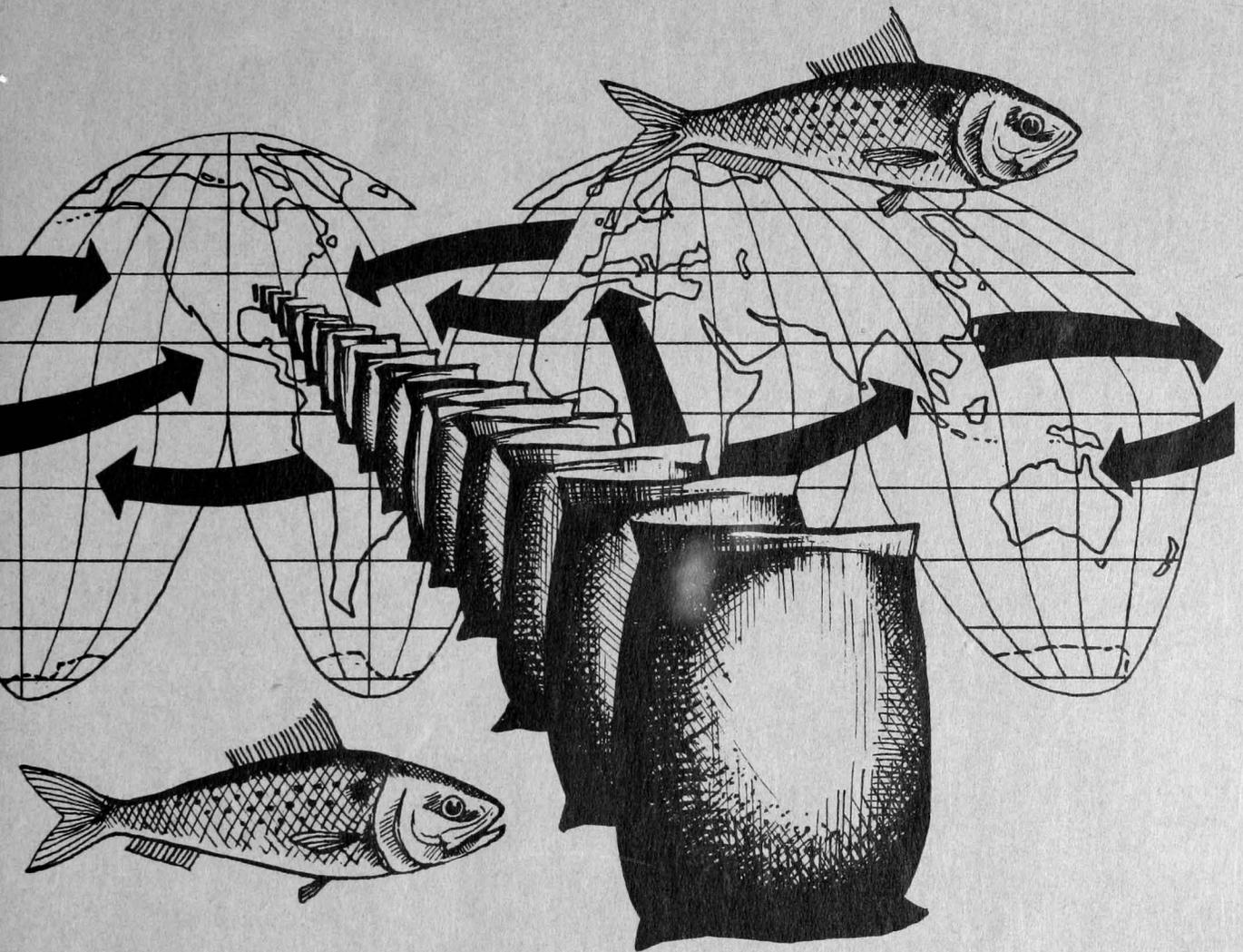


WORLD PRODUCTION AND TRADE IN FISH MEAL AND OIL



UNITED STATES DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

BUREAU OF COMMERCIAL FISHERIES

WASHINGTON 25, D. C.

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PREFACE

THIS REPORT IS A GENERAL ACCOUNT OF THE WORLD'S PRODUCTION AND TRADE IN FISH MEAL AND OIL. IN 1959, THE WORLD MARKET FOR FISHMEAL SUFFERED A DECLINE IN PRICES OWING TO TREMENDOUSLY INCREASED PRODUCTION IN A NUMBER OF COUNTRIES. IN MANY COUNTRIES, STOCKS OF FISHMEAL, WHICH COULD BE SOLD ONLY AT A LOSS, HAVE ACCUMULATED. SOME REDUCTION PLANTS--AND EVEN THE ENTIRE REDUCTION INDUSTRY--HAVE BEEN FORCED TO CLOSE AS PRODUCTION COSTS HAVE BEEN TOO HIGH FOR THE FISHMEAL TO COMPETE IN WORLD MARKETS AT THE PREVAILING LOW PRICES. AN EFFORT HAS BEEN MADE IN THIS REPORT TO SHOW INCREASES AND DECREASES IN PRODUCTION OF FISH MEAL AND OIL, ESPECIALLY DURING 1953 TO 1959, THE PRINCIPAL MARKETS FOR THE PRODUCTS, AND THE CHANGES IN SUPPLY SOURCES IN PRINCIPAL MARKETS.

THE DATA USED IN THIS REPORT HAVE BEEN ASSEMBLED FROM NUMEROUS SOURCES, TRANSLATED FROM MANY LANGUAGES, AND CONVERTED FROM DIFFERENT STANDARDS OF MEASUREMENT TO A SINGLE STANDARD--THE SHORT TON OF 2,000 POUNDS. THE SOURCES FREQUENTLY HAVE BEEN CONTRADICTORY, WITH MANY DATA VAGUE, INCONSISTENT, INCONCLUSIVE, OR IMPOSSIBLE TO OBTAIN. IN CERTAIN COUNTRIES, STATISTICS ON FISHMEAL ARE COMBINED WITH THOSE FOR WHALE MEAL, BONE MEAL, AND MEAT MEAL; FISH OIL IS OFTEN COMBINED WITH MARINE ANIMAL OIL. IN SOME CASES, SEPARATE FIGURES ARE NOT MAINTAINED ON THE PRODUCTION OR EXPORT OF FISH SOLUBLES. WHERE POSSIBLE, AN ATTEMPT HAS BEEN MADE TO RECONCILE INCONSISTENCIES AND DISCREPANCIES IN DATA; WHERE THIS HAS NOT BEEN POSSIBLE, THE DATA ARE FOOTNOTED TO INDICATE WHAT IS INCLUDED BESIDES FISHMEAL AND FISH BODY OIL.

WORLD PRODUCTION AND TRADE IN FISH MEAL AND OIL

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WORLD PRODUCTION AND TRADE IN FISH MEAL AND OIL

INTRODUCTION

The value of fish and fish wastes as fertilizer and as animal feed has been known since early times. However, the special mechanical treatment of fish, fish wastes, and offal to produce fishmeal is a result of the industrialization which started in the 19th century, particularly in England, Germany, and the United States. Fish oil was for many years regarded as the more valuable product of reduction; the meal resulting from the residue of flesh and bones was considered a byproduct. The importance of fishmeal to supply the necessary animal protein in animal feeds was recognized some years ago, and its use has increased rapidly.

