United States Department of the Interior, J.A. Krug, Secretary
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WHALE AND FISH OILS (ICELAND)[1/]

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INTRODUCTION

Herring, cod liver, and whale oils are the most important oils produced in Iceland. Oils derived from haddock, coal fish, pollock, and fish related to the cod family are mixed with the cod liver oil to standardize the vitamin content.

This report deals with the description of the activities of the industries involved in the production of Iceland's whale and fish oils.

ICELANDIC WHALING

Historical background: The whaling industry started in Iceland about 1886. At that time the whaling boats, facilities and shore factories belonged to the Norwegians. Whaling and whale processing in eight small factories along the Icelandic coast continued until 1905. Between 1886 and 1905 the total catch of one summer season averaged 800 to 1,000 whales. Approximately twenty-five whale catchers were usually engaged. Each whale produced an average of seven tons of oil; a season's total whale oil output averaged approximately 6,000 tons. The 1902 season was considered an excellent one--1,305 whales, producing approximately

1/ American Consulate Report No. 4, Reykjavik, Iceland, January 31,1949.

7,000 tons of whale oil, were caught. Because of the introduction of a whale gun in the 19th century, the danger of the extermination of whales increased. The Icelanders feared that whales would become extinct because of the apparent decrease in the number of whales. Between 1902 and 1905 an Act of Parliament was passed prohibiting whaling to foreigners in Icelandic waters for a period of ten years. This law later was extended. From 1905 to 1930 there was no whaling of significant economic value. In 1930, however, one enterprise was given permission to hunt and process whales. The shore factory was located at Taltnarfjordur on the west coast of Iceland. Between 1930 and 1939 Iceland had only three small whale catchers, which delivered their whale catches to Taltnarfjordur. In 1935 and 1936, the total catch of whales amounted to 28 and 85, respectively. During World War II whaling was discontinued.

Whale factory in Iceland: In 1946, a company called Hvalur h.f. (Whale, Ltd.) was formed under the presidency of Mr. Loftur Bjarnasson. This firm purchased half the tank farm at Hvalfjordur* (which is located north of Reykjavik) and half the pier and other facilities from the Icelandic Government. The tank farm formerly belonged to the United States Navy. In 1947, the construction of the whaling factory was started at Hvalfjordur, and the factory was ready for operation in April, 1948. About 60 Icelanders and 18 Norwegians were employed at the whale factory during the 1948 whaling season.

The company purchased four whale catchers named respectively "Whale I", "Whale II", "Whale III", and "Whale IV", each vessel between 300 - 400 tons d.w. Two of the whale boats are equipped with 800 hp. oil fuel steam drive, and the other two with 1100 hp. The latter are more suitable for whaling. On each whale catcher there are about 16 men, mainly Norwegians, masters at whaling, who are teaching the Icelanders the techniques of whaling. Each whaling expedition averages between 36 - 48 hours at sea. The largest catch by one whale catcher was three whales.

Whaling grounds: The North Atlantic has always been of secondary importance as a whaling ground compared with the Antarctic areas. When whale fishing commenced in the North Atlantic from stations in Norway, Iceland, and Spitsbergen and gradually showed less and less prospect of expanding large-scale whaling began in the Antarctic. Nations engaged in whaling in the Antarctic generally utilize large floating whale factories, whereas in Iceland all whales are processed in the shore factory at Hvalfjordur.

In 1948, the whale catchers went out in search of whales off the coast of the Westmann Islands and followed the Icelandic continental deepwater shelf, which is about 30 to 60 miles off the coast. Many whales were found. From May and continuing until October 15, the whales appeared more and more to the west off the continental shelf of the south western coast of Iceland. During the months of June, July, August, and September many whale catches were made off Faxa Bay and numerous whales were seen there.

*Herring catches were extremely abundant in this fjord during the winter herring season 1947-48; extremely poor 1948-49.

In August 1948, during the summer herring season, Norwegian herring fishermen sighted many beaked whales, an erroneous indication, as herring statistics proved, that there were great shoals of herring along the northern coast of Iceland.

