is going to be a great saving for the mills in this country in competition with the mills in Germany.

5937. But the mills at present handle their cargoes in a different way and if the Germans have hitherto handled their cargoes as you say they have done, then to get on a par with them we must handle our cargoes in the same way or better. What I suggest is to handle them in the same way or better. Do you agree that that would go a long way to help us?—It would go a long way to help you.

5938. I believe there are a certain number of ships that run between this country and West Africa. Horts have or did have three steamers until the Government took one away?—Yes.

5939. The Niger Company have a certain number of steamers?—Not between this country and West Africa.

5940. They may come to Liverpool or go to Rotterdam, I thought they had steamers.—No.

5941. They charter steamers occasionally?—Occasionally.

5942. I have suggested in some of my questions to previous witnesses that if a line—whether run by Messrs. Elder Dempster and Company or anyone else—of suitable cargo steamers, properly ventilated and so on, were run between this country and West Africa, and there were no passengers, it could be run cheaper and a lower freight given to the merchants.—Personally, I do not think so. When West Africa has developed so that you can load a full cargo at one port and a full cargo at another port suitable for a tramp steamer, then of course, the position will be slightly altered.

5943. I take it that Messrs. Holt have made their steamers pay. They take no passengers, do they?—I have not actually seen their steamers, but I believe they are fitted for a few passengers.

(Mr. T. Walkden.) Yes, they take their own men.

(Mr. C. C. Knowles.) But it is not a general passenger service. I am only trying to see some other way of saving the cost in freight so as to help us to bring the trade here. Of course, I am quite ignorant of anything to do with shipping.

5944. (Mr. T. Worthington.) I see you control 295 steamers with, I think, a capital of something like ten millions sterling. Are there any other steamers besides Messrs. Holt's in the trade between England and West Africa; that is to say, are there any running now?—There are none running at the moment.

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5945. Were there any other British steamers before the war besides your line?—There were no other British steamers.

5946. So that you had complete control?—There were German lines.

5947. I see you give a very good defence of the rebate system in your précis; but the Union-Castle Line, which I think I am right in saying now runs to the south and east coasts of Africa, do not have any rebate system.—I am chairman of the Union-Castle Line, and therefore of course I am fully conversant with the facts. In South Africa the circumstances are entirely exceptional: certain grievances existed in the trade and for many years there was an agitation carried on by a section of the community who believed that the abolition of rebates would secure everything they desired. I think probably it was partly inspired by personal feelings against the late Sir Donald Currie, who was, as you probably know, a very strong personality out there. Ultimately the South African Government passed a law making rebates illegal, and, as a result, when I became chairman of the Union-Castle Company, I went out to South Africa and accepted a new mail contract on the basis that the Government desired. The South African merchants were so anxious to avoid the loss of the advantages secured under the rebate system that they proposed to the shipping companies a mutual arrangement to ensure stability in the trade. As a result a form of contract was agreed upon by which the shipping companies promised to provide all the advantages formerly enjoyed under the rebate system in return for the merchants' entire support. Nearly 100 per cent. of the merchants signed that contract.

5948. My attention was called to it because I understood the other day in conversation that on the east coast of Africa there was a merchant who had nuts of some kind—ground nuts I think—shipped as a direct cargo and he did not lose his rebates by doing so.—What was the port?

5949. Quillimane.—Is this during the war?

5950. Yes, it is quite recently.—I do not know the actual circumstances. There is a rebate on the East African service.

5951. That was an advantageous position to be in, if a man could in case of need charter a steamer for a special cargo from one port?—There must have been some special circumstances on account of the war; but the rebate applies to East African ports.

5952. No doubt you have complete lists of shippers both to West Africa and homeward?—Yes.

5953. Have you any idea of the total number of merchants and shippers altogether on the coast?—I could not give it off-hand.

5954. There are several hundreds of them, I suppose?—The number of large shippers in West Africa is comparatively small.

5955. Still there would be ten or a dozen of those?—Yes, more than that.

5956-7. And a lot of small ones?—A good many small ones, but not as many small ones as there are in some other trades.

After a short adjournment.

5958. (Sir W. G. Watson.) I understand that we shall have the privilege of getting palm kernels to London at the same, or at not worse rates than to Liverpool probably?—Yes, certainly.

5959. With regard to the Gambia, I do not think you have any sailings from the Gambia to London?—Up to the time of the war practically the only nuts exported from the Gambia were ground nuts, and up to that time ground nuts all went to Marseilles; so that really between the Gambia and an English port there was no call for a regular service. Since the war of course, the ground nuts have been coming to England.

5960. The reason why I asked that question was because we have chartered a few vessels from the Gambia to London, and I just wondered whether that would affect our rebates with regard to palm kernels from West Africa to London?—No.

5961. With regard to the rebates, how long do you keep these rebates in hand. Is it for twelve or for six

months?—The rebate circular provides for a return of 10 per cent. every six months, but it is not paid until the end of the following six months, and it does not become due unless the shipper has supported the regular lines during the whole period.

5962. (Sir G. Fildes.) In other words, it affects a year's transactions between the merchant and the shipowner?—Yes; a year is the longest term—it is an average of nine months.

5963. (Sir W. G. Watson.) Some of the large factories in Harburg are beside the main river. Do the ships go right up the river as far as Harburg or do they stop at Hamburg?—Our ships never actually went there. We ran a regular service to Germany, but our ships went to Hamburg and we always used to tranship on to Harburg. I do not actually know whether the German ships went up to the wharf or did it the same as we did. I think they did it mostly by transhipment.

5964. In any case they are rather large barges that are used up to Harburg?—Yes.

5965. So far as the rates and conditions are concerned, London will be in all respects the same as Liverpool, Hull, or Bristol?—It will be put on exactly the same footing.

5966. Would those firms that have facilities for unloading very quickly alongside their own mills get any advantage by reason of that as compared with a firm who had to unload on to the quay?—Up to the present time no such conditions have arisen, when they do arise they will have to be considered.

5967. You will probably give special consideration if a firm undertakes to unload a vessel in a very short time?—I have already explained to a member of the Committee that the whole essence of steamship owning is to get your steamers round quickly and, therefore, any step that anyone takes that will enable steamers to be turned round more quickly naturally is an advantage, and it will have to be considered by the shipowner, no doubt, with the people concerned.

5968. I think from Liverpool you generally get the West African return cargoes. Do you get any return cargoes from London?—Yes, we get return cargoes from London, but curiously enough from London up to the present time most of the cargo is rather rough, that is to say, there is more "rough" carrying from London than from Liverpool; although in nearly every other trade exactly the reverse is the case. I am speaking generally; I have not any actual figures here.

5969. I suppose London in any case is quite as good as or better than Hull for return cargoes. Hull has practically no return cargoes, I believe?—Up to the time of the war there was practically no return cargo from West Africa to either London or Hull, with very few exceptions.

5970. (Mr. T. Wiles.) What is the return cargo?—I mean the cargo back to England.

5971. (Sir W. G. Watson.) But you would get more cargo from London to West Africa than from Hull to West Africa?—Yes. There have been a good many questions on the subject of rebates and bearing on one that Sir George Watson asked just now, may I put in a list of the transit options and the prices charged by our steamers and also by the German steamers. (The list was handed in.) The transit options on palm kernels were granted at extra freights as under: *via* Liverpool from Sierra Leone and Lagos to Rotterdam, 7s.; Bremen, 7s.; Antwerp, 7s.; Amsterdam, 7s.; and London, 7s.; or from the rivers *via* Liverpool, 6s. 3d. to all those places; from other West African ports free, and I think the explanation of that is that practically no palm kernels came. To Hamburg *via* Liverpool, 7s. extra; Hull, 7s.; Bristol, 7s.; or from the rivers 6s. 3d. *via* Liverpool, to Hamburg, Hull, or Bristol. Then *via* Hamburg from all the ports to Rotterdam and Bremen they had an option of sending it on free. To Antwerp 7s. extra, or from the rivers 6s. 3d., and from other ports free. Amsterdam, London, and Flensburg were all in the same position, 7s., and 6s. 3d. from the rivers, and from other ports

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free. To Petrograd (which was quoted by one witness) it is 7s. 6d. from all ports *via* Hamburg. The English line quoted exactly the same optional charges as the Germans because we run a service also to Germany.

5972. (*Sir G. Fiddes.*) Does that mean that for 2s. 6d. extra you could have the cargo carried on from Hamburg to Petrograd?—No, it is 7s. 6d. extra.

5973. Somebody told us at an earlier stage that it was 2s. 6d.—Yes, I mentioned that it was wrong; he had the facts wrong.

5974. (*Sir W. G. Watson.*) But to Rotterdam and to Bremen it was absolutely free?—*Via* Hamburg to Rotterdam and Bremen it was free.

5975. That gives the advantage to Hamburg, or rather to Rotterdam and Bremen?—The reason that Rotterdam and Bremen are free is that the German ships could quite conveniently call at Rotterdam, and drop the kernels on the way, while the Bremen-owned steamers went on to Bremen and made that the last port. Therefore, as the English line was running alongside of them, when we did not go into these ports, but found for our own convenience and for economy it was cheaper to go into Hamburg, we gave the same privileges to the merchants who shipped by us as if they had shipped by the German lines.

5976. (*Sir G. Fiddes.*) When did the shipper have to declare his option—after arrival?—Within four to six days after arrival in Liverpool.

5977. And similarly with regard to Hamburg?—Yes, either four or six days.

5978. (*Mr. G. A. Moore.*) You have given us a very full account, from your point of view, of the rebate system, and shown incidentally the enormous advantages that the steamship companies derive from this rebate system in having the sole control practically of the trade. You put down as one of the advantages to the shipper the fact that you are able to keep up a regular service of steamers. But is it not the fact that we had that regular service of steamers by two lines for a long period before the rebate system was introduced?—Your knowledge of the West African trade goes back many years further than mine. All I can inform the Committee upon is what is within my knowledge, and that is that the rebate system has been in force in the West African trade for a great many years.

5979. But surely you are aware that the African Steamship Company and the British and African Steamship Company did serve the whole of West Africa for a large number of years under Messrs. Elder Dempster and under the African Steamship Company as separate companies without any rebate system?—It is a fact that the African Steamship Company has been serving West Africa since the year 1852 and the British and African Steam Navigation Company since the year 1866. I also know, as I have already mentioned, that it is a great many years since the rebate system was established in West Africa.

5980. It did not exist before Sir Alfred Jones's time?—I do not know the date, so that I cannot give it, but I know it is a great many years ago.

5981. Has it ever occurred to you that this measure of security, which is really a very valuable asset to the shipowner and which is the result of this rebate system, would be a very great advantage to the merchant if similar stability could be introduced into his business. In other words, would you be in favour of an arrangement of this kind: Supposing we as shippers were to waive our right to the return of this 10 per cent. primage in case you did not accept any shipments from any but the regular shippers, that is a mutual obligation on your part not to receive shipments from anybody else?—I think the only justification, or the justification for the whole policy of the regular lines is the fact that they give equal treatment to all. I am afraid that such a proposal as you put forward would hardly be in accordance with that broad principle which I personally have always stood out for.

5982. Then a monopoly is not a monopoly when it is held by the steamships, but becomes a monopoly if it is an arrangement with the merchants?

(*Sir George Fiddes.*) Do you not think that if you go into an abstract question of this kind, it is

travelling rather outside the reference to the Committee?

(*Mr. G. A. Moore.*) The point is this: The rebate system has a certain amount to be said for it on the one side and on the other, and certainly a good deal against it; and I think, having regard to the very elaborate defence which Sir Owen has put in, that it is only fair we should be able to bring out what appears to us to be the way in which it operates unfairly as against the merchant. One point which I consider is important is the fact that while it creates a monopoly on behalf of the steamship company there is no such reciprocal advantage to the merchant.

(*Sir G. Fiddes.*) If you are going to suggest that it will promote the development of the palm-kernel industry, if Sir Owen agrees to an arrangement such as you have just outlined on behalf of the shipper, I quite agree your question is in order; but unless you connect it in some way with the scope of our enquiry, you are travelling rather outside it if you endeavour across this table to induce Sir Owen to enter into an arrangement to ship nobody's goods but your own and your fellow merchants'.

5983. (*Mr. G. A. Moore.*) I was going to follow that up by asking Sir Owen this question. Inasmuch as this stability of the business brought about by means of this rebate system enables him to provide a specially equipped and constantly improving type of vessel, if this stability were given to the merchants' business would not it lead (as I believe it would) to a rapid and much more systematic development on the part of the merchants of the colonies, to the advantage of those colonies—an advantage which would be comparable in every way to the advantage claimed by the steamship owners?—In reply to that, I certainly believe that anything which enables a merchant to make a reasonable profit does tend to the general development of the trade of the Colonies.