Before World War II, the industry was concentrated in Northern Europe, North America, and Japan--the main producers being Japan, the United States, Norway, Germany, the United Kingdom, Canada, and Iceland. In 1938 these seven countries produced about 98 percent of the world production of 723,000 short tons of fishmeal. In 1948, these countries (with the exception of Japan and Germany) were still the leading producers. By 1953, however, production in other countries became significant. Angola, Morocco, Denmark, and the Union of South Africa had become large producers and exporters. Also, Japan and the Federal Republic of Germany had regained their former status as major producers. In 1953, these 11 countries produced about 88 percent of the world production of 1,122,000 tons. In 1958, Peru had become a major producer, and in 1959 became the foremost fishmeal producer of the world, supplying about 20 percent of the world production of nearly 2,000,000 tons (table 1 and figure 1).

A decline of as much as 30 percent in world fishmeal prices from early 1959 through 1960 was generally attributed to the increased production which occurred in Peru. Price quotations are listed in the discussions under the individual countries. In 1959, it was estimated that the world production of fishmeal was about 200,000 tons greater than world consumption.

Fishmeal is the protein concentrate derived from raw fish through the process of cooking, pressing, and drying. It is used principally in mixed feeds as a source of protein for poultry and hogs. Modern large-scale swine and poultry rearing operations have found that fishmeal, as a source of feed, supplies a complete, high-quality and well-balanced animal protein.

Stickwater is the liquid from pressing left after separation of

the oil. The moisture content of stickwater is evaporated and reduced by about 50 percent to leave a residue known as fish solubles. Sometimes fish solubles are re-introduced into fishmeal to increase the protein content, thereby making "whole" meal, or may be used directly as an ingredient in poultry or hog feeds.

Fish body oil is the fatty portion of the raw fish, freed by the cooking and pressing processes in the manufacture of fishmeal. The oil is used in the manufacture of margarine, protective coatings, floor coverings, and paints.

Raw materials for reduction utilize many species of fish. In countries such as Belgium and the Netherlands, the offal and wastes from the processing of edible fish--as well as any edible fish condemned as unfit for human consumption--are the raw materials used to

TABLE 1.--PRODUCTION OF FISHMEAL, BY MAJOR PRODUCING COUNTRIES,
1948, 1953, 1958, AND 1959
(IN SHORT TONS)

| COUNTRY | 1948 | 1953 | 1958 | 1959 |
|--------------------------------|------------|-----------|------------|------------|
| ANGOLA | 15,653 | 46,631 | 52,679 | 61,916 |
| MOROCCO | <u>1</u> / | 18,073 | 22,811 | 19,526 |
| SOUTH AFRICA | 11,795 | 96,170 | 109,258 | 143,722 |
| CANADA | 45,856 | 51,856 | 72,393 | 77,177 |
| UNITED STATES | 215,500 | 238,851 | 248,140 | 306,551 |
| CHILE | 882 | 8,218 | 20,725 | 33,811 |
| PERU | - | 13,330 | 139,854 | 366,351 |
| JAPAN | 37,809 | 105,374 | 231,530 | 258,468 |
| DENMARK | 11,904 | 30,986 | 72,319 | 78,242 |
| FEDERAL REPUBLIC OF GERMANY | 18,298 | 77,205 | 83,335 | 98,078 |
| ICELAND | 45,415 | 28,660 | 48,170 | 71,640 |
| NORWAY | 177,801 | 176,755 | 131,035 | 141,060 |
| UNITED KINGDOM | 66,248 | 92,314 | 87,743 | 87,696 |
| U.S.S.R. | 12,015 | 26,896 | <u>1</u> / | <u>1</u> / |
| TOTAL <u>2</u> / | 659,176 | 1,011,319 | 1,319,992 | 1,744,238 |

1/ NOT AVAILABLE.

2/ TOTALS DO NOT INCLUDE SMALLER QUANTITIES PRODUCED IN MANY OTHER COUNTRIES. THE AMOUNT OF FISHMEAL PRODUCED IN 1959 IN COUNTRIES NOT LISTED ABOVE IS ESTIMATED AT ABOUT 250,000 SHORT TONS.

NOTE: FOR SOME COUNTRIES DATA MAY INCLUDE WET OR DRY SOLUBLES.

SOURCE: FOOD AND AGRICULTURE ORGANIZATION, YEARBOOK OF FISHERY STATISTICS.