Production: The 1948 whale season, which started May 1 and terminated October 15 accounted for a total catch of 239 whales, each whale weighing an average of 70 metric tons. Fifteen hundred tons of whale oil were produced (the Icelandic Government purchased all the oil from Whale Ltd. at $443.30 per ton), 80 tons of meal, and about 1,060 tons of whale meat, 25 percent of which was made into whale sausage meat, which was exported to Norway.

Total Catch* of Each Whaling Vessel by Type of Whale**:

"Hvalur I"

51	Fin whales
3	Blue whales
4	Sperm whales
1	Sei whale
59	Total

"Hvalur II"

94	Fin whales
13	Blue whales
7	Sperm whales
1	Sei whale
115	Total

"Hvalur III"

50	Fin whales
8	Blue whales
4	Sperm whales
3	Sei whales
65	Total

Most of the whales caught were fin whales (Greenland whales) which furnish prime oil and edible fats, and meat. The average yield per whale was five to eight tons of oil and the same quantity of meat. The largest whales attain a length of more than 65 feet, each weighing over seventy tons. Of the various species of whales, the Greenland bonehead whale yields the largest whalebone, which sometimes attains 16 feet in length, i.e., every whalebone. The commercial name for whalebone is whale fin. The whalebone is highly valuable for ornamental objects and similar uses. In some instances a single whale yields 3,080 pounds of whalebone.

* Total 239 whales, of which 195 were fin whales, 24 blue whales, 15 sperm whales, and 5 sei whales.

** "Hvalur IV" was not equipped for whaling, but was used as a tug.

Whale processing: Oil, meat and meal constitute the most important products derived from a whale. The meal is used for hog and poultry food. It is said that whale meal provides excellent livestock food, for it contains a great deal of proteins. The production of whale meal amounted to about 80 tons; all of which was used locally. Whale meal grinders arrived late in the season, which accounts for the small output of whale meal. The total whale meat production amounted to 1,060 tons, 640 of which were exported to England. Part of the meat exported to Norway, as mentioned above, consisted of sausage meat. According to press reports, the British considered the whale meat savory and of high quality. The whale meat was quick frozen and packed in seven and two-pound packages. Locally whale meat retails at kr. 6.74 (55 cents per pound) per two pounds. The Federation of Icelandic Fish Producers are the wholesalers of whale meat. Whale blood, which can be used as an insulin for cattle, was discarded, for the factory is not equipped to process it. Whale livers are exported to England, where tests to determine its medical use are being undertaken.

The whale after he is killed maintains a temperature of about 40 degrees C. After being towed for about twelve hours, the temperature of the whale cools down to about 30 degrees C. To prevent spoilage, the meat must be cooled immediately before freezing. It is then sent to Akranes and Reykjavik for packing and quick freezing. There are plans for the erection of a cooling plant at Hvalfjordur, to be ready for operation in May, 1949, in order to cool down the whale meat properly before quick freezing it. Consequently, as soon as the whale is hauled into the factory it is processed immediately. The blubber, which is anywhere from seven to ten inches thick, is stripped within two hours by Norwegian flencers, using steam winches. The Norwegians are experts in flencing whales, which is an absolute necessity because all the meat is not edible. The expert selects the cuts of meat that are to be utilized, and the rest is used for meal and oil.

The whale blubber is melted in horizontal cylinders which are thoroughly insulated under forty pound steam pressure. The oil, subsequently, is refined in other cylindrical containers and finally purified in a centrifugal machine. It is stored in a 2,000 ton barge installed on the beach in the vicinity of the factory. The refined train oil (whale oil) is dehydrated by steam, thus forming meal containing about 13 percent fat and 50 - 60 percent protein in addition to 2 to 3 percent water. The blubber, bone, and inferior meat which is not used for human consumption is ground and boiled to remove the whale oil. However, the lack of proper facilities for hardening the whale and herring oil prevents Iceland from processing the oil into fats, which could be used in the local production of margarine. Iceland exports its whale and herring oil and re-imports some of it in a refined and hardened state for use in the production of margarine.

