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Fishery Leaflet 210

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CERTAIN ASPECTS OF THE GERMAN FISHING INDUSTRY

REPORT V - "WIKING EIWWEISS"

(A Protein Product manufactured from Fish)

One of a series of six fishery leaflets\* abstracted from BIOS FINAL REPORT No. 493, Item No. 22 prepared by Mr. W. H. Myles, Ministry of Fisheries, Dr. G. A. Reay, Department of Scientific and Industrial Research, and Lt. H. E. M. Farrer, Herring Industry Board, for the British Intelligence Objectives Sub-Committee, 32 Bryanstone Square, London, W. 1.

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General

The Company that had been manufacturing this product since just before the war is the Deutsche Eiweiss Gesellschaft, Wiking Haus, Schopenstehl, 22, Hamburg. The factory is situated in Wesermunde. Both office and factory were visited. At the former Herr P.P. Hiltner, owner, and Dr. Peters, his chemist, were interviewed. At the factory we were shown over by the Manager (name, probably Faerber).

About 50 patents have been taken out, nearly all in Hiltner's name. Three or four of these are in England - the rest in Germany, Italy and Norway.

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\*F.L. 206 Fish Processing Machinery, F.L. 207 Quick Freezing and Cold Storage of Fish, F.L. 208 Smoke Curing of Fish, F.L. 209 The Preservation of Fish by Canning and Related Processes, F.L. 210 "WIKING EIWWEISS" (A protein Product Manufactured from Fish), and F.L. 211 Institute for the Utilization of Fish of the Federal Fisheries Agency (Artificial Ice, Spoilage in Fish, Anti-Oxidants, and Fish Meal & Oil Manufacture).

Herr Hiltner told us that he had been in touch at one time with the English firm Fredk. Boehm, Ltd., in which Dr. Rewald, a Jewish refugee from Germany in 1939, is chemist. The Manager of this Company, Herr Lehmann, who lives in England, was keen before the war to put up a factory at Hull for the manufacture of "Wiking Wieweiss".

We were told that recently the factory at Wesermunde and the process had been shown to J. V. Backes, Director and General Manager of C. H. Goldrei Foucard & Son, 63/69, Llewellyn Street, London, S.W.

### The Process and Product

The raw material used is the flesh of white fish such as cod or saithe. In normal times the fish used were as much as 10 to 14 days caught and sometimes more. The Port Sanitary Officer decided what fish might or might not be worked up into a product meant for human consumption. Even from very bad, condemned fish, a satisfactory product could be obtained for technical uses. During the war the raw material used was mainly "stockfish" brought from Norway. This gave an inferior product - yellowish instead of pure white, and of a distinctly salt fishy aroma - but one that nevertheless was successfully used in soup kitchens.

The minced flesh of the fish is heated with stirring at 70° to 80°C. for 1 hour in 0.5 per cent acetic acid. This hydrolyses and extracts "glue" substances, mainly connective tissue. After washing in cold water in a rotating perforated drum to remove "glue" water, extractives etc., the material is pressed to reduce the water content to about 40 per cent.

The broken press cake is then continuously extracted for 6 to 8 hours with alcohol or trichlorethylene to remove lipid substances. Only the latter solvent was available during the war. The extracted material, in 300 kg. lots, is then dried under vacuum in a steam jacketed drier for 2 to 3 hours at a temperature in the material of about 50°C.

The insoluble product obtained is marketed in this condition for technical purposes in the textile and soap industries, who modify the material for their own uses. It was said that the product was incorporated with staple fibre for the purpose of colour binding.

The insoluble product, finely ground, is then digested with a solution of caustic soda, 500 litres of water being used with 100 kg. of dry protein, and the concentration of caustic soda being 5 to 8 g. per 100 g. protein. Digestion is carried out for about one hour at 30°C, followed by about one hour at 80° to 90°C.

The end of the digestion period is determined by testing the viscosity of the fluid - the limiting viscosity corresponding to a flow time of 40 to 60 seconds to empty a 100 cc. pipette with unstricted delivery end.

Neutralisation to pH7 with acetic or lactic acid follow. Lactic acid yields a product of more agreeable taste, but one that is rather hygroscopic. Acetic acid is therefore preferred.