5984. The effect of this rebate system, as you have pointed out, is that it enables you to give the same rates and the same treatment to all the shippers. In the case of West Africa, that amounts to this: that you are able to stop at a very small port and pick up perhaps 10 bags of kernels and take them at the same rate (which is really an absolute loss to the steamer by stopping and picking up this small lot of kernels) as you charge the man who ships, say, 500 tons. Do you consider that that does not penalise the man who ships 500 tons in favour of the man who ships 10 bags?—One of the great difficulties of the West African trade is this enormous number of ports. In the past the good ports have undoubtedly to a certain extent suffered, as you indicate, by average rates over all the ports. The Committee may be interested to know that on the 1st of October last, under the new tariff, we have taken a step in the direction of assisting the good ports and differentiating in their favour as against the worst ports.

5985. (*Sir G. Fiddes.*) They are worse ports from the steamer's point of view, I suppose you mean?—It practically means the trade point of view. It is the steamer's point of view as to a port.

5986. (*Mr. T. Wiles.*) Is it the quantity or is it the difficulty of navigation?—It is both.

5987. (*Sir G. Fiddes.*) It is the steamer's point of view in either case?—Yes, in either case. For instance, for the first time steamship lines have differentiated between what are known as the "Oil Rivers," and we have put them in two classes—the deep river, which we consider deep if over 15 feet, and the shallow river which is under 15 feet. We have given the river over 15 feet of draft 2s. 6d. advantage in freight over the shallow river. Also we have given the railway ports of Sekondi and Accra an advantage over the other ports on that coast; and to the two other best ports we have given a 5s. advantage over the more difficult ports. The steamship lines hope in the future, as West Africa gets developed, that they may from time to time improve the position of the good ports.

5988. (*Mr. G. A. Moore.*) We were talking of elevators in Africa this morning. Is it not patent that if anything of the kind were to be erected and necessary

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arrangements made by merchants, some very considerable inducements would have to be given to them—more than 2s. 6d. a ton—in order to compensate them for the expense which they would be put to to give you quick despatch?—I agree that the whole question bristles with difficulty, but I think that the places where it may in the not very distant future be possible to erect elevators, to the advantage of all concerned, are at the railway terminals where the goods of all merchants have to arrive by railway.

5989. At the same time you agree with the point brought out by a previous witness that, except in a reduction of rate, there is no apparent advantage in these elevators to the merchant?—I can see an advantage if it avoids the cost of bagging.

5990. But we do that already in many cases. The actual delivery of the kernels at the elevator and collecting them in the elevator would put the merchants to a greater expense than at present and that expense would have to come out of the freight and something besides. That is the point.—I quite appreciate that the whole question presents great difficulties, and the principal advantage in the erection of an elevator, or the greater advantage, in my opinion, would be to shipping, and therefore to the steamship companies.

5991. I take it that you are not altogether prepared to defend as a principle or as the best possible arrangement the fact that the cheap ports are at present paying for the more expensive and more difficult ports to work?—As a principle it would be very hard to defend. I think it is very desirable, however, in the interests of the trade of West Africa, and very important, that at this stage of West African development the small ports should be properly served with tonnage.

5992. Another effect of the rebate system is that it not only keeps out a tramp service, but it is also effective in keeping out any other line of steamers. Further it is also effective in preventing individual merchants undertaking the ownership of steamers for their own cargoes.—In the whole history of steamship owning I do not think there has been a single case of the rebate system ever stopping any new line from starting, provided the owners of the steamers who wished to come into the trade had sufficient steamers to carry on business. With reference to the other part of your question about the merchants owning steamers, I would like to inform the Committee that when I became chairman of Elder Dempster and Company I had strong pressure put upon me by the trade to be no longer connected with merchants' business. Sir Alfred Jones was interested in a merchant's business. At the request of the trade we sold that merchant's business to the West African trade. Therefore, if the shipowner should not carry on trade, it appears to me it ought to work both ways to the benefit of everybody.

5993. Is it not a fact that when the rebate system has been prevented or stopped by legislation, the thing has been got over by an agreement by which the shippers bind themselves to ship solely by the conference lines, and if they break that agreement, they are charged a higher freight?—I have explained previously to a member of the Committee exactly what happened in the one case that I have had to do with, that is in South Africa. I do not think I can do better than put in a copy of the agreement which was entered into by the six lines engaged in the South African trade.

5994. (*Mr. T. Wiles.*) Was that agreement entered into at the suggestion of the merchants?—Yes.

5995. (*Mr. G. A. Moore.*) They charge an extra freight. Is not that the only point? I mention this because I saw an agreement the other day to that effect?—I have the agreement here, but there is no extra freight. The consideration in the agreement is that we undertake to carry the merchants' cargo.

5996. If after signing that agreement they ship by an outside steamer, what happens? If they break the agreement, what happens?—What happens generally when you break an agreement?

5997. What is the penalty? Do you refuse their cargo or do you charge them an extra rate in future?—It is two years since I made the agreement, and I do not think there is a penalty in it.

5998. (*Sir G. Fiddes.*) Perhaps you can tell us what happens in South Africa if the shipper breaks his agreement?—In South Africa our shippers do not break their agreements.

5999. The case has never arisen?—That is so.

6000. (*Mr. T. Wiles.*) It is rather interesting. If that is the answer, that the shippers never break the agreement, that would be quite enough for me.—That is so.

6001. (*Mr. G. A. Moore.*) You mention in your précis that the principle followed as far as practicable since the war, has been to apportion the space to shippers *pro rata* to their average pre-war shipments over a period of twelve months. I think that arrangement was really suggested and brought about by the merchants. Is that not so?—Yes. In the West African trade there is a very excellent practice. In addition to meeting quarterly at the Colonial Office to deal with Colonial questions, there are also constant meetings between the West African merchants and the steamship lines, and early in the war, when there was a difficulty about homeward cargo, the West African merchants had a meeting with us on the point, and that which I describe in my précis was the best solution at the time.

6002. As a matter of fact, over the whole of Nigeria the merchants themselves have arranged what those proportions are?—I did not know that.

6003. You have been asked a good many questions about the effect of freights outward and homewards to different parts, and the Chairman this morning asked you some questions about the effect of outward cargo from Hamburg. There is one point I want to bring out and that is that when kernels are shipped to Hamburg it does not follow that Germany must ship the value of those kernels back to West Africa, because the proceeds of the kernels are often remitted to England and therefore Germany can pay for those palm kernels by shipment to England.—For instance, sugar.

6004. Yes, anything of that kind. That is rather an important point in connection with the question which the Chairman put this morning. But there is also this, that if we could manage to divert the outward cargo, in the shape of spirits, from Germany to this country we should go a long way towards making it more difficult for the Germans to get cargoes of palm kernels to their ports.—It is very important, and if it could be brought about it would be a very great advantage.

6005. It is a general fact throughout the shipping world that the cheapest freights exist to the port which has the return cargo?—That is a broad general principle.

6006. You mention in your précis that the African Oil Mill was the first of its kind?—I said I believed it to have been "one of the first of the kind."

6007. I am not sure whether you mean the first of its kind so far as its machinery is concerned, or the first to crush kernels.—What I meant was that almost any crushing mill can crush kernels. The point is that they cannot take out all or enough of the oil, and therefore it is only specially constructed machinery that can economically crush kernels. I believe this mill erected by Sir Alfred Jones, in an endeavour to bring trade to this country and also to get cargo for his steamers, to have been one of the first of its kind to have special machinery for getting out the maximum quantity of oil by expression.

6008. Is it then a piece of history with which you are not acquainted that Messrs. James Samuelson and Messrs. A. M. Smith and Company crushed palm kernels as their main business for a great many years prior to the erection of the African Oil Mills?—I was not aware of that.

6009. As a matter of fact it was when they were pushed out of the trade by Hamburg that Sir Alfred

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Jones erected this mill in order to try and retain in Liverpool a certain proportion of the palm kernels.—I was not aware of those facts.

6010. Mr. McConman, the manager of the African Oil Mills, has told me that the great difficulty they have to contend with is to get rid of the cake and meal. You practically endorse that?—I am not personally connected with the working of the oil mills or with the company, but I see Mr. McConman fairly often, and the difficulty has been in getting rid of the cake and meal.

6011. And not the oil?—The oil was not the difficulty. In the first instance the best market they had for the meal was the Co-operative Butter factories in the North of Ireland, which used it for feeding the pigs with the skim milk; they were a regular market for the meal.

6012. You give certain reasons in paragraph 7 of your précis for the advantages derived in shipping palm kernels to Hamburg. There is one which I think you have left out; that is, that owing to the fact that full cargoes of kernels went to Hamburg you were able to give better stowage and turn out the cargo better?—That was so.

6013. Again, in connection with the question of giving full cargoes of kernels to this country by means of elevators and trying to arrange for quick despatch, would it not rather handicap you with your other steamers as you would not be able to load them entirely with palm oil and cargo of that kind? Do you not require in order to get proper stowage, a certain amount of bag cargo?—If the palm-kernel trade is diverted from Germany to England after the war there will be no difficulty in providing the necessary number of steamers that can load full cargoes of palm kernels. There will always be a certain quantity of palm kernels shipped from the small ports which the other steamers can arrange to take.

6014. In shipping full cargoes of palm kernels it will often be cheaper to elevate those into a barge and then into a factory than to move the ocean steamer?—Yes; to carry kernels from a steamer to a factory which is alongside a river or canal is a very cheap process and is generally cheaper than moving a big steamer a way from its loading berth, because it is liable to have accidents.

6015. That is the case even with grain in Liverpool where they elevate as much as 600 tons an hour out of these barges?—Yes.

6016. One more question, which is important not only to this Committee but to the trade, and that is as to the future of the palm-kernel trade under present circumstances. So far as we can see, the produce coming into our factories in West Africa is going to be quite normal, notwithstanding the fact that lower prices are being paid for it in consequence of the excessive charges and the difficulty of moving it. In your opinion is there a reasonable prospect of your being able to move and bring to Europe anything like a normal amount of produce during this coming season? I am asking you just in a general way, because we decided yesterday that it was not fair to ask you for any details.—The merchants had a meeting with me a short time ago, when they pointed out the difficulties that might occur, and I then told them that I was prepared to go into the market and charter whatever steamers may be necessary to carry the West African cargo to England but that one could not possibly do it at the present rates. The British Government take up our cargo steamers under requisition—I am not making any complaint about that, because they require them—and they pay us about 7s. per ton per month on the dead-weight of the steamer, on time charter. In carrying out my promise to the merchants, we have chartered steamers on time charter. We began by paying 12s. 6d. We then paid 16s. per ton dead-weight per month on time charter. We then paid 17s. 6d. We have now paid 20s. 6d. Last Friday we offered 22s. 6d. per ton dead-weight per month on time charter, and we lost the steamer which was chartered elsewhere at 25s. At the present tariff rates for an average cargo outwards and an average cargo homewards on the basis of 20s., we should lose on this one boat 15,426l. I have had it worked out this

morning to see what the rate on kernels would have to be, not to make a profit, but so that we should not lose money, and I find that, whilst our present rate for palm kernels is 25s. per ton of 40 cubic feet or per scale ton of 13 cwts., if we had to charter a boat at 25s. it would take (assuming that the outward rates were according to the present tariff) a rate on kernels of 80s. 6d. per ton of 40 cubic feet or 13 cwts. to just clear the cost of the charter, and we would make 15l. at that figure.

6017. (Sir George Fiddes.) That is 15l. gross profit?—On the round voyage, showing a rate of 80s. 6d. per ton of 40 cubic feet or 13 cwts. as against our present rate of 25s. A boat was chartered yesterday in America at 26s. for two round voyages, delivery and re-delivery in America, to bring grain to this country. If it is necessary for the Admiralty to continue requisitioning as they have been requisitioning recently I really do not know where rates are going to.

6018. (Mr. T. Wiles.) Unless they take over all the steamers.—That will make matters worse. That does not solve the difficulty at all.

6019. This matter of freights is a matter of knowledge at the moment, and it hardly affects the general question that we are looking to after the war.—I would like to make it quite clear that I gave a definite assurance to the West African merchants that we would charter whatever tonnage was necessary to meet the position. I told them a month ago that naturally the rates would have to be higher, and very considerably higher.

6020. (Sir George Fiddes.) The answer to Mr. Moore is that in fact the tonnage will be there but the rates will have to be adjusted accordingly?—Yes. I have already put in Appendix III. to my précis showing that on palm kernels the rate up to the 17th December of last year was never more than 25 per cent. up, and on an average was more like 15 per cent. up; and even at the present moment the rate on palm kernels is only 40 per cent. more, whilst the increase in the ordinary market is of course many hundreds per cent. This is one of the advantages that West Africa has received, I might say, from the rebate system.

(Mr. G. A. Moore.) I asked the question because I do not consider that there can be anything more disastrous to the West African trade and the future of that trade than for the merchants to have to stop buying produce. I wanted to ask you whether there was any reasonable probability that you would be able to lift it during the coming season in order to meet that situation. To-day the timber trade is practically at a standstill. There are about 60,000 tons which have not been moved, some of it more than twelve months old, and it cannot be moved. I might just say that I am not asking you any questions with regard to transit options because I believe those will be entirely altered after the war.