Several sperm whales were caught. The so-called sperm whale is the largest of all whales and is usually more than 65 feet in length, of which the head is one third the size of the whole body. The oil is

concentrated mostly in the head, which is cut open and the oil drained out. The head of the sperm whale contains sometimes as much as 34 barrels of oil. Meat from the sperm whale, however, cannot be used for human consumption.

At present about eight 70-ton whales can be processed within 24 hours at Hvalfjordur, or at the rate of one and a half whales every five hours. The factory at present has three cookers, and its owners plan to purchase an additional cooker. The present capacity is 40 tons of oil per 24 hours.

Outlook: The 1948 financial income of the whaling station at Hvalfjordur amounted to eight million kronur ($1,229,000). Construction costs and facilities and foreign manpower amounted to four million kronur ($615,000) in foreign currencies, chiefly pounds sterling and Norwegian kronur. Local labor costs to Icelandic workers amounted to 1.1 million kronur ($169,000).

According to a local press report, the Danes plan the construction of a whaling station in the Faroe Islands which will be operated by the Danes and Faroese. Two vessels will deliver their catches of whales to this station. It is not unreasonable to assume that these vessels will operate off the Icelandic territorial waters during the 1949 whaling season.

A bill on whale fishing was presented to the 68th session of the Althing last October. Its passage by the Althing, perhaps with minor revisions, is anticipated shortly. Iceland is a party to the International Whaling Agreement signed on December 2, 1946 in Washington, and the purpose of this bill is to bring Iceland's local law in conformity with the Agreement.

In 1949, the whaling season will begin on April 15 and terminate on October 15. (The whaling season is regulated by international law.) It is anticipated that 1949's production will amount to 3,000 tons of oil and 2,000 tons of meat.

COD LIVER OIL

Up until about 1900, shark fishing was carried on extensively by Icelanders and shark liver oil constituted the chief fish oil export. Shark fishing began to decline after 1900. For the past 15 to 20 years occasionally a ship has been engaged in shark fishing off the northwestern coast of Iceland or the west coast of Greenland.

Before World War II the production of cod liver oil ranged between 4,000 and 5,000 tons annually. Cod and fish related to the cod family are caught by ocean-going trawlers and by the motorboat fleet. The ocean-going trawler catches on the average between 250 and 350 tons of

fish per trip, chiefly cod. Of this total, on the average 10 to 20 tons of cod liver oil are brought in by each ocean-going trawler after each fishing trip, which lasts from 12 to 14 days. The process whereby the livers are steam boiled under high pressure on board the trawler is not fully effective. Forty to fifty tons of oil are extracted from 100 tons of livers; under a more efficient extracting process 100 tons of livers should produce up to 60 tons of cod liver oil. The residue is thrown into the ocean because of lack of space on board the ocean-going trawler. The motorboat fleet, of which there are over 600 vessels, chiefly small vessels between 35 and 60 tons, is mainly engaged in offshore line fishing. Its boats are not equipped to process the livers, and therefore the fish are brought in ungutted with head on and processed on shore.

The crews of Iceland's large ocean-going trawlers gut the fish on board and immediately steam boil the livers of the fish for the oil content, a practice started about 1928. Subsequently, the oil is pumped into tanks and stored there until the ship calls back at port, generally within two weeks. The oil then is pumped out into a tank truck and delivered to one of the four cod liver oil factories. There are three located in Reykjavik and one in the Westmann Islands. In 1932, the first factory with equipment for destearinating cod liver oil was erected so that the oil could be exported in a consumable condition. The cod liver oil undergoes a process in the factory whereby the stearin is removed, producing the so-called medicinal cod liver oil, which is the most important type of cod liver oil. (This process of extracting the stearin from the cod liver oil is called "destearination.") Stearin is that part of the oil which makes it congeal and gives it an unpurified appearance. By extracting the stearin, the cod liver oil under refrigeration remains clear. Some of the cod liver oil is used in the unprocessed state for veterinary purposes, such as poultry and livestock feed.

The income received from the cod liver oil, as well as the fish catch, is divided among the crew (motorboats only, not ocean-going trawlers). The price of cod liver oil depends upon the vitamin content; medicinal cod liver oil averages about $680 f.o.b. per ton, veterinary cod liver oil (stearin not extracted) averages $620 f.o.b. per ton.