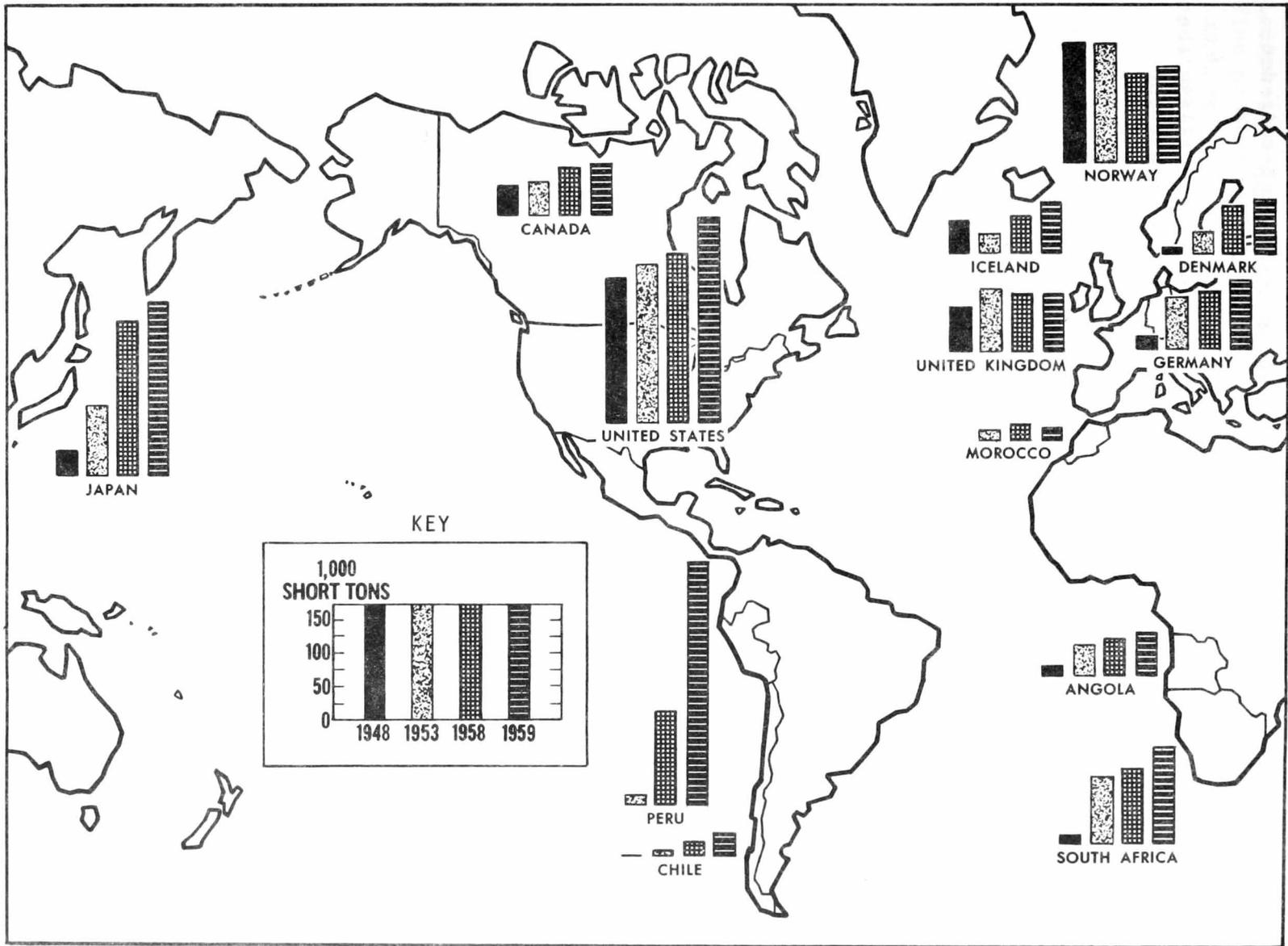


FIGURE 1.--PRODUCTION OF FISHMEAL, BY MAJOR PRODUCING COUNTRIES, 1948, 1953, 1958, AND 1959

produce fishmeal. In most fishmeal producing countries, however, wastes and offal form a small part of the raw material sent to reduction plants.

U.S. reduction plants on the Atlantic and Gulf coasts utilize the menhaden (Brevoortia tyrannus). A large fishery exists solely for this species and solely for reduction. A lesser part of the production of fishmeal comes from wastes and offal from groundfish, tuna, salmon, and sardine processing, and from whole herring and "industrial" fish (mainly bottom fish taken by small trawlers).

About one-half of Canada's production of fishmeal is from the British Columbia herring (Clupea pallasii), caught almost exclusively for reduction.

An Eastern Atlantic sardine (Sardinella aurita) is the basis of the Moroccan fishmeal industry and also forms a large part of the catch for reduction in Angola. The sardinella (Clupea eba), the "carapau" (Selar crumenophthalmus), and the jack mackerel (Trachurus trachurus) are also used in Angola for reduction.

In the Union of South Africa and South-West Africa, the sardine or pilchard (Sardinops ocellata) and the jack mackerel or maasbanker (T. trachurus) are the principal fish caught for reduction. Some meal is also made from wastes and offal of sardine canneries, groundfish (chiefly hake, Merluccius capensis) processing plants, and spiny lobster (Jasus lalandii) freezing and canning plants.

The principal fish for reduction in Peru is the "anchoveta" (Engraulis ringens), though there is some production from bonito (principally Sarda chilensis and S. velox) cannery wastes; a low-grade meal is obtained from the "machete" (Ethmidium chilcae). The anchoveta is also found in the waters off northern Chile, and its use in reduction is surpassing that of the "pescada", a southern hake (Merluccius gayi), formerly the principal source of Chilean fishmeal. In Mexico, one fishmeal plant on the Gulf Coast, uses chiefly an anchoveta (Cetengraulis endentulus).

The saury (Cololabis saira) is a major source of raw material for reduction in Japan. The Japanese factory-ship fleets in the Bering Sea use the bottom fishes taken by the trawl fishery. Wastes and offal from fish processing also form a considerable part of the raw material used in the Japanese reduction industry.

The North Atlantic and North Sea herring (Clupea harengus) is the major source of fish meal and oil in Denmark, the Federal Republic of Germany, Norway, Iceland, and the United Kingdom. Denmark and the Federal Republic of Germany, especially, are also using the sand

launce (Ammodytes tobianus). Offal and wastes from herring and other fish processing--as well as fish condemned as unfit for human consumption--are sent to the reduction plants in the northern European countries.

NORTH AMERICA

CANADA

The Industry

On the east coast the Canadian reduction industry is located chiefly in Newfoundland, Nova Scotia, and New Brunswick, and on the west coast in British Columbia (figure 2). There are about 45 reduction plants in these areas and about the same number of dealers handling the fishmeal trade in Canada. Total production of fishmeal dropped from 91,428 short tons in 1956, the record year, to 57,559 tons in 1957, but rose to 77,177 tons in 1959 (table 2, figure 3). Fish body oil production reached a high point of 35,977 tons in 1959. Three firms produced fish solubles. Figures on production of solubles are not available.

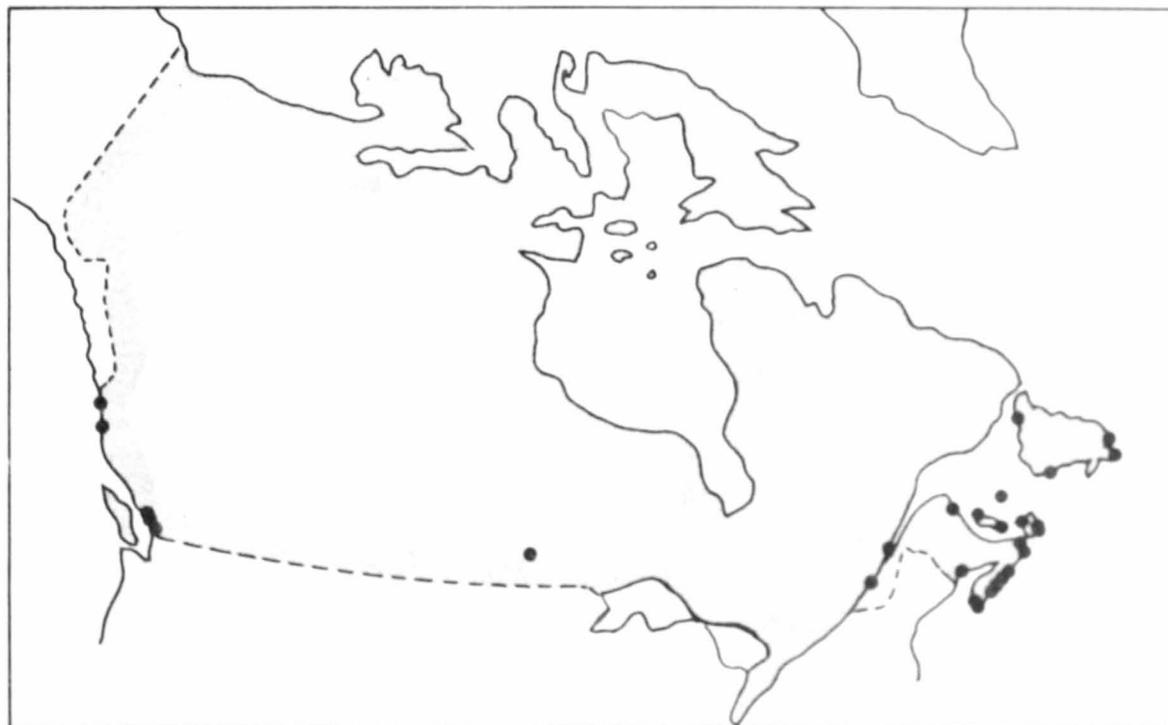


FIGURE 2.--CANADA: LOCATION OF FISH-REDUCTION PLANTS

TABLE 2.--CANADA: PRODUCTION OF FISH MEAL AND OIL, 1953-59
(IN SHORT TONS)

| YEAR | FISHMEAL | FISH OIL |
|------|----------|----------|
| 1953 | 51,856 | 15,478 |
| 1954 | 61,725 | 16,882 |
| 1955 | 67,440 | 21,273 |
| 1956 | 91,428 | 29,389 |
| 1957 | 57,559 | 16,489 |
| 1958 | 72,393 | 26,487 |
| 1959 | 77,177 | 35,977 |

NOTE: FISHMEAL INCLUDES COD-LIVER MEAL, COD BODY AND OFFAL MEAL, HERRING BODY MEAL, SALMON OFFAL MEAL, AND MEAL FROM OTHER SPECIES, AND FISH FERTILIZERS.