6021. (Mr. T. Walkden.) We are indebted to you for this very interesting, instructive, and, I think I might say, accurate, memorandum you have put before us. Speaking on behalf of the merchants, especially in Manchester, trading with West Africa, I think I can say that they are all accurate statements. In regard to Manchester there is one point you have raised as to uniform rates of freight and the equality of opportunity for large and small shippers. That has been a strong point with the Manchester shippers. They have thought that the large and small shippers should have an equal opportunity to develop their business.—We have always tried to carry out that principle.

6022. As the rebate system has been mentioned, this other point has often been raised with our Manchester shippers. Have you many shippers on your services to West Africa who object to this rebate system?—In my experience of shipping to West Africa the great mass of regular shippers who are shipping weekly thoroughly approve it. With regard to West African opposition to rebates, the strong opposition—I am not talking of the individual merchant, because you will always find differences of opinion—has generally come from big shippers having the control of large quantities of cargo at a particular port, or series of ports serving a particular district.

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6023. The point we take up in Manchester is that the outward cargo is equal to, and probably more important than, this inward cargo, and therefore we in Manchester rather favour this rebate system, and, if I may say so, the reason is that we are given a variety of shipping services to West Africa. Before the war we know that we had six services per week. I think you mentioned in your memorandum that you want to serve all the small ports?—Yes.

6024. That is why we favour it, because it helps the steamship company to give us a regular service to the smaller ports?—That is what we endeavour to do.

6025. You mentioned that Africa was developing and that these small ports would have to develop, and you were anxious to give a regular service, and it is your idea to keep it up?—Our idea was that a merchant who may be established at a small place was not to be ignored; he might be the beginning of a big trade there and therefore we wanted to give each port a reasonable service.

6026. That is why we in Manchester appreciate the giving to us of a regular service. It has been mentioned, I think, by Mr. Knowles this morning about having cargo steamers and a passenger service. You have cargo steamers?—We have a great many cargo steamers. The reason why we are sometimes criticised is that the great bulk of our cargo steamers have passenger accommodation for about 20, the idea being that otherwise there is no way in which white people can get to and from these small ports. There are no railways along the coast in West Africa and the consequence is that if they are all pure cargo boats the British trade really could not be carried on. It would never pay to put on mail steamers to these small places.

6027. That is why we appreciate having those cargo steamers carrying a few passengers. We think the system has worked very well.—Perhaps I may mention that prior to the war the actual number of steamers we had employed always in the West African trade, besides others that came in as necessity arose, was 92 steamers, of 274,000 tons, whilst the Germans had 51 steamers, of 133,000 tons.

(Mr. T. Walkden.) I was pleased to hear that you had promised to keep on as good a service as possible during the war, and I do not think the merchants will object if you stand by your uniform rates of freight; that would be quite satisfactory to the Manchester shippers and importers. I have no further questions to ask.

6028. (Mr. L. Couper.) Reference has been made in many previous questions to the rebate system. You were a member of the Royal Commission on Shipping Rings which sat from 1906 for two or three years?—Yes.

6029. At that time you had no connection with West Africa?—I had no connection with West Africa.

6030. I am particularly interested in that. I was a witness before that Commission, and I feel some little satisfaction that a poetic justice allows me to examine you as you did me. You may recollect that West Africa was very fully enquired into by that Commission?—Yes.

6031. I thought it might be of interest, as so much has been made of this point of rebates, if the Committee knew just two of the conclusions which the Royal Commission published, one being an explanation of a recommendation not adopted, that recommendation being the abolition of the system of deferred rebates. It says: "Generally speaking those shippers in the United Kingdom who wished the system to be abolished by legislation were shippers who because of the amount or the character of their shipments, considered that they would be better off, or equally well off, in an open freight market. They included representatives of big merchant houses, such as Mr. J. Holt and Mr. Miller of the West African trade, and the four manufacturers doing their own shipping who appeared before us. But the proportion of general merchants appearing before us, whether large or small, who were in favour of the abolition of the system of deferred rebates was small and we formed the opinion that the great majority of shippers of all

"classes in this country would prefer that the system should be retained, provided that some means could be discovered of controlling the monopoly power of the conference system and checking its liability to abuse." You may also recollect this other reference to the West African trade: "Apart from Lagos, no West African port according to Mr. J. Holt (of the West African Trade Association), would account for more than about 30,000 tons of cargo both inwards and outwards per annum. At Lagos some 200,000 tons are shipped outwards and inwards, but in this case the cargo cannot well be taken to or from the port direct. It has to be carried *via* Forcados, (120 miles away) by a subsidiary branch boat service. The circumstances of the trade, therefore, do not admit of constant or serious opposition by "tramps"?—That is so. After that they deepened the port down to 19 feet and just when we thought we could dispense with 21 branch steamers which we keep the port began silting up again and went back to 13 feet. It is now better, and I think it is about 15 feet to-day; but it is still a very difficult port.

6032. I thought it would be informing to this Committee to know that this Royal Commission did go very thoroughly into the West African trade conditions at the time?—At the time the Commission practically became an inquiry into Sir Donald Currie and Sir Alfred Jones.

6033. You agree that rebates, while they might affect the kernel trade as opposed to other nuts and seeds, would have no bearing on the position of British as opposed to German interests?—None. The position is exactly the same; it has no bearing on whether the trade went to Germany or to England.

6034. And perhaps it is in your knowledge that the German firm of Gaiser was probably in a better position to load up cargoes of kernels than any other firm in West Africa, but so far as I know, they never did so.—I believe they are one of the oldest established firms on the coast.

6035. In your view is the Elder Dempster agreement with the Woermann Line suspended or cancelled?—It has been dormant for a great many years, and I have just taken legal opinion upon it; I got that opinion this morning, and it says that if the agreement was in existence at the outbreak of war it is now cancelled. It is a very old agreement.

6036. If the German steamers return to West Africa there is bound to be competition, I take it, failing some arrangement to maintain an equality of rates between the German and British lines?—I do not think there is any advantage to be gained in trying at this moment to ascertain exactly what will happen after the war in respect of freights.

6037. In your précis you refer to German State railways. In that connection an interesting statement was made to me some time ago, curiously enough, in your office in Hamburg, Sir Owen, as to some machinery which had been ordered in the centre of Germany for Hamburg, and it was found cheaper for the manufacturers to consign that to Hull and afterwards send it back to Hamburg, by reason, no doubt, of the preferential system on the railways. Is it within your knowledge that something of the same sort applies on our English railways; that is, that goods originating from a Continental port pay less to the railway than goods of British origin conveyed between the same stations in England?—No. Although I am an English railway director, I know very little about through rates; but with reference to the other part of your question, there was an interesting report by British Government representatives abroad on State assistance in constructing and running ships and in granting preferential railway rates. In 1898, in order to compete with water traffic *via* Dutch ports, and to aid the German palm oil industry, the Prussian State railways gave preferential rates on palm oil, palm-kernel oil, coconut oil, and coconut butter from German seaports to Bavaria, Austria-Hungary, the Rhine Provinces, Westphalia, &c.

6038. If anything of the sort exists on the English railway system, it might be well worth inquiring into if

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we are to get the mills erected in this country, might it not?—Certainly.

6039. You also state in your précis that it is very difficult to point to any direct evidence of German Government assistance to the German traders generally, but I suppose you do feel, with most of us, that the German system is very highly organised and probably embraces all interests?—Yes, the German State was always anxious to do everything in its power to help the shipping trade. For instance, one case brought close to my personal knowledge was that they started "control stations," nominally to see that emigrants were cleanly, but in practice to divert them, so that no emigrant crossing the German frontier was cleanly unless he had a ticket by the German line. By that means they subsidised the German shipping companies to the extent of between half a million and a million a year without practically any cost to the State.

6040. Do you suppose that the German shipowners, merchants, and manufacturers were perfectly free or that they came under some organisation?—I do not know of any other direct way. As to the only two direct cases that I personally know of, one was the system of "control stations" I have mentioned, and the other was the great advantage to goods shipped over State railways. But I can quite believe that there were other ways of helping them. They might, for instance, have been helped very materially by being given very low rates, or rebates, for carrying their coals over the State railways; say, for instance, if half the railway rates had been refunded to them.

6041. May I be allowed to give a short account of an instance which occurred within my knowledge indicative of German Government control over trade? Some two years ago the institution that I am connected with was approached by a firm of the highest standing in Germany with a view to entering into a joint agreement which had reference to a foreign country. We looked into the thing and went some way with it, and at a certain stage it was agreed by both parties that the matter should be referred to our respective Foreign Offices. I very well remember meeting our German friends on the subject some time after that and they said, "Well, what does your Foreign Office say?" I said, "They see no reason to object to the scheme." I said, "What does your Foreign Office say?" "Oh!"—was the reply—"They are most enthusiastic about it, and they have already drafted a letter to every German firm and individual in this foreign country ordering that immediately this new concern is established all the business they now do with other concerns shall be diverted to it and shall be continued with it.—I know that the facts of that case are as you state.

6042. None of us would wish such a system to apply here, but is the German system not separated by an unnecessarily wide gulf from the British system in certain Government respects? Have you ever carried any German Government passengers by your steamers?—Never, to my knowledge.

6043. Have you any knowledge of British Government passengers being carried by German steamers?—I know many of them who never went by any other steamers.

6044. (Sir G. Fiddes.) Of the highest rank downwards?—Of the highest rank downwards, and a very distinguished one who died the other day was a case in point.

6045. (Mr. L. Couper.) Some of the witnesses before us, embracing the merchant, mill-owning, and consuming interests have spoken favourably of coöperation. You also, I see, in your précis advocate some coöperation. Have you considered how that coöperation could be made practicable. Your words are, "I have come to the conclusion that, in addition to the necessity for mutual coöperation in this matter between British merchants, millers, manufacturers, shipping companies and others interested, it will be essential—if success of a permanent character is to result from the efforts which have been and are being made—that Government assistance be given in order that the industry may obtain a firm footing in this country."

Have you any practical scheme to put before us?—No, I have no cut and dried scheme.

6046. Other witnesses have expressed themselves in favour of such a scheme, but, when one presses them, one finds as a rule that they have nothing to suggest, and I had hoped that you might have something to say on the point.—No, I have no definite scheme to suggest.

6047. Have you considered—I must suppose that you have—the provision of tramp liners? to use a somewhat paradoxical expression. I mean a cheaper type of vessel than your ordinary liner.—But we are running this trade already with vessels of all classes. The idea that we are running the West African trades with high class liners, with the exception of express boats, would be entirely mistaken. We are running the West African trade with as economical steamers as can possibly be built. I am a tramp owner myself. The first steamers that I ever built were tramps, so I know all about them.

6048. I would suggest that the kernels which previously went in German steamers to Germany, and therefore represent an addition to the cargo of your steamers, should perhaps be carried in some tramp liners which might be owned mutually by yourself and other interests.—Personally, I should always be pleased to consider any definite proposal.

6049. We may have to fight German duties by imposing duties.—I think that is quite possible.

6050. But do you think Germany has depended entirely on duties, and that there is nothing in her organisation?—I think the German organisation has been extraordinarily good.

6051. Do you think that after the war the organisation (whatever that may mean exactly), will be brought to a still higher state of perfection than ever before?—Yes, I think it will be. I think the competition after the war will probably be keener for many years than anything we have ever had to meet in the past.

6052. And you would agree therefore that German organisation should really be met by British organisation?—Yes, I certainly think that every improvement in organisation should be adopted as far as possible.

(Mr. L. Couper.) I should be very glad to see the shipping companies in West Africa taking the lead in formulating some scheme.

6053. (Professor W. R. Dunstan.) I think I need ask you very few questions as Mr. Couper has put to you several of the questions that I intended to ask. I was rather hoping you might be able to develop your conclusions in paragraph 9. You have told us of the advantage the Germans have got through their railways, and you say that "in other matters connected with the carriage of his raw materials the former—that is the German—possessed some substantial advantages. These advantages have undoubtedly contributed towards creating what the Chairman has described as the *vis inertia* of the situation which must be overcome if the industry is to take permanent root in this country." Of course it is something more than *vis inertia*, remembering Newton's definition of *vis inertia*. It is partly want of similar facilities, is it not, which is at the root of some of the trouble?—Certainly; I think there is room for improvement in that direction.

6054. It is not simply the prejudice or pig-headedness which is implied by "*vis inertia*"—something which has to be pushed away?—I agree.

6055. I was going to suggest to you that you might develop this idea a little by telling us how you think the shipping facilities to this country might be improved. I am thinking of it as including port charges, dock dues, and so on, and possible alterations at Liverpool. Would it be possible for you to state rather more definitely what you consider is required in order to bring our organisation from your point of view on a level with the German organisation? because it seems to me that that would be of material assistance to the Committee.—Of course, as far as the Port of London is concerned, practically nothing had been done in the port for 10 or 15 years up to the formation of the Port of London Authority. I was vice-chairman of that

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[Continued.]

body for some four years, and I know that what they have done will, in the future, help the trade of London very considerably. But there is no standing still. It is not a case of setting out some particular thing that has to be done; you can only get perfect facilities in commerce by constant watchfulness, and spending the money that is necessary to get the very best facilities.