Recently, particularly during and since the war, the catches of iced fish exported to Great Britain and Bizonia and fish (chiefly cod, haddock) delivered to the freezing plants have increased tremendously. This in turn has increased the production of cod liver oil. The total production of cod liver oil in 1948 amounted to 9,098 tons and the cod liver oil producing people anticipate that 1949's production will total approximately 11,000 tons.

The greater part of the destearinated cod liver oil in 1948 was exported to the United States, the market absorbing 2,982 tons of Icelandic cod liver oil. In 1946, imports to the United States from Iceland were almost double (5,938 tons). In 1948 the largest buyers in order of importance were: the Netherlands (904 tons), Soviet Russia (754 tons),

Denmark (574 tons), and Germany (660 tons). Most of the undestearinated oil prior to 1946 was exported to Great Britain. The latter country has not imported any Icelandic cod liver oil in 1947 and 1948. Russia's imports dropped by more than half from 1,774 tons in 1947 to 754 tons in 1948.

Cod liver oil exports to the United States have been declining owing to an increase in the production in the United States of highly concentrated vitamin pills. American consumers prefer the taste of pills to that of cod liver oil. Icelandic cod liver oil producers have voiced some concern, and are fearful of losing a dollar market.

HERRING OIL

Iceland's most important herring fishery grounds are located off the northern Icelandic coast. The season, which is known as the summer herring season, commences in July and terminates during the middle of September. However, for the first time, during the winters of 1946-47 and 1947-48 large quantities of herring were caught in Hvalfjordur, a large fjord lying to the north of Reykjavik. This season, the Icelanders refer to as the winter herring season. The 1946-47 season began late in December and ended in March; the 1947-48 season commenced in October and terminated in March. The winter herring runs have been irregular. The total catch for the winter seasons was, respectively, 12,029 and 147,213 metric tons. Unfortunately, the 1948-49 winter herring season produced only 3,000 tons. Save for the two unusual winter herring seasons, summer herring catches have declined considerably since 1944 as the following statistical table indicates:

Year	Total Summer Herring Catch	Summer & Winter Herring Oil	Total Amount of Summer Herring Salted
	tons	tons	barrels*
1939	126,000	16,900	260,990
1940	235,000	37,000	89,967
1941	99,850	14,435	70,000
1942	148,800	24,600	43,864
1943	187,600	24,060	50,530
1944	221,800	33,800	35,180
1945	60,300	6,900	95,395
1946	131,700	17,617	168,470
1947	122,400	31,801	63,196
1948	56,059	17,452	114,799

* 7 bbls. = about 1 ton.

Herring catches have been variable. For example, more boats were engaged in the 1945 herring fisheries than in the 1944 season, and the total 1945 catch was only about one half of that of 1944:

Number of Ships Engaged in Herring Fisheries

Year	Summer herring fisheries	Winter herring fisheries
1939	225	-
1940	217	-
1941	118	-
1942	113	-
1943	133	-
1944	141	-
1945	167	-
1946	246	60
1947	264	168*
1948	241	150**

* 1947-48 winter herring season
** 1948-49 " " "

First to begin large scale herring fisheries were the Norwegians, who operated in the latter part of the 19th century off the coast of Iceland. Their catches were entirely salted. When the Icelanders began herring fishing, they also salted their total catches. With the erection of the first herring processing factory in 1911, salted herring production gradually declined. It was not until 1930 that herring oil production and meal, a byproduct, began to increase by leaps and bounds. During the past ten years, over 90 percent of the total herring catch was processed into oil and meal. In 1930, the first state-owned factory for the reduction of herring oil and meal began operating in Siglufjordur, the main herring processing center, which is located on the northern coast of Iceland. The herring processing industries developed rapidly; by 1948 there were approximately twenty liquefaction factories ready for operation, with a total working capacity estimated at approximately 19,800,000 pounds per 24 hours. Seven of the factories are owned by the Icelandic Government and are capable of processing about 45 percent of the total annual output. The herring factories, particularly those constructed in recent years, are equipped with up-to-date machinery. In order to process winter herring in the vicinity of the herring grounds, several factories were constructed in and around Reykjavik. During the 1947-48 winter herring season, the herring had to be transported to the northern coast factories, where they were processed, because no processing facilities were available near Hvalfjordur. Much time and unwarranted expenses were incurred. In addition to the new factories, the Haeringur, a floating herring liquefaction plant, was purchased under the 2.3 million dollar loan to Iceland. It is to be used wherever herring may run.