SOURCES: FISHERIES STATISTICS OF CANADA; U. S. FOREIGN SERVICE DESPATCHES.

The British Columbia herring fishery, the second fishery in importance in the Province, is now conducted solely for the production of fish meal and oil. The herring (*Clupea pallasii*) is taken by seiners--largely in the inlets of the east and west coasts of Vancouver Island and the neighboring mainland--and sent to the reduction plants. This fishery supplies about one-half of Canada's annual production of fish meal and oil. Wastes and offal from the salmon canneries and other food-fish processing plants on the Pacific Coast are also reduced

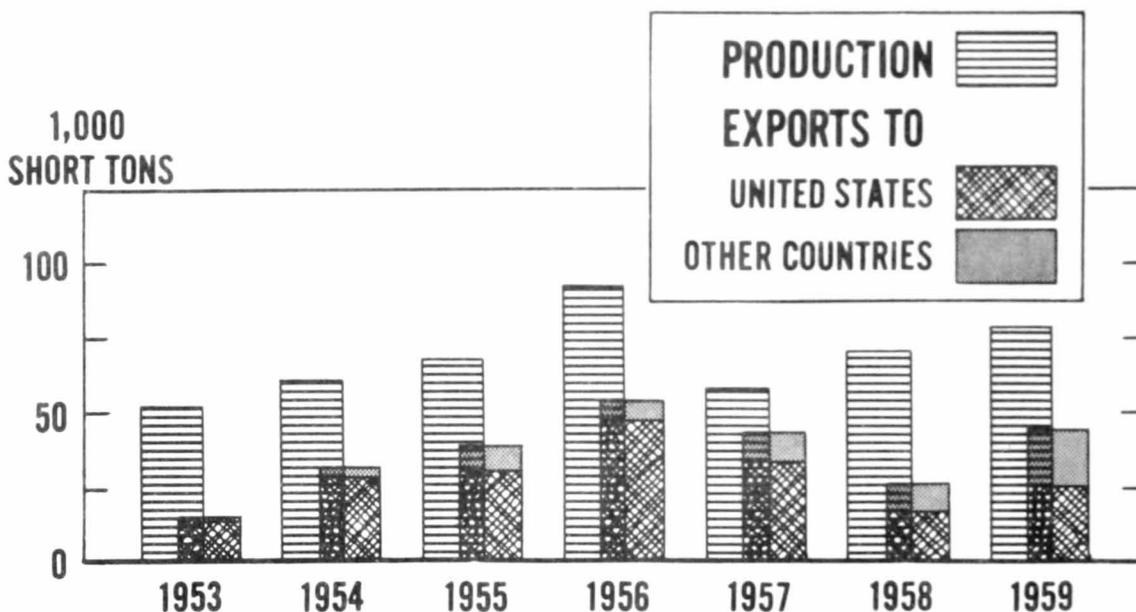


FIGURE 3.--CANADA: PRODUCTION AND EXPORTS OF FISHMEAL, 1953-59

to meal and oil.

The reduction plants on the Atlantic Coast produce meal from cod livers, cod wastes and offal, herring and trash fish, and the wastes from the groundfish industry. Small amounts of fish fertilizer are produced from alewives, capelin, herring, and other species.

Reduction plants producing fishmeal or fish fertilizer from one or more of these raw materials are located, as follows:

British Columbia - Vancouver, Steveston, North Vancouver, Butedale, Prince Rupert.

Nova Scotia - Mulgrave, Yarmouth, Petit de Grat, Hood Harbour, Glace Bay, Clarkes Harbour, Lockeport, Louisburg, Canso, Liverpool, Lunenburg, North Sydney and Halifax.

Newfoundland - St. John's, Burgeo, Curling, Harbour Grace.

New Brunswick - Black's Harbour, Loggieville, Fairhaven.

Quebec - Grindstone (Magdalen Islands), Montreal, Quebec.

Prince Edward Island - Souris, Tignish.

Manitoba - Winnipeg (fresh-water fish).

In 1955 and again in 1957 and 1958, strikes in the British Columbia herring fishery reduced the size of the herring catch. In 1959, however, a record production of Pacific herring meal and oil was made despite a five-month strike in the herring fishery, and the December closing of the fishmeal plants. In that year, 41,696 short tons of herring meal and 21,551 tons of herring oil were produced. This fishery and the reduction industry on which it depends remained closed from December 1959 to November 1960.

Prices and Costs

British Columbia fishermen were paid the equivalent of about US\$13.00 per short ton for herring during the last months of 1959. The decline in world prices of fishmeal in late 1959 was not accompanied by a drop in the cost of raw materials purchased by British Columbia reduction plants. In November 1960, however, the herring fishermen agreed to accept a price of about US\$9.00 per ton, and fishing

TABLE 3.--CANADA: EXPORTS OF FISHMEAL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|----------------|--------|--------|--------|--------|--------|--------|--------|
| UNITED STATES | 15,266 | 30,731 | 32,439 | 47,793 | 34,064 | 17,419 | 26,429 |
| UNITED KINGDOM | 326 | 1,300 | 3,102 | 3,490 | 6,741 | 8,478 | 15,927 |
| PHILIPPINES | - | 210 | 501 | 1,280 | 1,818 | 70 | - |
| VENEZUELA | - | 340 | 1,773 | 853 | 610 | - | - |
| OTHER | 23 | 53 | 1,063 | 534 | 120 | 1,267 | 2,366 |
| TOTAL | 15,615 | 32,634 | 38,878 | 53,950 | 43,353 | 27,234 | 44,722 |

SOURCE: TRADE OF CANADA, EXPORTS, 1953-59.

TABLE 4.--CANADA: EXPORTS OF FISH OIL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|--------------------------------|-------|-------|-------|-------|------|------|--------|
| UNITED STATES | 2,157 | 2,455 | 1,078 | 703 | 25 | - | 276 |
| FEDERAL REPUBLIC OF GERMANY | 1,470 | 1,738 | 2 | 5,272 | - | 82 | 683 |
| NETHERLANDS | 1,053 | 1/ | 3,693 | 463 | - | 139 | - |
| UNITED KINGDOM | - | - | - | - | - | 150 | 10,311 |
| VENEZUELA | 80 | 105 | 81 | 10 | - | - | - |
| OTHER | 2 | 5 | 425 | 6 | 1/ | 3 | 1/ |
| TOTAL | 4,762 | 4,303 | 5,279 | 6,454 | 25 | 374 | 11,270 |

1/ INSIGNIFICANT.

NOTE: INCLUDES HERRING OIL AND OTHER FISH-BODY OILS.