6056. I agree; but London for the moment is not of great importance in connection with the business we are considering. It may be in the future but is not now.—Not just at the moment, but I mention London because, at this moment, one of the biggest mills in England is being erected in London for dealing with palm kernels. If, as seems possible, other mills are also to be erected here, it is quite likely that London within the next few years will be anyhow the chief centre of the palm-kernel industry as far as England is concerned.

6057. Then, taking that view, do you consider that London is better equipped than Liverpool to meet German competition?—I think it is being very rapidly improved.

6058. So that you do not feel any very great apprehension with regard to it?—New brooms sweep clean. The only fear is that they may weary of well-doing and not push on the development as fast as they ought to.

6059. Turning for a moment to Liverpool, what have you to say about Liverpool in the same connection; I mean as to future German competition. We have had it in evidence that the charges at Liverpool are high in comparison?—I have been going into it very carefully, and undoubtedly Liverpool is somewhat handicapped in dealing with palm kernels. Of course, they have spent an enormous amount of money in making the port of Liverpool, and the English ports do not get any assistance either from Imperial taxes or local rates, and the trade has to bear all the interest on the expenditure.

6060. It strikes one on reading the evidence that some alteration is desirable in the interests of the industry. I do not suggest any particular form for the alteration to take at the moment, but it looks as though something should be done to try and diminish the cost.—If we ever in this country get the people of a port broad-minded enough to make a free port and put the whole of the expense of the port on the district, I believe that port and district will absolutely go ahead in that neighbourhood out of all proportion to any other port in the country.

6061. Do you see any signs of any such port coming into existence?—No, I do not.

6062. You will agree that the Liverpool question seems to be an important one to deal with in connection with the problem that is before this Committee?—Yes. As far as Liverpool is concerned, I do not look in the future to the palm-kernel trade being developed in Liverpool to any very great extent unless they can reduce the cost of handling the kernels there.

6063. Is there anything more you can say about paragraph 9 of your conclusions in your précis with regard to the way of meeting German competition in the future from the point of view of the shipping trade?—No, I do not think so.

6064. Then I will pass to the last sentence in your précis, and perhaps you will allow me to say that I have read it with the greatest interest; it appears to me to contain a large amount of very valuable information. At the end you say: "I have come to the conclusion that in addition to the necessity for mutual co-operation in this matter between British merchants, millers, manufacturers, shipping companies and others interested, it will be essential, if success of a permanent character is to result from the efforts which have been and are being made, that Government assistance be given in order that the industry may obtain a firm footing in this country." You told Mr. Couper that you had no scheme in your mind for securing mutual co-operation between these different parties?—That is so.

6065. Without raising any tariff question, is there any assistance you think the Government might give to the industry with advantage? Would you agree with me, for example, that something could be done by giving scientific and technical assistance to the industry

at both ends?—I am personally a great believer in trade and commerce making use of scientific and technical experts and information. In this country I do not think we have quite taken full advantage of them in the past, and there is room for further improvement in that way, and certainly the Government might assist in that direction.

6066. Would you agree with me that it was more a matter of the proper organisation of that research work that is needed than anything else that is required at the present time?—Yes. I believe that nearly all useful inventions originally come from this country and that it is an entire mistake to think that they come from Germany, and we should try by further organisation—it is a question of organisation—to get business men to take advantage of them.

6067. Do you also agree that we have seen from the evidence brought before the Committee that there are a number of important points which ought to be dealt with in the interests of industry?—Yes. I agree.

6068. (Mr. T. Wiles.) My colleagues have examined you so thoroughly, Sir Owen, that they have left very few of my questions to be put to you. These three companies, the African Steamship Company, the British and African Steam Navigation Company, Limited, and the Elder Line, Limited, we may take it are one line as far as working goes, managed by Elder Dempster, and all the steamers are used to the best purpose by Elder Dempster?—These lines always ran a joint service long before Elder Dempster managed them. The African Steamship Company only came under the management of Elder Dempster in recent years. As I have already mentioned, that is a company established in 1852 and only came under the management of Elder Dempster a comparatively few years ago—perhaps 25 years ago.

6069. It is like one business; there is no competition in any way between the three?—Yes, it is one business.

6070. Do you consider that all the ports on the coast of West Africa are served by these three companies?—Yes, every port.

6071. There is no port which has a grievance; they are all well served we may take it?—I cannot say that there is no port that has a grievance.

6072. I will not say "grievance," but we may take it that every port which has any nuts or goods to ship, has a service worthy of the stuff that it has to ship?—Yes.

6073. In your précis you speak of the three lines—the Woermann Linie, the Hamburg-Amerika Linie and the Hamburg-Bremer-Afrika Linie. Your three companies were running in close agreement with those three German companies?—We had the agreement that I mentioned.

6074. You did not compete in any way?—We had an agreed tariff.

6075. Is it your view that when the war is over, it is likely that agreements will again be set up with those lines?—I cannot imagine an Englishman making an agreement directly after the war is over with the Germans.

6076. Would it not rather be your view then that after the war is over, some of these boats, if there are any left whole, will come back into competition with you?—Undoubtedly. They had 51 steamers. I believe the Government took 12 of them at the Cameroons, and another was captured at Sierra Leone. But the great mass of them, I should think about 30, are lying in neutral harbours, and a good many of them went across to Pernambuco to avoid our cruisers at the beginning of the war.

6077. But when the war is over, we may take it that the British feeling will be so strong against the Germans that they will refuse to enter into any agreement with them, and that the German boats will form a competition on the West African coast?—That is what I anticipate.

6078. Did the German lines before the war carry the mails to Germany?—Yes, the German mails.

6079. And I suppose received a subsidy for that?—I am not certain how they were paid for carrying the mails.

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6080. Might not there have been a subsidy paid to them which would very much assist them in cheapening the freight on the kernels in some way?—I might get the information, but I do not actually know how they were paid for carrying the mails. I have always had an idea that when a German steamship company carried on a new service to develop any ports they may have been recouped somehow by the Government for the money they lost whilst they were developing the trade.

6081. Through the mail service?—I do not know how it was done.

6082. Do you suggest it is possible that it would be done through the mail service?—No, I was not suggesting that.

6083. Do the lines with which you are connected carry the British mails to West Africa?—Yes, on a poundage basis with a limitation.

6084. It is not a remuneration which you consider a subsidy in any way?—It is not a remuneration at all.

6085. Is the remuneration which your companies get for carrying British mails what one might call a subsidy?—No. It is a poundage basis, but it neither has the advantage of a subsidy nor of a poundage basis. It is a poundage basis with a limited amount of total payment which was arranged many years ago and which the Post Office have kept in existence, as it is a very favourable arrangement for the Post Office.

6086. Then may we take it you would rather be without the mails?—I have not looked into that. I did not think it was apropos of this enquiry and I have not gone into it.

6087. If the line is subsidised by the Post Office sufficiently to assist it in giving good rates for goods?—You may take it the answer is no. The mail service is a very small payment.

6088. You say the home port is Liverpool?—Yes.

6089. Can you tell us why Liverpool has been the home of the West African lines?—The home of the West African lines was originally Glasgow. The men who developed West Africa were all Scotsmen, and eventually the centre moved to Liverpool. That is roughly the position.

6090. From what you said to Professor Dunstan, you think it is likely that the trade will move towards London?—I said I thought that palm kernels would tend towards London, but I was not talking of the other West African trade. My remarks were entirely confined to palm kernels, which in the past have not gone largely to Liverpool but went mainly to Hamburg.

6091. Yes; but the business was done through Liverpool, as we have heard in evidence. If mills are built on the river in Liverpool with the jetties which have been mentioned by one or two members of the Committee, would the liners find it worth while to go alongside with a minimum quantity of nuts to discharge? If the mills had elevators on the river, would it be possible for the liners that usually bring the kernels to go alongside the mills?—In Liverpool I do not think there are the facilities. I think in Liverpool the steamers will always discharge in the docks, except possibly at Birkenhead. I cannot speak with certainty.

6092. Those elevators would be of no advantage except to take cargo out of the lighters?—That is so, I think. I do not know how the mill of Messrs. Lever Brothers is situated.

6093. Could you tell us the date when the rebate system began?—No, but I shall be pleased to supply the information.

6094. It would be rather interesting if you could give the date when it began.—Yes, I will.

6095. Since the rebate system was begun have freights tended upwards?—I am sorry I have not that information here with me.

6096. You are making a very fine defence of the rebate system and it would be interesting to me to know when it commenced and if the general trend of freights has been upwards since the monopoly started?—I think you may take it that the expenses of steamers have been steadily rising for nearly 20 years. Before the war it was much more expensive to work a steamer than it was 10 or 15 years ago.

6097. But you will admit that freights have been fluctuating generally up and down in the past years?—Naturally they have fluctuated very much.

6098. Do you think if the mills in London are built and completed by the end of the war and if the mills in Hull that we have heard about are running, there will be any difficulty in giving the same freight to Hull, Bristol and London as to Liverpool if there is a regular demand in those ports for the kernels?—No, not the slightest difficulty.

6099. We may take it from you as chairman of these companies that it is quite likely?—If there is a demand that will keep a service going the freights would be equal to all those ports.

6100. Can you give any explanation of Mr. Watson's answer to Question 2844. He was asked: "Since you started crushing palm kernels you have been able to get all the kernels delivered in Hull that you wanted?" and he said "No. We have not a kernel in the place to-day. I cannot get them. They will not bring them here. Last week I offered to pay 5s. a ton extra."—I think Mr. Watson's answer was most unfair. Up to the time of the war he had never bought a ton of palm kernels. In spite of war occurring, we arranged to carry round at the steamship owners' expense for three months any kernels that were bought for delivery at Hull. Whatever quantity he bought for delivery at Hull we undertook to carry round from Liverpool to Hull at our own expense without any charge, although it was very expensive carrying them round. I then arranged for a direct service and 13 steamers have since carried 37,000 tons of kernels to Hull, where there had never been a demand before the war, and we did that in spite of the war and in spite of the fact that Hull was one of the worst ports to go to because at that time the German submarines were off the port. Yet, Mr. Watson comes here and instead of expressing his thanks for the way we treated the port, he makes those remarks.

6101. Do you have a written contract with your shippers who regularly ship with reference to primage?—No, simply a circular.

6102. If I started business in one of those ports and wanted room, I could ship at the same freight as the oldest shipper?—Yes.

6103. Without any minimum quantity?—Without any minimum quantity.

6104. And there would be no advantage if I shipped 1,000 tons or 10 tons?—No advantage.

6105. One of your defences of the rebate systems is "The assured stability of freight." What guarantee has the shipper? He has stability, you say; but my contention is that the rates have always been going up.—I am afraid everything has been going up.

6106. Not the freights. The freight market, as I know, fluctuates very much, but where there are lines of this kind you say there is stability. What guarantee has a shipper that rates are not going to be constantly increased when there is no competition?—The restraints against the imposition of unreasonable rates of freight are that there is absolute certainty of opposition against a steamship company if the trade becomes unduly remunerative. On that subject I would like to hand in a list showing the results of these three steamship companies over the last ten years (*the list was handed in*).

6107. Who decides if they are not remunerative? Is it the shipper or is it the shipowner?—What I said was that there was plenty of competition in the shipping trade and if it is found that a trade has become unduly unremunerative there is at once a competition in the trade, as there would be in any other business, and no rebate circular will stop that competition if the trade is known to be specially remunerative. In the West African trade we have constant meetings; very seldom many months pass without our having meetings either in Liverpool or in London with the merchants in the West African trade. The best security is to look at the past history of a trade. If you look at the past history of this trade the way that the shipping lines have treated the West African merchants in the past

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is, I think, the best guarantee they can have for their treatment in the future.

6108. Yes, but chairmen and directors change from time to time and it may not always be so?—If the policy so altered you would find plenty of competition.

6109. Does not your statement rather go to show that with over 90 ports to call at and the facilities you have put out as the advantages of having this system, it is almost impossible to have competition. The only competition is when there is a very large quantity which can be sent by a German steamer.—I have never known of any place where it was impossible to have competition.

6110. But as I read your précis it rather points out to me that your companies do it so beautifully for the shipper that it is impossible to have competition.—May I say that as long as a company does a thing beautifully there is no necessity for competition. The whole essence of competition is when you are not doing a thing well.

6111. But I point out that it does it so beautifully, and from its own point of view so well, that it is almost impossible for a new man to compete. Directly a new man comes in he cannot run the number of steamers. Will you throw out some chance for those firms who want to start mills to be allowed to charter steamers when it is necessary?—You are talking about a condition of affairs which has not as yet arisen as far as I can see.

6112. That is what we are here for. We are discussing the future.—No man has been more keen than myself to press the West African Governments to improve their ports in the different colonies. They have spent a great deal of money and they are at present all keen about it, but until it is all carried out it is not possible, where you are trading from West Africa to Liverpool, to treat it as a trade like that from, say, Calcutta to London, because it has not yet got to that state of development.

6113. If one of your regular shippers charters one tramp steamer he at once loses all his rebates on all his shipments in the year?—That is so.