Herring oil, salted herring, and meal constitute the most important products derived from raw herring. Part of the summer catches are salted, owing to the better quality of summer herring. A negligible amount of both summer and winter herring is sent to canning factories. Herring oil is the most important fish oil product; the production is considerably larger than that of whale or cod liver oil.

CONCLUSION

Particularly during 1948, the Icelanders were hard-hit financially, not because of the lack of fishing vessels or shore herring processing facilities, but entirely because of the exceptionally poor herring runs. Herring oil, a commodity in great demand, which the Icelanders had hoped to produce in great volume, actually betrayed expectations. The new "reconstruction" trawlers are primarily responsible for the increasing output of cod liver oil, and it is not unreasonable to assume that the production will continue to be augmented. Whaling will undergo intensification and the production of whale oil will be increased in 1949. In short, the Icelanders are concentrating assiduously on expanding their production of whale and fish oils, particularly herring and cod liver oil. Under Iceland's Four Year Plan (ECA), the Government has indicated its desire to expand and improve the herring processing factories, to enlargen its fishing fleet, and to erect a refining and hardening plant. Thus far, the Icelanders have been able to market the whale and fish oils profitably. According to ECA reports, the demand for fish oils will extend beyond 1952.

Table 1 - Iceland's Production of Cod Liver Oil, Herring Oil and Whale Oil 1939 - 1948, Inclusive

Year	Cod Liver Oil	Herring Oil*	Whale Oil
	tons	tons	tons
1939	4,500	16,900	669
1940	5,400	37,000	-
1941	5,080	14,435	-
1942	4,750	24,600	-
1943	6,800	24,060	-
1944	8,000	33,800	-
1945	6,500	6,900	-
1946	6,143	17,617	-
1947	7,368	31,801	-
1948	9,098	17,452	1,500

* The herring oil production statistics are somewhat lower than the export figures because the former are based on estimates derived from herring catches. Herring oil production in Iceland is based on the fat content of the herring; the catches differ considerably in fat content.

Table 2 - Iceland's Exports of Cod Liver Oil, Herring Oil, and Whale Oil 1939 - 1948, Inclusive

	Volume (lb.)
1939	
Cod liver oil:	
Denmark	504,915
Norway	580,670
United States	13,285,846
Sweden	11,143
Germany	51,623
Czechoslovakia	47,956
Other countries	30,214
Total	14,512,367
Herring oil:	
Norway	25,689,420
Denmark	8,293,608
Germany	218,055
Netherlands	3,740,000
Great Britain	326,014
Total	38,267,097
Whale oil:	
Great Britain	305,390
Norway	1,161,954
Germany	8,690
Denmark	11,658
Total	1,487,692
1940	
Cod liver oil:	
Denmark	12,736
Norway	21,483
United States	12,340,160
Total	12,374,379
Herring oil:	
Norway	4,822,244
Denmark	4,950,534
Great Britain	39,578,871
United States	6,118
Total	49,357,767
1941	
Cod liver oil:	
United States	8,030,710
Great Britain	3,899,572
Other countries	3,840
Total	11,934,122
Herring oil:	
Great Britain	61,074,567

Table 2(Cont.) - Iceland's Exports of Cod Liver Oil, Herring Oil, and Whale Oil 1939 - 1948, Inclusive