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Finally, the neutralised fluid is "spray dried" in air entering the drying tower at 125<sup>o</sup> to 150<sup>o</sup>C., the prevailing temperature in the drier being about 80<sup>o</sup>C.

The pure white powdery product consists mainly of polypeptides with little or no free amino acids and is 100 per cent digestible. It was sold retail in 1 kg. cardboard packets with paper liner and transparent cellulose outer wrapping for RM. 9. The wholesale price was RM. 7.40. The price to the fish industries was RM 7 and to importers of Chinese eggs RM. 6.50. The raw material i.e. fish, was bought at the normal "fresh" prices of 7, 10 or 14 pf. per lb. This was a 'political' arrangement - if they could afford to pay this price, the upkeep of the fishing industry made it necessary that it should be paid.

The yield of product from a weight of landed fish (i.e. gutted but including head and tail) was 10 per cent. 1 kg. of the product was said to be the equivalent of 330 shell eggs. From "stockfish" the yield was 50 per cent, but bone was included in this wartime product.

Under the "four Years' Plan", 20,000,000 kg. of white fish were processed in four years, i.e. 5,000 tons per annum. The present plant at Wesermunde can deal with 1,500 tons of fresh fish per month, producing 150 tons of dried product.

The product had use in the food industry mainly as a substitute for eggs in the making of cakes, mayonnaise etc.

#### The Factory Lay-out (Wesermunde)

Complete plans and specifications of this plant are being asked for from Mr. Johnston, Central Fisheries Office, Hamburg. The factory was very up-to-date. It occupied for its size a comparatively small floor area, the production generally being spread over three or four open grid floors.

The main items in the production plant were:-

- (a) A steam jacketed cooking tank with stirring apparatus and outlet to a perforated washing drum;
- (b) A perforated rotating washing drum where the flesh protein is freed from acetic acid, the hydrolysis products of the connective tissue, and extractives, by a flow of cold water;
- (c) A sieve bottomed reservoir for the washed material;
- (d) A hydraulic press which reduces the water content to 40 per cent.
- (e) Two continuous extractors for treatment with alcohol or trichlorethylene;
- (f) A steam jacketed vacuum drier for recovery of solvents and drying of material in batches of 300 kg.
- (g) A grinding mill where the dried material is reduced to a fine powder for treatment with alkali;

(h) Steam heated digestion tanks where the product in powdered form is digested and subsequently neutralised by acetic or lactic acid. The apparatus was in fact the Petzold-Kreisel chocolate mixer.

(i) A Krause standard spray drying tower supplied by Lurge, Frankfurt.

Recommendations

The manufacture of this product is undoubtedly linked up with the general "Ersatz" programme put into operation in Germany before the war. It is doubtful how far the product would in this country stand up to the competition of "China Egg" in normal times.

Once the plans become available they may be brought to the notice of the producing and processing sides in the fishing industry here. Further investigation of prospective channels for the utilisation of the product would probably be required before production were entered into on a large scale.

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Appendix 1. Research Institute for the Fish Industry  
Altona on the Elbe

Chemical Analysis

Test with reference to the German manufacture Eiweiss Company.

Protein.....	93.90%
Moisture.....	4.65%
Salt.....	0.09%
Fat.....	Traces
Calcium (CaO).....	0.42%
Ash.....	0.80%
Lecithin phosphoric acid.....	0.22%
Total phosphoric acid (P <sub>2</sub> O <sub>5</sub> ).....	0.53%
Organic Iodine content 3.0 mg. %.....	0.003%
Digestibility of "Eiweiss" is practically.....	100%

Altona/Elbe, 12th August, 1935.

Appendix 3. Recipes for the Baking Trade

War Year 1943

The undisputed and extraordinary qualities of the raw material Wiking Eiweiss enable the Baking industry even during war-time to manufacture pastries.

Whipped Cream

With flour, without gelatine for filling - garnishing.

- 3 litres water or skim milk
- 500 gms. sugar
- 40 gms. Wiking Eiweiss (dry powder)
- 500 gms. flour
- Pinch salt.

2 litres of water or skim milk to be brought to boil. Mix the 500 gms. sugar, 40 gms. Wiking Eiweiss and 500 gms. flour in the remaining litre water. This is added to the boiling water and mixed and allowed to boil vigorously and made to the desired volume. To the cream, any desired flavour may be added.