6114. If he came to one of your firms in the Conference and asked you if you would charter him a steamer, would your firm charter him a steamer at the current price or at the liner price?—As a matter of fact, 300 tons is a much more general quantity to ship, and not 1,000 tons or 5,000 tons.

6115. That is because they have not had the lines to ship by.—It is a very different thing to shipping grain that comes down by railway 5,000 tons at a time. West Africa, I hope, will get to the stage of erecting elevators and dealing with bigger quantities at a time.

6116. That hardly meets my point if it is possible in the future—because our Committee is inquiring into the future. Sir George Watson said in his evidence that he should charter steamers when he was wanting to buy kernels for his mills. Supposing one of your regular customers finds it possible in the future to require a steamer for 4,000 or 5,000 tons would your firm charter him a steamer at the rate or practically at the rate at which it could be obtained on the Baltic?—If conditions alter we will consider the new conditions. Up to the present the position practically does not arise.

6117. I am only putting it to you because if I were asked to put a large amount of money in mills and I knew I was depending on a steamship monopoly for my freight I should feel that while you were there it would be all right, but you might be gone or somebody else might be there and I should be very handicapped all the time, and it would not be safe to do it. I want you to say something if you can to relieve the mind of the man who is possibly going to invest in one of these mills.—As long as he is in exactly the same position as any other man who invests, as long as nobody else has any advantage over him in freight, surely that meets the position.

6118. No, it does not seem to me to meet the position because in all business the man who has the largest quantity to ship can generally get a lower freight. Do

you not agree to that?—You always try to get the lowest freight.

6119. But you always can do so when there is no monopoly?—I believe it is to the benefit of the whole trade that in the present conditions of the West African trade everybody should pay the same freight.

6120. Then you cannot give me any hope that you would allow your customer to charter a ship because he happens to have 3,000 tons or 4,000 tons to ship. You would say "No, we will not allow you to do that; all your rebates go and we shall only carry it at the old freight"?—I think the interests of West Africa are best served under the present arrangement. That is my strong personal opinion.

6121. In the last paragraph of your précis you say that Government assistance must be given in order that the industry may obtain a firm footing in this country. You have answered one or two questions about the assistance, but I do not think you have given your opinion as to how the industry should be assisted; that is to say, in what form. Other witnesses have given their opinion.—If it is by a tariff it would have to be on margarine.

6122. You think if a duty were put on margarine coming into this country that would be sufficient?—That was my view.

6123. You would have a duty put in this country on all margarine coming in?—What I said was that if a duty were put on, it would ensure the margarine works all being here and remaining here.

6124. If Government assistance (which you say at the end of your précis is desirable) is proposed, I take it your view is that that assistance would send the kernels to this country and not to Germany?—Yes, that is my view.

6125-6. If we put a duty on in some manner so as to try to prevent the kernels going to Germany, there will be more kernels to come to this country?—That is so.

6127. That will be a great advantage for the Conference shipping companies?—But the same companies which carried the kernels before the war will carry them afterwards, unless somebody else comes in.

6128. But your vessels, I take it, brought practically all the kernels to this country?—We had a line to Hamburg too.

6129. The bulk of the kernels brought to this country came in your ships?—And we carried our proportion to Germany.

6130. Did the bulk of the kernels coming to this country come in your vessels?—Yes, the small quantity that came here.

6131-2. If a larger quantity, through legislation or tariffs, was forced to this country, you would get a larger quantity coming in your liners to this country?—Not necessarily.

6133. Having regard to the facilities you spoke of, the quay facilities and arrangements at these various ports here, which are probably much better than the Germans have?—No. We have no advantage at the English ports at all.

6134. I think you refer to the quay facilities, in your précis, rented by our steamship companies?—But any other line that comes to England can get the same.

6135. I think we may take it that you give better facilities for shipment to this country than a German line would?—I can only go by the position before the war. Before the war our port authorities gave the same facilities to any line that came here quite apart from its nationality.

6136. Then your statement here is not correct?—Yes, it is.

6137. You say, "Shippers also had the benefit of the quay space rented by the steamship companies."—So they had. That is not opposed to the other statement.

6138. But the German companies have not quay space on our quays?—Because they are not running a line here at present. Directly they run a line here they could give the same facilities. The ordinary course is that directly any line comes to this country, whether English or belonging to any other nationality, they go to the port authorities and hire quay space, for which

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they pay an annual rental. Having done that, they can give the advantage of it to their shippers the same as we do.

6139. At the ordinary charge?—Yes, or free of charge.

6140. Then there is nothing in that practically. Do you take kernels free of charge on the quay space?—They can leave them there a certain time.

6141. Free of all charges?—As far as we are concerned.

6142. You put them on the quay for them, I take it. If the merchant buys c.i.f. to Liverpool do you pay the charge on the quay space?—When we discharge overside at Liverpool there is no expense incurred at all by the importer.

6143. You put them free on the quay?—When discharged in Liverpool, you pay dock and town dues a shilling, plus now ten per cent.; that is 1s. 1d. You pay master-portage 1s. 2d. plus ten per cent.; that is 1s. 3½d., making 2s. 4½d. in all.

6144. Will you explain this. You say "Shippers" also had the benefit of the quay space rented by the "Steamship Companies, pending their exercise of "their options"?—They have five days to declare the option after cargo has arrived in Liverpool, during which time we keep it on our quay, which we pay the port authority for, without any charge for the five days.

6145. Supposing some Government assistance is given which would be expected to divert the kernels from Germany to this country, and there was no competition with your lines, and you could have the whole of the trade in your hands, to get over the

nervousness which all merchants have (and where there is a monopoly there is nervousness because naturally it is human nature for the directors or the shareholders to put up their rates) would you be prepared to agree that any dispute arising as to what is a reasonable freight should be settled by the Railway Commissioners, or some department of the Board of Trade, as is the case with railway rates?—Having seen the very unsatisfactory results on railways by that arrangement, certainly as a business man I would not recommend it being extended.

6146. Unsatisfactory from whose point of view?—I think from the country's point of view.

6147. Your view is that the Railway Commissioners' decisions are not satisfactory?—No,—that the system is not satisfactory.

6148. And you would not throw out any hope that you would agree to a maximum rate being fixed by some commissioners like the Railway Commissioners?—Yes, I will agree with it directly, if the Government will guarantee me a monopoly such as the Government has given the railways. I would agree directly if the Government would guarantee me against competition.

6149. Supposing this legislation has taken place, and there is a monopoly, and the Colonial Office agrees to assist by making jetties and in other ways developing the colonies (which it has done in other colonies, and which we may always hope for) and you have licences or licences are given to call at these jetties, would you see any great hardship in maximum rates being fixed?—I would see no hardship at all in maximum rates being fixed if the Government insure us against competition.

The witness withdrew.

Adjourned to Wednesday next at eleven o'clock.

THIRTEENTH DAY.

Wednesday, 17th November 1915.

Colonial Office, Downing Street.

MEMBERS PRESENT:

Mr. A. D. STEEL-MAITLAND, M.P., Under-Secretary of State for the Colonies (<i>Chairman</i>).	Mr. WALKDEN.
Professor WYNDHAM R. DUNSTAN.	Sir W. G. WATSON, Bart.
Sir GEORGE FIDDES, K.C.M.G., C.B.	Mr. T. WILES, M.P.
Mr. G. A. MOORE.	Mr. T. WORTHINGTON.
Sir OWEN PHILIPPS, K.C.M.G.	

Mr. J. E. W. FLOOD (*Secretary*).

Mr. JAMES PIMLOTT called and examined.

The witness handed in the following précis:—

I.—*Extent to which Palm-Kernel Cake and Meal, Coco-Nut Cake and Meal and Earth-Nut or Ground-Nut Cake are now used in Ireland.*

A circular asking for particulars as to the extent to which the above-mentioned cakes and meals are used in Ireland was issued to 41 instructors in agriculture employed in 30 counties, the replies briefly summarised are as follows:—

Palm-kernel cake or meal:—

- In 4 counties used fairly extensively.
- In 8 counties used to a limited extent.
- In 13 counties not used.

Coco-nut cake or meal:—

- In 1 county used fairly extensively.
- In 7 counties used to a limited extent.
- In 22 counties not used.

Earth-nut or ground-nut cake:

- In 1 county used to a very limited extent.
- In 29 counties not used.

Three counties, viz.: Dublin, Meath and Londonderry, are not included in these figures as there are no Agricultural Instructors employed therein at present. I understand from other sources, however, that in Counties Dublin and Meath palm-kernel and coco-nut cakes are used to a limited extent, but I have no information regarding County Londonderry.

Palm-kernel cake and meal have been used on all the Department's farms and coco-nut cake and earth-nut cake on some of them.

II.—*Possible extension of the use of Nut Feeding stuffs by Farmers.*

It is scarcely necessary to observe that farmers generally are conservative, in their methods and ideas and that they are slow to purchase any unknown feeding stuff. In Ireland progress in matters of this kind is generally slow. So far as I know none of the feeding stuffs of which I speak is manufactured in the country and pioneer work is necessary to convince merchants that a new kind of cake which may be brought to their

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[Continued.]

notice by British makers possesses the qualities claimed for it, and that it will prove satisfactory in the hands of the farmers. Agriculturists, too, require to be satisfied that the new feeding stuff is as safe and reliable as those to which they are accustomed. Here I may remark in passing that feeding cakes are not used to the same extent as in Great Britain. Fattening of cattle is not so extensively carried out, store cattle are usually out-wintered and the grass is supplemented with hay only, while for dairy cows, since winter dairying is the exception and not the rule, any concentrated foods given consist chiefly of maize meal, bran and crushed oats or barley. Many of the Agricultural Instructors point out that cattle and pigs do not at first consume palm-kernel cake or meal very readily; one agriculturist complained to me that his deliveries of this product last winter were not uniform and that even when his bullocks had become accustomed to one lot of meal, they refused for several days to eat that of the next consignment; again I have been informed that coco-nut cake will not keep well when stored and that loss has occurred through part of a consignment becoming unfit for stock.

Reports from a number of the Agricultural Instructors show that merchants in various counties have bought consignments of palm-kernel cake or meal and that they have been unable to persuade farmers to buy the material. It is easy to understand that a trader after one experience of this kind will hesitate before risking the purchase of a consignment of another new feeding stuff until he is assured that it will not be left on his hands.

I understand that some merchants in Ireland are doubtful of the expediency of pushing the sale of palm-kernel and other nut cakes at present, as they are not convinced that supplies of these feeding stuffs will be available after the war to the same extent as at present.

Price is also an important factor in the sale of these feeding stuffs. I do not say that the present enhanced prices are not justified, but it appears that the prices of palm-kernel and coco-nut cakes have advanced in recent months at least as much as those of the better known feeding stuffs. Some persons have expressed surprise at this in view of the much larger quantities which presumably are now being made in Great Britain as compared with pre-war times. I have been informed that the present price of palm-kernel cake tends to restrict its use in certain districts.

I have endeavoured to enumerate the chief difficulties to be overcome in extending the use of these three feeding stuffs in Ireland. Probably the greatest obstacle is the inherent conservatism of agriculturists, but in every profession or industry there are men ready to take the lead and to set an example to their more cautious brethren, so it is with the farmers of Ireland.

As an example of what may be accomplished by a merchant even in a district which is not one of the most progressive in Ireland, perhaps I may be permitted to quote an extract from a letter I received not two weeks ago from Mr. Charles Kelly, Letterkenny, County Donegal. It is as follows:—

“Palm-nut cake. I am selling agent for the African Oil Mills Company, Limited, Liverpool. I sold in the year—

1914—449*l.* 5*s.* 5*d.* worth
1915—1,040*l.* 8*s.* 0*d.* worth.

“It is extremely slow work at first to get farmers persuaded upon the merits of a new food, and I had to be satisfied to wait until the more intelligent men gave their results—when the trade moved more easily. The demand this season is extending, people are feeding palm-nut cake and meal to milch cows, stall feds, pigs, also poultry.”

“I understand poultry owners find it satisfactory in the way of egg production. Palm-nut meal was fed during last season in limited quantities to horses, particularly by dealers who buy six-quarter olds.

“Coco-nut cake is much appreciated, particularly as a calf meal, but latterly there is no English manufactured coco-nut cake obtainable at Liverpool. Ground nut or earth-nut cakes are unknown

in County Donegal. I have been trying to sell some but so far without result.”

Although Mr. Kelly does not refer to the fact in the letter from which I quote, he fattened a small lot of pigs successfully himself on nothing but palm-kernel cake and swede turnips, along with small quantities of buttermilk and treacle, and I have no doubt his enterprise in that direction contributed to his success as a selling agent for palm-kernel cake.

III.—Experiments.

A number of experiments have been carried out by Agricultural Instructors or on the Department's own farms with palm-kernel and coco-nut cakes or meals. I propose very briefly to refer to several of these tests.

(a) Experiment with dairy cows in which palm-kernel and coco-nut cakes were tested against decorticated cotton cake, each cake being fed at the rate of 4 lb. per head per day along with a constant quantity of roots, hay and meal.