		Volume (lb.)
1942		
	Cod liver oil:	
	United States	3,819,651
	Great Britain	8,203,239
	Cuba	9,671
	Other countries	880
	Total	12,033,441
	Herring oil:	
	Great Britain	58,347,450
1943		
	Cod liver oil:	
	United States	10,582,651
	Great Britain	1,640,560
	Other countries	18,355
	Total	12,241,566
	Herring oil:	
	Great Britain	65,916,662
1944		
	Cod liver oil:	
	Great Britain	3,300,184
	United States	10,446,620
	Other countries	283,314
	Total	14,030,118
	Herring oil:	
	Great Britain	58,138,390
1945		
	Cod liver oil:	
	United States	7,951,572
	Great Britain	5,380,426
	Norway	220,792
	France	1,774,828
	Sweden	2,200,000
	Netherlands	440,310
	Other countries	456,229
	Total	18,424,157
	Herring oil:	
	Great Britain	29,004,637
	Denmark	1,548,800
	Total	30,553,437

Table 2 (Cont.) - Iceland's Exports of Cod Liver Oil, Herring Oil, and Whale Oil 1939 - 1948, Inclusive

	Volume (lb.)	Value (U.S. $)
1946		
Cod liver oil:		
Australia	22,854	7,269
United States	13,062,951	3,403,133
Belgium	395,974	124,217
Great Britain	1,238,982	343,979
Denmark	643,280	176,648
France	8,067	2,348
Faroe Islands	3,810	869
Norway	703,098	75,357
U.S.S.R.	327,800	91,044
Sweden	238,106	48,480
Czechoslovakia	220,000	64,792
Germany	156,477	43,508
Total	17,021,399	4,381,644
Herring oil:		
Great Britain	25,195,034	2,643,382
Denmark	84,620	7,012
Norway	937,332	63,945
U.S.S.R.	12,358,612	1,409,324
Total	38,575,598	4,123,663
1947		
Cod liver oil:		
United States	4,734,276	1,470,776
Batavia	20,988	6,760
Belgium	187,444	38,688
Denmark	24,937	7,606
France	661,980	198,148
Faroe Islands	2,123	712
Netherlands	158,400	38,664
Italy	528,277	144,534
Norway	1,113,840	283,679
Palestine	48,400	16,114
Poland	5,095	1,500
U.S.S.R.	3,902,300	1,156,283
Switzerland	84,911	21,198
Sweden	218,431	71,300
Germany	203,938	65,043
Total	11,895,340	3,521,005
Herring oil:		
Great Britain	20,701,654	3,444,854
Norway	1,814,654	411,453
Czechoslovakia	3,920,400	447,489
U.S.S.R.	18,723,540	3,673,325
Total	45,160,248	7,977,121

Table 2 (Cont.) - Iceland's Exports of Cod Liver Oil, Herring Oil, and Whale Oil 1939 - 1948, Inclusive

1948	Volume (lb.)	Value (U.S. $)
Cod liver oil:		
Australia	13,587	4,541
United States	6,559,916	1,956,092
Belgium	37,272	9,829
Bulgaria	198,288	60,642
Cuba	38,214	9,972
Denmark	1,264,320	273,875
Finland	325,958	100,472
France	657,632	191,927
Faroe Islands	3,396	1,156
Greece	109,971	34,131
Netherlands	1,989,962	608,059
Italy	309,905	95,919
China	202,958	61,158
Norway	440,748	115,042
Palestine	508,200	188,540
Poland	464,937	140,031
Rumania	219,942	66,270
U.S.S.R.	1,659,354	492,452
Switzerland	159,513	39,848
Sweden	136,620	31,766
Czechoslovakia	418,231	132,516
Trieste	506,304	156,836
Hungary	849	138
Germany	1,451,760	413,402
Total	17,677,837	5,184,614
Herring oil:		
Great Britain	25,706,370	4,386,028
Denmark	2,424,400	444,522
France	2,597,927	589,748
Netherlands	7,465,040	1,537,185
Czechoslovakia	3,512,300	722,369
U.S.S.R.	2,242,240	438,580
Germany	18,390,110	3,325,806
Total	62,338,387	11,444,238
Whale oil:		
Denmark	506,004	100,052
Netherlands	1,194,600	230,142
Total	1,700,604	330,194

Note: Icelandic kronur f.o.b., kr. 6.505 = U.S. $1
English Pound = $4.03

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