SOURCES: TRADE OF CANADA, EXPORTS, 1953-59; CANADIAN FISHERIES ANNUAL, 1959.

was scheduled to begin again in December. During 1955, east coast fishmeal plants, which were not a part of a fish-processing plant, paid US\$10.35 per ton for wastes and offal, and in 1960 only US\$3.37 per ton. In July 1960, a price of US\$111.75 per ton, f.o.b. Vancouver, was quoted for British Columbia herring meal. July 1960 quotations showed Newfoundland fishmeal (60 percent protein) selling at about US\$84.00 per short ton, f.o.b., east coast Canadian mainland ports. Fish oil was quoted at about US\$171.00 per short ton, f.o.b. east coast Canadian ports.

Foreign Trade

More than one-half of the Canadian production of fishmeal is exported. In 1959, nearly 45,000 short tons were exported, of less than 78,000 tons produced. The United States and the United Kingdom were the principal export markets (table 3). Exports of fish body oil dropped from a 5,000 ton annual average during 1954 to 1956, to an insignificant amount in 1957 and 1958 (table 4). The United States, the Federal Republic of Germany, and the Netherlands were the principal buyers of Canadian fish oil until 1958. In that year, the United Kingdom entered this market, and in 1959 took the bulk of Canadian fish oil exports of 11,270 tons. In Canada, fish oil has been largely replaced by cheaper vegetable oils in the manufacture of margarine, and lard in the manufacture of shortening.

Canadian exports of fish solubles by country of destination from 1953 to 1959 were as follows:

| Year | United States | Jamaica | Total |
|------|-------------------------------|---------|-------|
| | <u>short tons</u> | | |
| 1953 | 3,520 | - | 3,520 |
| 1954 | 5,284 | 2 | 5,286 |
| 1955 | 5,880 | - | 5,880 |
| 1956 | 4,095 | - | 4,095 |
| 1957 | 8,414 | - | 8,414 |
| 1958 | 4,079 | - | 4,079 |
| 1959 | 4,442 | - | 4,442 |

Small amounts of fish scrap and fish offal, amounting to about 2,000 tons, net Canadian export, are traded between the United States and Canada. Minor quantities have also been imported occasionally from Iceland, or exported to Australia.

MEXICO

The Industry

Fishmeal in Mexico has been mostly a byproduct of the canning industry located chiefly in Baja California. Recently a reduction plant started operations in Ciudad del Carmen, fishing exclusively for reduction and using mostly an anchoveta (Cetengraulis edentulus), and some menhaden and other fish. There are 16 reduction plants in Mexico, though 5 of these are not presently in operation. Production by these plants was between 2,200 and 3,300 short tons of fishmeal in 1959. The 1960 production should be considerably higher as the plant at Ciudad del Carmen is now producing about 600 tons a month. The total capacity of the 16 plants is in excess of 100 tons of raw fish per hour, or about 180 tons of meal per 8-hour day. One plant introduces solubles from stickwater into the meal. A plant at Ensenada produces a small amount of fish solubles; the entire production is exported to California.

Little probability exists for any significant increase in Mexican fishmeal production if world prices remain low. Eventual self-sufficiency in domestic needs in both fish meal and oil may be possible if the world price situation improves.

Prices and Costs

The plant at Ciudad del Carmen pays the equivalent of US\$14.50 per short ton for fish for reduction. This plant estimates its production cost for meal, delivered in Mexico City, at the equivalent of about US\$160.00 per short ton, at which price it cannot compete with Peruvian fishmeal which was offered in Mexico City at US\$114.00 per ton in July 1960. The Baja California producers, who normally sell most of their fishmeal in the United States, are unable to compete with Peruvian prices either in the United States or in Mexico because of high production costs and freight and handling charges.

Foreign Trade

Imports of fishmeal into Mexico have increased from 1,287 short tons in 1956 to 11,020 short tons in 1959. These imports come chiefly from the United States, Peru, and Canada, with small amounts from Norway and Chile. Import permits are now required on fishmeal by a decree of July 15, 1960, but the previously required agricultural sanitary permits were issued prior to this date for about 15,000 tons of fishmeal, mostly from Peru. Import duties amount to about US\$18.00 per short ton. There is a government severance tax on the production of meal amounting to about US\$2.90 per short ton. Import permits are required for fish oil. Duties vary with the size of the container.

PANAMA

The Industry

Two fishmeal plants in Panama, one on Taboga Island and one at Puerto de Caimito, have a capacity of 8 to 10 short tons of raw fish per hour. Purse seines are used to capture anchoveta (Cetengraulis mysticetus) and thread herring (Opisthonema libertate). In 1959, about 9,500 tons of fish were processed, yielding about 2,000 tons of meal. The fish oil produced by the two plants is sold locally for soapmaking. Fishing vessels are owned by the plants. The price of local fishmeal depends on the quantity purchased. More than five-ton lots sell at the equivalent of US\$125.00 per ton, delivered at plant. Fish oil was quoted at US\$0.07 per pound. Stickwater is not utilized nor are solubles produced.

Foreign Trade

Import duty on fishmeal amounts to about US\$180.00 per short ton, plus one percent of the f.o.b. value at port of embarkation. This import duty rather effectively protects the local industry. No severance tax is charged on fish caught for reduction purposes and there are no export duties or quantitative restrictions on imports. In 1959, about 2,000 tons of meal were exported, largely to West Germany and the United States, and about the same amount imported. This paradoxical situation was explained by the fact that imports were made early in the year when the two reduction plants were not in operation.

UNITED STATES

The Industry

In 1959, for the first time, the utilization in the United States of fish and shellfish for industrial purposes exceeded that for human food. Of the 2,550,000 short tons of fish and shellfish caught, about 1,375,000 tons (or nearly 54 percent of the total) were used in the manufacture of such industrial products as fishmeal, fish oil, fish solubles, homogenized-condensed fish, and shell products or as bait or animal food. Over 90 percent of the raw materials for industrial use have gone into the manufacture of fish meal, oil, and related products.

In 1959, U.S. reduction plants in operation, exclusive of duplication, numbered 150. The plants are located on all coasts (figure 4), but those with the largest capacity are on the Atlantic and Gulf coasts. Classified according to raw materials used, there were 36 menhaden, 28 shrimp, 21 crab, 24 tuna and mackerel, 15 herring, 11 Pacific sardine and 34 groundfish, ocean perch, etc. plants. In