The results stated briefly were that the palm-kernel cake produced almost exactly the same quantity of milk as the decorticated cotton cake, while the coco-nut cake increased the flow of milk to the extent of about one gallon per cow per week as compared with the decorticated cotton cake. The percentage of fat in the milk in each case was increased by .25 in favour of the palm-kernel and coco-nut cakes.

(b) Experiment with pigs in which one lot received a mixture of maize meal (5 parts) and pollard (4 parts) while the second lot received during the first period of 39 days a mixture of equal parts of palm-kernel meal, maize meal and pollard, and during the second period of 13 days palm-kernel meal (2 parts), maize meal (1 part) and pollard (1 part). Both lots in addition were given separated milk. The total weight of meals and milk given to each lot was the same. There were five pigs in each lot.

The result of the experiment was that the lot to which palm-kernel meal was fed showed a total live weight increase of 1 qr. 5 lb. more than the other lot. The instructor who conducted the test stated in his report that:—

“It was noticed that the pigs in lot 2 (palm-kernel lot) consumed their food with evident relish and would have eaten more than lot 1. Taking the actual prices paid for meals, viz.: maize meal and pollard 10*s.* per cwt. and palm-kernel meal 6*s.* 6*d.* per cwt., the pigs in lot 2 were fed 4*s.* 2*d.* per head cheaper than those in lot 1.”

(c) In another experiment the results were even more favourable to the palm-kernel meal.

In this case there were two lots of pigs of four in each:—

Lot 1.—The food consisted of equal parts of maize meal and pollard.

Lot 2.—The food consisted of equal parts of maize meal, pollard and palm-kernel meal.

Both lots received in addition separated milk and each lot was given as much food as the pigs would eat.

At the conclusion of the test the palm-kernel lot weighed 3 qrs. 14 lb. more than the other lot, but against that must be charged the cost of 2 cwt. extra meal mixture which the pigs consumed. The value of the extra 98 lb. live weight increase was about 49*s.*, while the cost of the extra meal consumed was about 18*s.*; in other words, after deducting the cost of the extra food consumed the pigs in lot 2 were worth about 7*s.* 6*d.* per head more than those in lot 1, and they had been fattened on a meal mixture costing from 15*s.* to 20*s.* per ton less.

(d) In 1909-10, in a very carefully conducted experiment carried out by the department with pigs, half the meal mixture for one of the lots consisted of coco-nut meal.

At that time coco-nut meal cost 1*l.* 3*s.* 9*d.* per ton more than the standard mixture of meals in use, namely, equal parts of maize meal, barley meal and pollard.

In the report which was published it was stated that

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“the coco-nut meal does not appear to warrant the extra price of 1*l.* 3*s.* 9*d.* per ton paid for it,” but it was also stated that “had the coco-nut meal been used in smaller proportions the results might have been different.”

IV.—*Opinions of Agriculturists who have used Palm-kernel, Coco-nut, and Earth-nut Cakes for feeding to Cattle and Pigs.*

I think it is desirable to refer to each of these feeding stuffs separately.

(a) *Palm-kernel Cake and Meal.*

Palm-kernel meal is used more extensively in County Wexford and the surrounding counties than elsewhere in Ireland. So far as I know this is the only part of Ireland in which a trade in this feeding stuff was firmly established for some years prior to the outbreak of war. Elsewhere it appears to have been purchased only from time to time by a very limited number of agriculturists.

It may be of interest if I quote from the report of the Agricultural Instructor for County Wexford as follows:

“Palm-nut meal is extensively used in this county.

“It is fed to dairy cows, young cattle, fattening cattle and fattening pigs.

“It is usually mixed with other meals (barley, oats, Indian meal, &c.), it is fed both dry and steeped in hot or cold water.

“To cattle it is usually fed with roots.

“For pigs it is mixed through boiled potatoes, boiled turnips, raw pulped turnips or mangels, Indian meal porridge, &c.

“The meal is much more extensively used than the cake.”

The reports I have received from the Agricultural Instructors, from merchants, from agriculturists and from the managers of the Department's farms are generally, but not uniformly, favourable to the use of this feeding stuff. But on the whole they confirm my own experience. During the past twelve months I have used palm-kernel meal as a constituent part, varying from one fifth to one fourth of the meal mixture for fattening pigs, and I regard the results as eminently satisfactory. I have also used palm-kernel meal in the rations of dairy cows with satisfactory results. I have no personal experience of its use for fattening cattle, but it was used extensively for this purpose last winter on one of the Department's farms, and apart from the difficulty of getting the cattle to eat it the manager has stated that he regarded it as suitable for that purpose.

I may here refer to the statement already given in the quotation from the letter of Mr. Kelly, the County Donegal merchant, that palm-kernel meal has been used in some cases for feeding to horses and poultry. One of the Agricultural Instructors has also stated that he has known palm-kernel meal to be fed to horses along with boiled swedes.

(b) *Coco-nut Cake and Meal.*

Coco-nut cake, like palm-kernel cake, has been used in County Wexford for a number of years, but not to any great extent in any other part of Ireland. I would like to quote again from the report of the County Wexford Instructor as follows:—

“Coco-nut. This meal is not so extensively used as palm-nut.

“It is usually fed to dairy cows, and to fattening and young cattle.

“The meal is used more frequently than the cake, it is usually mixed with other meals and fed in same way as palm-nut meal.”

I have no personal knowledge of the use of this feeding stuff, but I learn from a number of sources that farmers who have used coco-nut cake are pleased with the results. It is fed in some of the grazing districts in Ireland to cattle on the grass, particularly during winter and spring. In other districts it is fed to dairy cows and to pigs, and I am informed with good results. I have reason to believe though that for pigs the best results are obtained when it is given in limited quantities.

(c) *Earth-nut Cake.*

This feeding stuff has been introduced into Ireland only quite recently. I have a consignment on order which I intend to use for dairy cows. I have no direct testimony as to this cake except from the manager of one of the Department's farms who is feeding it to cows at the rate of 3 lb. per head per day, and so far with satisfactory results.

6149a. (*Chairman.*) You come from the Irish Department of Agriculture?—Yes.

6150. You have submitted to us some very interesting notes, though it has been a little late for some of us to go through them carefully before you came. Can we let them stand, with any alterations you like to make, at the head of your evidence?—Yes, I am quite willing that should be done.

6151. You have given us, to start with, the statistics as to counties in which cake and meal are used fairly extensively and those in which they are used to a limited amount, and later on you say it is really round Wexford and that district that cake and meal are being used most?—Prior to the outbreak of war I do not know any other district in Ireland where the trade was established firmly.

6152. Was much used there prior to the war breaking out?—I have not any statistics of the quantities. Mr. O'Connor, whom the Department suggested should give evidence and whom I understand you have asked to give evidence,* might have been able to give you some information on the point because he is actually a trader in Enniscorthy, I think. I myself saw some figures which the Instructor for Wexford obtained from Mr. O'Connor the other day, and I am rather diffident about giving them if he is coming to give evidence. As far as I remember the quantity consumed in the last twelve months was about 100 tons.

6153. Since the outbreak of war?—Yes. During the past twelve months to the present day it is about 100 tons which he sold and used on his own farm; that is palm-kernel cake and meal.

6154. The point I was really making was (without your binding yourself to any particular figure), whether there had been any use of either cake or meal there before the war broke out?—Yes. The only place in Ireland where it was used, as far as I know, to any appreciable extent, was Wexford.

6155. Was it from the African Oil Mills?—I have no evidence as to where it came from.

6156. Because practically, except for a certain amount made by the African Oil Mills, there was little, if any, made in the United Kingdom before the war?—We had some samples analysed in the Department from various places. I do not know if there are any from Wexford which would throw any light on it.

6157. I mean before the war. There has been a great change since?—There are no dates to these analyses so that they would not help very much.

6158. At the bottom of the first page in your memorandum which you sent us, amongst the difficulties that were encountered you state that the deliveries had not really been uniform, and that, consequently, this lack of uniformity—that is, in reference to palm-kernel cake—tended to rather put off any farmer who had been trying it. Do you know if it was at all a common experience?—I cannot tell you if it is common. I want to say at the outset of my evidence that I have put down all the difficulties that anybody has informed me of—everything on the wrong side that I heard—so that the Committee would know what opinion is held either by one or more people in Ireland who use the stuff. My evidence on that point is founded on the statement of the manager of one of the Department's farms. He told me that he used about 15 tons of palm-kernel meal during the last twelve months; I cannot say whether he used any cake or not, but it was mostly meal. He was feeding it to bullocks and he told me that he had some difficulty in getting the cattle to take it at all, but that was only a matter of days, or two or three weeks until they became accustomed to it, and then they ate it quite readily. He said that when he

* Mr. O'Connor was not able to attend.

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had used up one lot and had got in the next consignment, he had the same difficulty over again. So impressed was the foreman in charge of these particular cattle that he came to my colleague the other day, and said: "I hope you are not going to buy any more palm-nut meal for the bullocks this winter, as I had enough trouble with it last winter." That is the only evidence I have as to the deliveries not being uniform. I have evidence from a great many places that cattle do not eat the stuff very readily at first. I have also been informed that that is now overcome to some extent by supplying what is known as a flavoured palm-nut meal. I have seen a sample of that flavoured stuff and it certainly has an aromatic flavour and taste which should overcome the difficulty. I had very little difficulty myself in that way. I have charge of one of the Department's farms, so that not only have I been able to collect evidence from various people, but I have also had some experience in using the stuff on that particular farm. We had a little difficulty in getting the stock to eat it, but not much, because we mixed it in moderate proportions with other foods, and neither with cattle nor pigs was the difficulty serious.

6159. Did you mix it with barley and oats?—I mixed it with various foods.

6160. This instance that you noted was really with regard to meal when you said it had differed in sample. I want to get it clear. There is rather an important difference in method of manufacture and various other ways between the meal and the cake?—My note from this particular farm is: "About 15 tons of palm-nut cake and meal fed during the past year," and "the stuff not uniform." I had a conversation with this particular farm manager. I was so impressed with the point that I telephoned to him and asked him very particularly about it. He told me what I have told you. I gathered that it was the meal, because it is practically all meal that is used there.

6161. I can imagine a considerable variation in cake according to the method by which it has been crushed and the amount of oil which is left in it. That makes a good deal of difference. Possibly it is less easy to understand how one kind of meal can differ from another. Which meal was it that you referred to. Was it the extracted meal or the crushed meal?—I asked him which brand it was, and I tried to get all the particulars I could of this particular incident. He said he had not the name of the brand but he told me the name of the firm from whom he bought it.

6162. Perhaps you could tell us that?—It was Messrs. Paul and Vincent of Dublin from whom he got deliveries. I have seen the managing director of that firm since, and although I had not this incident in my mind, I asked him in connection with my evidence generally what makes he sold, he said: "Two: the African Oil Mills and Smith's."

6163. Then when you are talking of meal have you the difference in mind; that is to say, meal which is made simply by grinding up the cake which has been pressed, and meal which is got by extraction, which is very much more fluffy. Have you had the difference before you?—The meal I have used myself and on which I can speak quite definitely is a grey gritty meal, and its guaranteed percentage of oil is about 5 or 6, and of albuminoids about 19 per cent.

6164. That is really cake ground into meal?—Frankly, I do not know.

6165. Have you had the light, extracted meal?—I obtained a sample of flavoured palm-nut meal the other day, containing 4 per cent. of oil and 15 per cent. of albuminoids. That was very different from the meal that I have been using myself because it was more light and fluffy, as you describe. That is the only sample I have seen which approximates to your description.

6166. You do not know whether that has been used at all extensively in Ireland?—I understand that a good deal of this flavoured meal is being used, and the Star brand that I saw the other day would approximate very closely to your description of the light fluffy meal.

6167. For what animals and under what conditions would that be used. Obviously you could not feed it by itself in the open to bullocks?—No. There is very little concentrated food fed to cattle on the grass in

Ireland. The main system of feeding cattle in the open is hay and hay only when wintering store cattle. Of course, if fed inside—there is a certain amount of stall feeding done—the difficulty does not arise to the same extent because it can be mixed with other foods.

6168. With regard to the Star brand, which is a light extracted meal, for what purpose is that chiefly used. Is any of it used for bullocks?—Yes.

6169. Or would it be used inside for pigs?—For both—and for dairy cows as well.

6170. On the whole, with the light meal have you experienced any indications of how people are taking to it?—You are asking me questions about something that I am perhaps less clear about than anything else—that is this light meal. The only sample of light meal that I have seen is the one that I saw the other day of the flavoured stuff with 4 per cent. of oil and 15 per cent. of albuminoids. The man who sent me that reported very favourably on it and said that the people are pleased with it and its use is extending in his district. I have no other evidence where any distinction is made between ordinary palm-kernel meal and the light meal, because it is all described in the notes submitted to me as palm-kernel meal and no distinction is made. My own experience is confined to one sort which is, I take it, ground cake containing 6 per cent. of oil.