Brown or Hot Lump (?)

without fat, with a little egg.

- 500 gms. water or skim milk )
- 250 gms. flour ) together and well
- 20 gms. Wiking Eiweiss ) browned
- 20 gms. sugar )
- Pinch salt, flavouring,
- egg yellow colouring.

- 150 gms. water or skim milk
- 3 eggs
- 20 gms. baking powder

The Wiking Eiweiss is mixed with the flour and as indicated above, well browned, then the eggs are beaten with the remaining water to the desired consistency. Bake in moderate oven.

Pastry Dough

Without egg and fat

- 100 gms. Wiking Eiweiss (dry powder) )
- 1250 gms. sugar ) beaten together
- 2000 gms. (2 litres) water )
- 5000 gms. flour
- 150 gms. Ammonium Carbonate, pinch salt,
- egg colouring and flavouring.

Mix flour and Ammonium Carbonate and proceed accordingly in the usual way. Just make enough to use on the one day.

Fat Free Puff Pastry

(Pot Cake or Field-post Cake)

- 80 gms. Wiking Eiweiss (dry powder) )
- 2000 gms. sugar ) beaten together
- 300 gms. full egg (or 6 eggs) )
- 1200 gms. water )
- 5000 gms. flour )
- about 1½ litres skim milk or water
- 120 gms. baking powder
- 2500 gms. fruit, egg colouring, flavouring, pinch salt.

Directions: Flour, skim milk and other ingredients are beaten together.

Vienna Lump without Eggs

- 40 gms. Wiking Eiweiss (dry powder) )
- 400 gms. sugar. )
- 1000 gms. flour ) Well mixed
- 1000 gms. (1 litre) water\* ) together
- Egg colouring, flavouring )
- pinch salt )

\* One adds the total amount of water without delay thereby preventing the mass from becoming viscous.

- 40 gms. Wiking Eiweiss (dry powder) )
- 800 gms. sugar ) mixed together
- 80 - 100 gms. baking powder )
- 1000 gms. (1 litre) water )
- 1000 gms. flour

The mixed mass as well as the remaining 1000 gms. flour are well mixed. Yield:- 8 cakes of 28 cms. diameter.

Note: In case of need use 3/4 of sugar.

Vienna Lump

Using 90% Wiking Eiweiss and 10% whole egg.

- 40 gms. Wiking Eiweiss (dry powder) )
- 200 gms. sugar )
- 1000 gms. flour ) well beaten
- 1000 gms. (1 litre) water \* ) together
- 4 eggs, egg colouring, flavouring, )
- pinch salt )

\* One adds the total amount of water without delay thereby preventing the mass from becoming viscous.

40 gms. Wiking Eiweiss (dry powder)	)	
600 gms. sugar	)	beaten together
80 gms. baking powder	)	
1000 gms. (1 litre) water	)	

The mixed mass as well as the remaining 1000 gms. flour are well mixed.  
Yield:- 8 cakes 28 cms. diameter.

Note:- Even though more eggs are available there is no need to change the recipe.

Practical Hints--In egg white whose beating properties have been injured as well as in "Massen" which have failed can in most cases be again made to rise by the addition of Wiking Eiweiss.

Wiking Eiweiss cannot be overbeaten, can withstand great heat, can be boiled and after boiling can rise again.

Wiking Eiweiss is mixible with fat and flour. It absorbs sugar.- in raw as well as the cooked state - in all amounts. The extraordinary richness of Wiking Eiweiss is recognised. In general a solution in water in ratio 1:15 is employed. In the preparation of Vienna "Massen" without eggs a solution of the dry powder in the ratio 1:25 is used. In the preparation of foam "Massen" our recipe calls for a solution of 1:15, yet one can without hesitation choose higher dilutions of 1:20 or 1:25.

Concerning Colouring--In agreement of the Reich and Prussian ministers of the interior of 6.12.37, Gesch.-Z.IV B 52 47/37/4239 IV the manufacture of cooked and baked products with Wiking Eiweiss as well as the simultaneous use of the usual colouring materials in the baking and confectionery industry need not be disclosed. Therefore as much egg yellow colour should be added as Wiking Eiweiss to make the baked product bright.

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