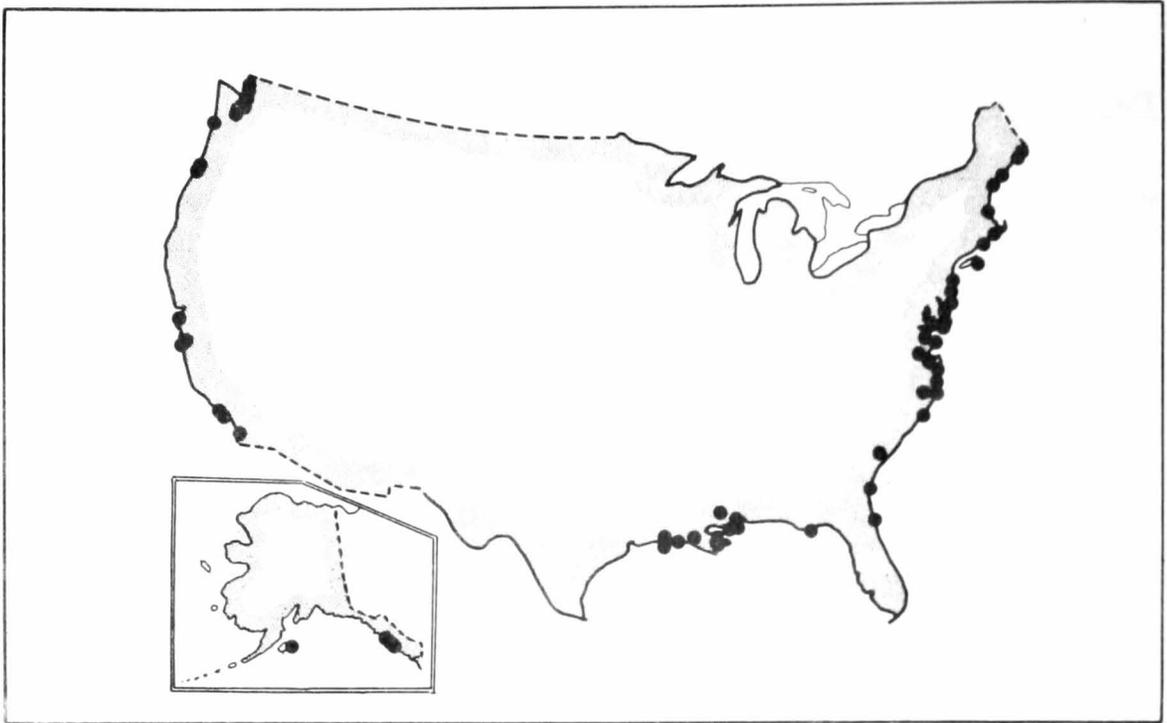


FIGURE 4.--UNITED STATES: LOCATION OF FISH-REDUCTION PLANTS

addition, 8 plants handled such miscellaneous materials as anchovy, alewife, salmon offal, horseshoe crab, fur seal, and whale. Some of the reduction plants were listed as processors of more than one type of raw material--these being chiefly plants which produce meal from herring and groundfish on the Atlantic Coast and plants utilizing tuna, mackerel, and sardines on the Pacific Coast. Approximately 80 to 85 percent of U.S. fishmeal production is handled by 15% the 150 plants. The number of reduction plants did not increase in 1960.

TABLE 5 .--UNITED STATES: SUPPLY OF FISHMEAL, 1953-59
(IN SHORT TONS)

| YEAR | PRODUCTION | IMPORTS | TOTAL |
|------|------------|---------|---------|
| 1953 | 238,851 | 131,473 | 370,324 |
| 1954 | 256,967 | 145,777 | 402,744 |
| 1955 | 264,502 | 98,003 | 362,505 |
| 1956 | 295,793 | 90,421 | 386,214 |
| 1957 | 264,085 | 81,196 | 345,281 |
| 1958 | 248,140 | 100,352 | 348,492 |
| 1959 | 306,551 | 132,925 | 439,476 |

SOURCE: BUREAU OF COMMERCIAL FISHERIES.

TABLE 6 .--UNITED STATES: SUPPLY OF FISH SOLUBLES, 1953-59
(IN SHORT TONS)

| YEAR | PRODUCTION <u>1/</u> | IMPORTS | TOTAL |
|------|----------------------|-----------|---------|
| 1953 | 81,494 | <u>2/</u> | 81,494 |
| 1954 | 115,030 | 3,614 | 118,644 |
| 1955 | 110,919 | 3,297 | 114,216 |
| 1956 | 128,829 | 2,991 | 131,820 |
| 1957 | 122,273 | 9,709 | 131,982 |
| 1958 | 130,177 | 14,567 | 144,744 |
| 1959 | 165,359 | 26,630 | 192,030 |

1/ INCLUDES HOMOGENIZED-CONDENSED FISH (WET-WEIGHT BASIS).

2/ NOT AVAILABLE.

NOTE: IMPORTS OF FISH SOLUBLES ARE UNDERSTOOD TO BE ON A WET-WEIGHT BASIS, EXCEPT THOSE FROM THE UNION OF SOUTH AFRICA WHICH ARE BELIEVED TO BE ON A DRY-WEIGHT BASIS.

SOURCE: BUREAU OF COMMERCIAL FISHERIES.

U.S. fishmeal production has been at a high level and reached a record high of 306,551 tons in 1959 (table 5, figure 5). Fish solubles (including homogenized-condensed fish) have been produced in increasing quantities--81,494 tons in 1953, compared with 165,359 tons in 1959 (table 6). Postwar production of fish body oil reached its highest point in 1956 with 98,629 tons; in 1959 production was 91,590 tons (table 7).

TABLE 7 .--UNITED STATES: PRODUCTION AND FOREIGN TRADE IN FISH OIL
(EXCLUDING LIVER, WHALE, AND SPERM OIL), 1953-59
(IN SHORT TONS)

| YEAR | PRODUCTION | IMPORTS | EXPORTS <u>1/</u> |
|------|------------|---------|-------------------|
| 1953 | 75,337 | 5,978 | 54,234 |
| 1954 | 81,105 | 6,506 | 70,817 |
| 1955 | 92,546 | 5,149 | 71,336 |
| 1956 | 98,629 | 5,329 | 70,402 |
| 1957 | 74,101 | 3,604 | 57,470 |
| 1958 | 80,816 | 2,456 | 47,022 |
| 1959 | 91,590 | 3,334 | 72,240 |

1/ INCLUDES SMALL QUANTITIES OF NON-MEDICINAL LIVER OILS.

SOURCE: BUREAU OF COMMERCIAL FISHERIES.

The U.S. fishmeal industry is now based chiefly on the menhaden (Brevoortia), which is found off the Atlantic coast from Massachusetts to Florida and along the Gulf of Mexico coast to Texas. Before World War II, the industry had been located traditionally at Atlantic Coast ports, with some landings made at Gulf of Mexico ports. The growth of the poultry and swine raising industries in the postwar period, however, caused an increased demand for fishmeal, and modern equipment and new plants were introduced into the Gulf reduction industry. About 25 percent of the total Atlantic and Gulf catch now comes from Gulf of Mexico waters. The menhaden fishery uses more than 200 vessels with nearly 600 auxiliary boats and more than 200 purse seines. Almost 5,000 fishermen are occupied in this fishery.

In 1959, from the 1,096,932 short tons of menhaden delivered to reduction plants, 223,893 short tons of fishmeal were produced (table 8). In addition, 25,380 tons of meal were processed from tuna and mackerel cannery wastes, 11,963 tons from herring, 2,927 tons from Pacific sardine cannery wastes, and 30,344 tons from unclassified forms, consisting chiefly of wastes from plants processing alewives, groundfish, ocean perch, anchovies, crabs, and salmon. Small amounts of meal are produced from horseshoe crab and from wastes of crab, shrimp, fur seal, and whale processing.

The menhaden also accounts for the bulk of the fish oil (excluding liver, whale, and sperm oil) produced in the United States. Of the 91,590 short tons of fish oil processed in 1959, about 85 percent (77,355 tons) was obtained from the menhaden (table 9).