6171. It is worth while bearing in mind the distinction as between a heavy meal which is merely ground cake and a light meal which is made by quite a different extraction process?—I am sorry that I have no definite evidence to offer you on this point.

6172. It really affects the question of whether grinding or extraction is the better, if the industry continues. Is much feeding stuff used for pigs in Ireland?—Yes.

6173. If it found its way, would there be a biggish market for it?—Ireland is a big pig raising country.

6174. Do you feed pigs more extensively in proportion to other countries than you feed cattle?—Yes, much more.

6175. Therefore there is a great deal of food used for pigs at the present moment?—Yes.

6176. Consequently there would be a biggish market for meal of either kind if it found favour?—Yes.

6177. Would it be possible to find out the kind and extent of the market. If you were a crusher wondering whether you should set up a mill you would say to yourself "what is the likelihood of my getting a market for my cake or extracted meal." In Ireland, especially, if a light meal is more likely to be used for pigs than cattle, he would say, "how great is the market in Ireland to which I can look if I push it." Have you any idea of the size of the market?—Not in actual tons per annum, for instance, but some guide would be obtained or some light would be thrown on the subject by looking up the imports of maize and maize meal into Ireland. A very large proportion of that import is fed to pigs, of which we might reasonably assume a fair proportion, could be replaced by this meal if farmers can be educated up to use it and if they find it satisfactory. I have not got with me a copy of the Report on Exports and Imports. All I can say in general terms is that pigs are fattened on a fairly large scale in practically every county in Ireland. That is so to a less degree down the east coast, round about Dublin and Louth, but in most other districts through the west, south, north, and the midlands, excepting in the grass counties, pigs everywhere are fattened; and at present the main feeding stuff used is maize along with a certain amount of pollard and potatoes.

6178. In your notes you say that, on the whole, palm-kernel meal, of whatever kind it be, compares very favourably with maize at the price?—I have given briefly the result of two experiments in support of my view, and I am able to say I have been using it myself, and I have had very great satisfaction from it.

6179. Even without binding yourself to a figure you could not give any approximate idea of the amount of maize so used at present?—No.

6180. Would you say 10,000 tons or 50,000 tons?—Far more than that, but I will send a copy of our

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returns with the figures of our imports if that will help you.

6181. We shall be very glad to have them. So far as you are able (again without committing yourself to exact statistics), could you give some idea of the proportion which is used for feeding pigs, because it is that market we want to get an idea of?—That must be a guess at the best; but I will see if anyone can give me any guidance on that and I will look into it closely.

6182. We quite realise that we can get no more than a guess but a well informed guess is better than nothing?—I will give you any help that I can.

6183. I see you mention in your memorandum the feeding of meal to horses and possibly to poultry?—Yes.

6184. Has there been much experience as regards feeding it to horses?—I have only heard of it from two sources, one of them being the letter that I quote from Mr. Kelly, and the other is from an Agricultural Instructor in County Carlow. He also said that he had seen it fed with boiled swedes. I do not know whether it is common in England but it used to be in Scotland and still is in Ireland to feed boiled swedes both to cattle, horses, and pigs. This man said that he had seen it fed with boiled swedes to horses with good results.

6185. You mention that there is a certain amount of apprehension that the supply cannot continue after the war. Are you aware that the crushing of palm kernels on quite a large scale is beginning in England?—That was my impression.

6186. So really that apprehension has not a great deal of foundation. There is much more reasonable apprehension as to whether there will be sufficient market for the palm-kernel meal or cake that is produced?—One of the shrewdest men that I know in the feeding-stuff trade in Ireland, said to me last week, as far as I remember: "Some of the shrewdest men in Ireland are doubtful about pushing the sale of this cake, because it may not be forthcoming as easily and as readily and at as reasonable a price after the war; the supply may go to Germany very largely again or it may not." I said to him: "I suppose by 'the shrewdest men in Ireland' you mean yourself, because you are a pretty shrewd man." He said: "I have some doubts whether it would pay us, for instance, to advertise this thing very largely and push the sale of it." He is a man who, if he saw anything in it, would take it up and push it.

6187. Then if there was any security that there would be a continuation of the palm-kernel crushing in this country that would be an inducement to them to push the sale of it?—There would be no more point in that man's objection, and he is a shrewd man.

6188. That is at present one of his objections which would be overcome?—That is how he mentioned it to me. After all, the great difficulty is the farmers—the conservatism of the farmers. We always have that; no matter who else you may convince you have to persuade the farmers to buy.

6189. You had the same conservatism and overcame it with regard to Bombay cotton cake in its time?—Yes.

6190. There is a question whether the price has risen too much, and is at present too high. The idea of most of us was that although the prices of all feeding stuffs had advanced, yet that of palm kernels was still rather low in comparison with others, based on its proportionate value?—Several people in Ireland said to me, and I have it in written evidence from certain places, that the present price militates against the sale of this stuff. One man reported that when palm-kernel meal could be sold at 6*l.* a ton, there was a large sale for it. Now when it is 8*l.* a ton and over, the sale is very largely dropping off. Another man, a merchant, said to me: "When palm-kernel meal gets beyond 7*l.* a ton, we cannot sell it." So I began to look into the question of price, and the extent to which it had risen, and I took the published figures of the Board of Agriculture for England and just jotted them down very roughly for the last six months. They are abstracted from the articles in the Journal of

the Board of Agriculture for England by the Animal Nutrition Institute at Cambridge. I have not the figures for November, and I merely quote this in support of the statement made to me in Ireland. I have looked into it to see if there was anything in it, and I find per digestible food unit, the prices of palm-kernel cake and coconut cake have risen just as much as the prices of decorticated cotton cake and linseed cake.

6191. At present, however, I think they are still lower, though they have both risen. Is not the price of palm-kernel cake per food unit lower than that of linseed?—It is lower than that of linseed but not lower than that of decorticated cotton cake. I can give the figures. If you take the October figure you will find that the price per food unit (digestible) of palm-kernel cake is higher than that of decorticated cotton cake.

6192. It has just passed it?—Yes, and it began considerably lower.

6193. That is on the ordinary method of analysis, is it not?—It is on the quite up-to-date analysis of the digestible food units; it is not total food units.

6194. Have you got the actual prices on which those are based?—No; they are in the Board of Agriculture Journal, and they are the averages of the prices at four ports. In this article each month they calculate the price per digestible food unit based on the current prices at four ports.

6195. The most recent method is not to take the digestible units instead of total food units, but to separate the nutrient values. But I had better not go into a fresh method of calculation because that would lead us too far. However, in your opinion, has the price as a whole risen sufficiently high to check the sale going forward largely?—I have evidence from King's County, where it was used most extensively last year when the price was 6*l.* a ton, and the sale is much less now that the price has risen to 8*l.* a ton. A merchant in Dublin said to me the other day, "I cannot sell palm-nut meal when it gets beyond 7*l.* a ton." I do not know if you are interested in coconut cake?

6196. We are glad to hear evidence on it?—The same statements have been made regarding coconut cake, that the present price of, say, 10*l.* 10*s.* a ton retail to the farmer in Ireland militates against the sale of this article.

6197. The only reason I asked you the question was that the latest calculations of the value place the proportionate value of palm-nut cake rather higher in comparison with undecorticated cotton cake and linseed cake than was previously suggested in calculating those food units?—My figures are taken from the Journal of the Board of Agriculture.

6198. (Professor W. R. Dunstan.) Do you mind putting in the analyses that you have of palm-kernel cake and meal, because they are rather interesting from the point of view of the experience you have quoted in this memorandum, which I have not studied so minutely as I should like because I only had it this morning. If you put them in we can see the composition of the material generally used?—You mean the analyses of the samples which have reached the Department and have been analysed by them?

6199. Has the Department itself analysed samples?—Yes; those are the figures that I have before me. There is nothing very striking in them except that the analysis often shows a very marked difference from the guarantee; it is often above it.

6200. If you have no objection to putting them in they may be useful?—I have no objection to giving the figures. I do not know whether the Department would like the names of the firms who made the stuff, or where the samples were taken, to be published, because I do not know in exactly what form they were taken. I merely went to our section in charge of this matter, and said, "Have you analysed any samples of coconut cake or meal or palm-nut cake or meal, and, if so, will you give the figures?" They said they had, and I got the figures.

6201. (Chairman.) I do not think we need necessarily see the sources at all?—I name the samples A, B, and C, or give the name of the manufacturer,

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where we have it, but I would ask that it should not be published, because I have no authority from the Department.

(*Chairman.*) Certainly; we have no wish to publish them.

6202. (*Professor W. R. Dunstan.*) With regard to these figures of values, they have been obtained by taking the analysis and calculating the digestible food unit?—Those figures are quotations from the Board of Agriculture Journal.

6203. Do you happen to remember whether the indirect manurial value was taken into account?—Yes. They refer to that either in the Journal or in one of their leaflets.

6204. Indirect in the sense of it being through the animal that eats it?—I fancy a footnote in one of the Board of Agriculture leaflets would give that.

6205. I rather thought from a question of the Chairman that probably that had not been included?—I do not remember. I merely took those notes to see if there was anything in the contention about the price having risen.

6206. In August the value of palm-kernel cake, calculated in that way, was 1s. 4½d., and in October 1s. 8½d.?—You have the figures before you. I merely took them for the purpose of seeing if there was anything in this contention. They can be easily checked from the Board of Agriculture Journals.

6207. So far as I can see, they are the figures I am accustomed to, but the calculation of prices is October 1915?—Yes, each month in 1915.

6208. Your view is that if the palm-kernel cake is mixed with other foods and properly flavoured there would not be any great difficulty in getting animals to eat it?—I have not had any great difficulty.

6209. Have you had any experience with horses?—No.

6210. As to pigs, what is your view of the comparison of this material with maize. Would you regard it as a substitute for maize in the strict sense of the word, or a material to be fed with maize?—I have never used it as a substitute in the strict sense of the word, but I have used it as a constituent part of a mixture in which maize was also a constituent part. One experiment was maize meal and pollard, against maize meal and pollard and palm-kernel meal. The other was the same. So really it is there replacing equal quantities of maize and pollard; that is what it comes to.

6211. But in the food consumed by the pig there will be more than one constituent?—In the experiments that I quote there were three constituents. Those appear in my memorandum under the heading of "Experiments." Experiment (a) is with dairy cows; (b) and (c) are with pigs.

6212. But it is clear that it was actually a mixture that was fed to the animals?—Yes.

6213. So that it would be a case of considering to what extent palm-kernel cake could enter into what we call the "pig ration"?—Yes. I have no evidence of any instance in which it has been fed alone, except one to which I refer in my notes at the top of page 3.

6214. Was the palm-kernel cake in that case fed with the swedes?—Yes.

6215. And with small quantities of butter-milk and treacle?—Yes. You will always have that. Very few people fatten pigs who do not use some sort of dairy refuse or roots.

6216. When the figures that you are to send us are calculated, it could not be assumed that palm-kernel cake would replace those quantities of maize?—No. I distinctly stated it might replace only a proportion of maize.

6217. Quite so. With regard to poultry feeding what is the present food; is it maize as a rule?—Very largely, and potatoes, and grain of some kind—largely oats.

6218. There again the probability is that palm-kernel cake would be used in a mixture?—Yes, in every case I would say, for all stock practically.

6219. With regard to ground-nut cake you say that you have had very little experience, and it has been hardly used at all. It comes out very well in these

figures of values that you put in, in comparison with the feeding unit?—Yes.

6220. Do you know why it is that no trial has been made with ground-nut cake in Ireland?—It has not been offered to people in Ireland until the last two or three months. As far as I can gather nobody in Ireland heard about it until the last two or three months. A firm in Cork wrote to the Department, two or three months ago, and said that they had been offered "Coromandel brand," and should they use it?

6221. Are you testing ground-nut cake at present?—Yes.

6222. Do you know whether it is made from decorticated or undecorticated nuts?—It is the "Coromandel brand," which I understand is made from decorticated nuts. Its analysis indicates that it has a total of 52 per cent. of oil and albuminoids.

6223. There is some difference of opinion as to whether it is best to use decorticated or undecorticated ground-nut cake?—My impression was that the use of undecorticated ground-nut cake was decreasing and decorticated was being substituted.

6224. There is a difference of opinion in this country about it, and it would be well to try both kinds of cake?—I have no experience of that.

6225. We have heard of a number of cakes which, on the face of them, ought to be very valuable feeding stuffs. What is your own view as to the best way to get the merits of those cakes known and the cakes afterwards used in Ireland. Do you think your Department could help?—Yes, I think they could help by carrying out experiments.

6226. And then publishing leaflets?—My own view is that the experiments would have more effect in that direction if carried out through the local instructors in the different counties. They would arouse more local interest and bring the thing more home to the people in the counties than if the experiments were carried out on the Department's own farms, and leaflets were circulated giving the results.

6227. Would the counties work under your Department, and would you control their experiments?—Yes.

6228. Would you be perfectly willing to do that?—I am not speaking for the Department, but I do not think the Department is slow to take up anything new if they think it likely to lead to good for the farmers. They have the interests of the farmers at heart, and they are willing to do anything they can.