Prices

Prices quoted on the New York market dropped in late 1959. A comparison of New York quotations for fishmeal, fish oil, and fish solubles in 1958 and 1960 is afforded in the following tabulation:

| Product | Sept. 23, 1958 | Sept. 26, 1960 |
|--------------------------------------|---------------------------------|----------------|
| | <u>U.S. dollars</u> | |
| Domestic menhaden meal (60% protein) | | |
| F.O.B., East Coast, per short ton | 138.00-140.00 | 90.00-95.00 |
| Imported Peruvian meal (65% protein) | | |
| F.O.B., Gulf ports, per short ton | 154.00-156.00 | 88.00-90.00 |
| Domestic menhaden oil | | |
| F.O.B., Baltimore, per short ton | 145.00-150.00 | 120.00-130.00 |
| Domestic fish solubles, 50% solids | | |
| F.O.B., East Coast, per short ton | 95.00-97.50 | 35.00-40.00 |

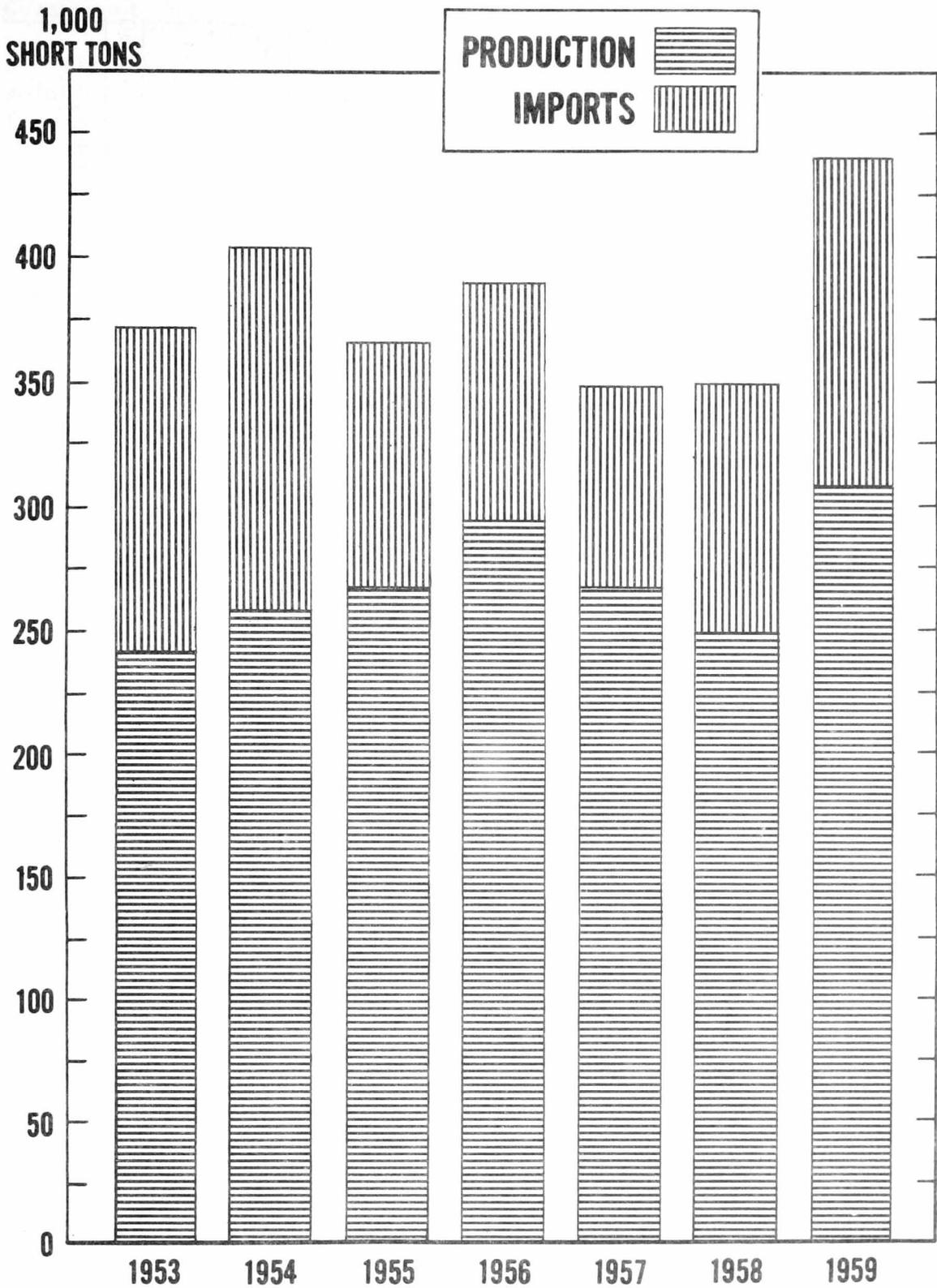


FIGURE 5.--UNITED STATES: PRODUCTION AND IMPORTS OF FISHMEAL, 1953-59

TABLE 8 .--UNITED STATES: PRODUCTION OF FISHMEAL, BY TYPE OF PRODUCT, 1953-59
(IN SHORT TONS)

| PRODUCT | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|--------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| MENHADEN SCRAP AND MEAL | 174,752 | 183,091 | 190,628 | 210,582 | 172,388 | 158,074 | 223,893 |
| HERRING MEAL | 206 | 6,973 | 7,671 | 11,298 | 13,891 | 10,277 | 11,963 |
| PACIFIC SARDINE MEAL | 144 | 6,513 | 6,966 | 2,809 | 1,474 | 10,756 | 2,927 |
| TUNA AND MACKEREL MEAL | 20,029 | 21,576 | 23,396 | 26,266 | 25,716 | 25,311 | 25,380 |
| OTHER MEAL ^{1/} | <u>38,720</u> | <u>38,814</u> | <u>35,841</u> | <u>44,838</u> | <u>50,616</u> | <u>43,722</u> | <u>42,388</u> |
| TOTAL | 238,851 | 256,967 | 264,502 | 295,793 | 264,085 | 248,140 | 306,551 |

^{1/} CHIEFLY OFFAL, WASTE, AND SCRAP FISH FROM THE GROUND FISH INDUSTRY; INCLUDES ALSO CRAB MEAL (9,206 TONS IN 1959), SEAL MEAL (330 TONS IN 1959), SHRIMP MEAL (627 TONS IN 1959), AND WHALE MEAL (1,881 TONS IN 1959).

SOURCE: BUREAU OF COMMERCIAL FISHERIES, CANNED FISH AND BYPRODUCTS, 1959.

TABLE 9 .--UNITED STATES: PRODUCTION OF FISH OIL, BY TYPE OF PRODUCT, 1953-59
(IN SHORT TONS)

| PRODUCT | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|--------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| MENHADEN OIL | 66,844 | 69,904 | 79,620 | 84,105 | 59,243 | 63,994 | 77,355 |
| HERRING OIL | 2,696 | 2,854 | 4,091 | 6,840 | 7,054 | 6,600 | 7,504 |
| PACIFIC SARDINE OIL | 48 | 2,835 | 3,367 | 1,264 | 330 | 2,779 | 705 |
| TUNA AND MACKEREL OIL | 2,471 | 2,194 | 2,044 | 2,644 | 2,768 | 2,351 | 2,254 |
| OTHER MARINE OIL ^{1/} | <u>3,278</u> | <u>3,318</u> | <u>3,424</u> | <u>3,776</u> | <u>4,706</u> | <u>5,092</u> | <u>3,772</u> |
| TOTAL | 75,337 | 81,105 | 92,546 | 98,629 | 74,101 | 80,816 | 91,590 |

^{1/} CHIEFLY GROUND FISH, OCEAN PERCH, AND ANCHOVY OILS; ALSO INCLUDES ALEWIFE, SEAL, SALMON, AND WHALE OILS.