6229. (*Mr. G. A. Moore.*) Have you any records going back any number of years with regard to the use of palm-kernel cake?—No, I am sorry to say that I have not.

6230. Then you cannot tell me whether the use declined before it came on just recently, for instance, that there was a more extended use twenty years ago?—I am sorry I cannot tell you that. I do not know if this feeding stuff is enumerated separately in the Department's Reports on Imports and Exports, but in any case the records would not go back so far.

6231. You are aware perhaps that the two Liverpool crushers twenty years ago had agencies in the west and south-west of Ireland for the sale of palm-kernel and coco-nut cake?—I have no knowledge of that.

6232. You mentioned the "Star brand." Can you say if that is a brand of meal which came direct from a crusher. I am not asking for the name?—No, I am sorry I cannot say. This name of "Star brand" only comes to me from one source; an instructor referred to flavoured palm-nut meal being used in his district, and mentioned that this was how they had overcome the difficulty of getting stock to eat the meal. So I wrote for a sample of it; he sent me a sample, and in his letter he said: "It is known commercially as the 'Star brand' flavoured palm-nut meal, and is guaranteed 4 per cent. oil and 15 per cent. albuminoids." That is the only time I think I ever heard of the "Star brand."

6233. Do you know whether, apart from the flavour, it had any other constituent?—No, I cannot tell you that. I will send you a sample of it if it would be of any interest.

6234. The reason that I ask is that with 4 per cent. of oil it is evidently a mixture, because there is

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[Continued.]

no meal which coming direct from the press has so little as 4 per cent., and no extracted meal which has as much as 4 per cent. left in it?—I appreciate that point. I believe I did see this "Star brand" quoted in Cork the other day, where a man was buying some of it, and I believe it was cake.

6235. In comparing the list of prices, what did you start from as the lowest price of palm-nut cake, or what is the extreme range?—1s. 4½d. to 1s. 8½d.

6236. I want it per ton?—In the notes published by the Animal Nutrition Institute at Cambridge it is averaged from the prices at four ports.

6237. The price of palm-nut cake for export was somewhere in the neighbourhood of 6l. a ton just before the war, but immediately after the war commenced, and people could not go on with their contracts, some was sold by auction at 4l. 2s. 6d. a ton. That was a very smart drop, and that was the price at which it started for consumption on the English market; but to-day you can sell it freely at 7l. a ton on the Liverpool market to a country dealer. I could sell quantities of it if I had it?—I never heard of it being sold in Ireland even at the cheapest period, just after the outbreak of war, at less than something over 6l. a ton to the farmer. At present it is about 8l. a ton to the farmer.

6238. The value in Liverpool to-day is about 7l. 5s. 2 —We have the expenses and the merchant's profit to add on to that.

6239. (Sir W. G. Watson.) You spoke about a cake merchant telling you that he was rather nervous of the supply of palm-kernel cake for the future?—Yes.

6240. I suppose you know that in all probability there will be a sufficient supply after the war owing to the fact that several new mills are being put up?—I was myself hoping that there would be a very much larger supply after the war, and that is my impression.

6241. On the other hand you also realise that if the German market is higher than the English market—in other words, if German farmers will give a higher price, after taking freight into consideration, there is no doubt that many of these mills will sell their cake to Germany or to the Continent if the price there is higher?—I would regard that as an ordinary business proposition, purely and simply, and I think it will take place in such circumstances as you have mentioned.

6242. Another man told you that he would not give a higher price than 7l. for palm-kernel cake?—The merchant's remark to me was this: "When palm-kernel meal rises above 7l. a ton I cannot sell it."

6243. He would mean that was relative to the present price of other feeding cakes?—He was not defending the farmers for not buying it. He conveyed to me, through conversation, that even at the present price he regarded it as good value, which would be broadly 8l. with him, because he said it was 7l. to 7l. 5s. in Liverpool that he would have to pay for it.

6244. You said that the present price of coco-nut cake was 10l. 10s. a ton?—10l. to 10l. 10s. to the farmer in various districts in Ireland after we have paid freights and railway carriage on our side, and the merchant's profit on selling it.

6245. I take it that freights now even to Ireland are higher than they used to be?—Yes, so I am told.

6246. (Mr. T. Wiles.) How many cake mills have you in Ireland?—Not many. There are one or two in Dublin, and one or two in Belfast, and I believe there is one in Derry.

6247. Have they experimented at all with palm-kernel cake?—Not with making it so far as I know.

6248. Where do you get your supply from, usually?—Mainly Liverpool, I understand.

6249. Your supply comes from Liverpool and not from Bristol?—It may come from Bristol for the south of Ireland. I am not clear on that point. I have a note as to some makers who were selling this stuff: they were Messrs. Lever Bros., the African Oil Mills, Messrs. A. Cross & Sons, of Glasgow, and the British Oil and Cake Mills.

6250. May we take it that practically 60 or 70 per cent. of the cake used in Ireland comes from this side

of the water, from Liverpool, and so on?—Of all cakes—linsed, decorticated and undecorticated cotton cake—I am sorry I cannot give you any idea of the proportion.

6251. I was trying to find out if there would be any chance of the mills in Ireland crushing, so that the Irish farmer, who now seems to be handicapped very heavily with two, three, and four freights, and two, three, and four profits, could get it cheaper?—From the Irish farmers' point of view it would be most desirable. Whether Irish cake manufacturers would consider it so I cannot say.

6252. Have not the farmers got co-operative societies in Ireland?—Yes.

6253. Have they purchased kernel cake?—I do not know that I have any direct evidence, except that I understand one society in Enniscorthy is selling it. I am quite sure, for instance, in Co. Wexford, where it has been used for a long time, it has been sold through some of the co-operative societies. I was speaking to a very progressive farmer from Wexford the other day, and I was mentioning to him earth-nut cake, and his remark was, "I will inquire about it at the co-operative society with which I deal." I take it that he buys the coco-nut and palm-kernel cake from that society. But Mr. Smith, who was invited to give evidence, would have been able, I think, to give you just that information; I am sorry, but I have nothing definite about it.

6254. (Sir Owen Philipps.) You have a large number of creameries in Ireland, have you not?—Yes.

6255. Both co-operative and otherwise?—Both.

6256. Do not those creameries use considerable quantities of palm-kernel cake in connection with their skimmed milk in feeding pigs?—It is very unusual in Ireland for a creamery to feed pigs; the separated milk as a general rule is returned to the farmer.

6257. You say it is very unusual?—Yes, for the creameries to do it.

6258. I have been told that the best clients that one of the big English firms have for purchasing palm-kernel meal made from the palm-kernel cake have in the past been the co-operative creameries in Ireland?—I can quite believe it, but it would be for sale to their customers if they did so. They must combine the selling business along with their creamery business. I do know that it is most unusual for co-operative creameries in Ireland to fatten pigs. I understand that one or two do it, particularly where they are making cheese, of late years, and using up the whey in that way.

6259. If they have been buying regular quantities from Liverpool you think it would probably be to sell to the neighbouring farmers, who take their skimmed milk back?—To the customers who supply the creamery with milk, I should say, because in my experience the fattening of pigs is very rarely practised by creameries.

6260. You mentioned the very interesting fact in your evidence that in the case of milking cows fed with palm-kernel cake the amount of fat in the milk increased?—Yes.

6261. That is a very important point to dairy farmers, is it not?—Very. I give you the experiment as one experiment; I would not like to generalise from one experiment, no matter of what nature it was; but that certainly was the result of that experiment, which was very carefully carried out.

6262. But if it can be shown that palm-kernel cake did slightly increase the fat in milk, it should extend the market for it considerably?—Very much, I should say. It is a very strong point in its favour.

6263. Has your attention been drawn to the fact that up to the time of the war most of the palm-kernel cake made in England was exported to Germany because the German farmers paid a higher price for it than the English farmers?—Yes, I have read that.

6264. How would you account for that? Do you think the fact that it has this effect on the milk would probably lead to that result?—I am not prepared to speak for the German farmers.

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6265. Farmers all over the world are pretty keen as business men, are they not?—May I rather indirectly reply in this way, that our own farmers have not been educated up to the use of this cake as a new feeding stuff; they are conservative and slow to take it up. Speaking for Ireland that is, I should say, the answer to your question.

6266. In spite of that fact they are very keen business men?—Yes, I am not going to deny that.

6267. I mean they are very keen buyers?—Yes.

6268. My experience of farmers is that they can buy about as keenly as any man in the country?—I would be the last one to dispute that.

6269. Therefore the fact that a large number of farmers, wherever they live, have for years been willing to pay a good price for this cake shows that the farmers themselves must have appreciated some advantage in it?—I would rather like to quote the analogous case of milling offals and bran which I understand were very largely exported to the continent for exactly the same purpose of feeding dairy cows. They probably appreciated them rather more for that purpose than our farmers did. It is quite possible, too, that they feed their dairy cows more extensively than our farmers do—in Ireland certainly.

6270. You mean that you have richer pastures in Ireland than there are abroad?—We have good pastures, but, as I have said, winter dairying is not extensively carried out, and the feeding of concentrated foods is on a very limited scale.

6271. I gather you think it is very important that if these cakes are to be extensively pushed amongst the farmers in Ireland, there should be security that the business will continue after the war?—I can only answer again as I did to the Chairman, that it was one of the shrewdest men I know in the trade who made the remark to me: "What guarantee have I, if I spend a lot of money in advertising these cakes, that I will get them after the war?"

6272. Was he a dealer?—Yes, a merchant and dealer. I would just like to say that on the first page of my notes I give some statistics regarding the counties in which these cakes and meals are used. As I mention, those notes are compiled from the reports of our agricultural instructors, and it is quite possible that there might be a few farmers in any county or in every county who may be using those cakes unknown to the instructors. For instance, as to earth-nut or ground-nut cake, I say that in one county it is used to a very limited extent. That is the report from the instructors, but I have a letter myself from a farmer in another county who says he has just bought 6 tons of it and is feeding it to bullocks. That might apply generally; so these figures are only approximately correct.

6273. There are a large number of experiments being made in this coming winter by different agricultural colleges in England as to the merits of palm-kernel meal with less than 2 per cent. of oil in it, namely, that which is obtained by the extraction process. Do you know of any similar tests being made in Ireland?—No, I have not heard of any being made in Ireland.

6274. The matter has not yet come before your Board?—No; but I myself will bring it before the notice of the Department. You are particularly anxious about the oil-extracted meal?

6275. Yes, to see how the results compare with the meals obtained by simply grinding the cakes obtained by compression?—Yes.

6276. (Chairman.) You say that in the one experiment you noticed the feeding of palm-kernel cake had a good effect on the amount of butter-fat in milk. Would it interest you to know that is precisely the same result as has been obtained from other experiments?—It would be very interesting to know that.

6277. The result obtained from other experiments is that the increase may amount to what sounds small, which is one quarter of one per cent. on the volume of the milk; but, when all is said and done, that is one-twelfth of the amount of butter fat, which is considerable?—I am exceedingly interested in that.

6278. Are there any methods which you think we could profitably pursue, or get others to pursue, so as to get more general information in order to overcome the conservatism of farmers?—I have tried to bear that in mind right through. Ever since I was deputed to come here that has been before me steadily, but I am afraid I cannot give you very much help on the subject. I have thought it out very carefully, and, as I mention in my notes, you have not only to educate the farmers, but you have also to educate the merchants. Many merchants are sufficiently persuasive to do very much in that direction. The farmers are prepared to take their word. As an instance I may mention Mr. Kelly, whose letter I quote extensively in my notes because I think that exactly sums up what may be achieved by a man who hears of a thing that is cheap and good and worth purchasing. Mr. Kelly has sold 1,000*l.* worth this year, which represents over 100 tons.

6279. The co-operative societies, of course, are very powerful in Ireland, or some of them are?—Yes.

6280. Would it help matters if the results of experiments were brought to their notice, or possibly to the notice of merchants, so that they could quote them authoritatively or be convinced by them themselves?—That is part of a system of pioneer work which will be necessary to get the thing known and its use established.

6281. It would be useful, so far as experiments go?—Yes.

6282. (Mr. G. A. Moore.) When you say that palm-kernel meal is not saleable at over 7*l.* a ton now, what is it that the farmer pits it against. It is not against any other kind of cake, I take it, but rather against locally grown food. Is that the fact?—I do not want to press the point too much about the 7*l.* a ton, because it would only apply to one district, I think, where farmers are not particularly progressive; but it would be compared on the whole, I should think, with maize in that particular case.

6283. With maize and not with locally grown—as oats and other things?—Perhaps also that is just the dearest market in Ireland for locally grown cereals.

6284. I suppose the local value of home-grown grains will have a considerable effect on the demand for any artificial food of this kind?—Yes, I should say so. There is one other thing I should like to say. The Department makes a reference in two of their leaflets to the use of palm-kernel cake and meal. One of those leaflets specially refers to pig feeding. I would like to hand those in to show that the Department have not overlooked these new feeding stuffs. (*The same are handed in.*)

The witness withdrew.

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