SOURCE: BUREAU OF COMMERCIAL FISHERIES.

Government Policies

Imports into the United States of fishmeal, fish scrap, and fish solubles, unfit for human consumption and not fertilizer grade, are free of duty and not subject to any quantitative import restrictions. The duty-free status was bound in a trade agreement with Iceland, effective November 1943, and under the General Agreement on Tariffs and Trade with Canada in 1948. This binding commits the United States to consult and renegotiate with other interested supplying countries in any actions which would change the duty-free status of the commodity.

The U.S. fishmeal industry filed a request for an escape-clause action with the Tariff Commission during November 1959. In consultation with the Tariff Commission, the industry agreed to withdraw this request, without prejudice. The industry is hopeful that possible solution to the presently disturbed market situation can be attained through an FAO conference of fishmeal producing and consuming countries.

Foreign Trade

The United States is a large importer of fishmeal and fish solubles. In 1959, imports accounted for about 30 percent of all fishmeal (table 5) and 14 percent of all solubles (table 6) available in the United States. Fishmeal imports of 132,925 short tons in that year, though not the largest on record, were still of such volume that--coupled with a record U.S. production of 306,551 tons--the U.S. supply of fishmeal reached 439,476 tons. This supply was only about 4 percent larger than that of the previous peak year of 1952, when the supply was 424,942 tons (221,403 tons from U.S. production and 203,539 tons from imports).

In 1959, the U.S. supply of fishmeal was augmented by record imports of 26,630 tons of fish solubles; also a record U.S. production of 165,359 tons of solubles was attained. In 1952, the supply of fish solubles was about one-fourth that of 1959. The 1959 supply of fish meal and solubles (converted to dry-weight basis) totaled 536,609 tons, or 27 percent higher than in 1958 and 8 percent higher than the previous record year of 1952.

Projected import data for 1960, based on cumulative figures for January through October, indicate that the amount of fishmeal imported will approach the total for 1959. Imports of fish solubles, however, declined sharply in 1960, and are expected not to exceed 15 percent of 1959 imports.

During the late 1950's, the geographical region contributing most strongly to the U.S. imports of fishmeal shifted from Europe and Africa to the Americas (table 10). In 1953, a total of 131,473 short tons

TABLE 10 .--UNITED STATES: IMPORTS OF FISHMEAL, BY COUNTRY OF ORIGIN, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| ANGOLA | 33,589 | 30,130 | 12,138 | 5,063 | 9,708 | 18,062 | 20,738 |
| CANADA | 28,733 | 39,740 | 41,661 | 57,127 | 42,823 | 27,777 | 39,033 |
| CHILE | 2,019 | 823 | 5,282 | 1,366 | 1,108 | 8,160 | 5,104 |
| DENMARK | 6,586 | 9,103 | 3,119 | - | - | 1,092 | 2,266 |
| MOROCCO | 6,229 | 4,404 | 2,815 | 1,157 | - | - | - |
| NORWAY | 21,748 | 34,154 | 14,568 | 10,965 | 2,930 | 1,184 | 141 |
| PERU | 10,685 | 17,596 | 8,734 | 7,766 | 16,817 | 33,371 | 49,923 |
| UNION OF SOUTH AFRICA | 14,072 | 4,794 | 3,545 | 3,470 | 4,015 | 7,345 | 9,727 |
| OTHER | <u>7,812</u> | <u>5,033</u> | <u>6,141</u> | <u>3,507</u> | <u>3,795</u> | <u>3,361</u> | <u>5,993</u> |
| TOTAL | 131,473 | 145,777 | 98,003 | 90,421 | 81,196 | 100,352 | 132,925 |

SOURCE: BUREAU OF COMMERCIAL FISHERIES; COMPILED FROM BUREAU OF THE CENSUS DATA.

TABLE 11 .--UNITED STATES: IMPORTS OF FISH SOLUBLES, BY COUNTRY OF ORIGIN, 1954-59
(IN SHORT TONS)

| COUNTRY | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------------|-----------|------------|------------|-----------|------------|-----------|
| CANADA | 2,426 | 2,767 | 1,698 | 4,024 | 2,699 | 1,660 |
| DENMARK | - | - | - | 3,298 | 9,943 | 18,723 |
| NORWAY | 1,140 | 317 | 793 | 1,606 | - | 2,211 |
| UNION OF SOUTH AFRICA | - | 81 | 344 | 726 | 1,063 | 2,303 |
| FEDERAL REPUBLIC OF GERMANY | - | - | - | - | - | 1,705 |
| OTHER | <u>48</u> | <u>132</u> | <u>156</u> | <u>55</u> | <u>862</u> | <u>28</u> |
| TOTAL | 3,614 | 3,297 | 2,991 | 9,709 | 14,567 | 26,630 |

NOTE: IMPORTS OF FISH SOLUBLES ARE UNDERSTOOD TO BE ON A WET-WEIGHT BASIS, EXCEPT THOSE FROM THE UNION OF SOUTH AFRICA WHICH ARE BELIEVED TO BE ON A DRY-WEIGHT BASIS.

SOURCE: BUREAU OF COMMERCIAL FISHERIES; COMPILED FROM BUREAU OF THE CENSUS DATA.

TABLE 12 .--UNITED STATES: EXPORTS OF FISH OIL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------------|--------------|------------|------------|--------------|------------|------------|--------------|
| FEDERAL REPUBLIC OF GERMANY | 36,156 | 10,481 | 10,503 | 31,742 | 26,297 | 17,118 | 16,589 |
| NETHERLANDS | 8,914 | 43,693 | 40,260 | 24,824 | 13,908 | 10,921 | 22,058 |
| CANADA | 2,108 | 7,511 | 11,308 | 1,626 | 1,228 | 6,485 | 1,920 |
| NORWAY | 1,606 | 1,103 | 6,140 | 6,251 | 5,272 | 5,795 | 8,055 |
| SWEDEN | - | - | - | 2,646 | 7,716 | 3,370 | 20,356 |
| BELGIUM | 764 | - | 1,099 | 760 | 662 | 2,344 | 2,167 |
| SWITZERLAND | 3,115 | 5,797 | 646 | 368 | 794 | 558 | - |
| UNITED KINGDOM | 300 | 1,377 | 882 | 921 | 850 | - | 5 |
| OTHER ^{1/} | <u>1,271</u> | <u>855</u> | <u>498</u> | <u>1,264</u> | <u>743</u> | <u>431</u> | <u>1,090</u> |
| TOTAL | 54,234 | 70,817 | 71,336 | 70,402 | 57,470 | 47,022 | 72,240 |

NOTE: INCLUDES INEDIBLE FISH AND FISH-LIVER OILS AND HYDROGENATED FISH OIL.

SOURCE: BUREAU OF COMMERCIAL FISHERIES; COMPILED FROM BUREAU OF THE CENSUS DATA.

of fishmeal was imported with the following relative contributions by principal countries: Norway 16.5 percent, Union of South Africa 10.7 percent, Angola 25.5 percent, Canada 21.9 percent, and Peru 8.1 percent. Imports for 1955 amounted to 98,003 tons, a decline of 25 percent over 1953. Percentage contributions according to principal countries were Canada 42.5 percent, Norway 14.9 percent, Angola 12.4 percent, Peru 8.9 percent, and Union of South Africa 3.6 percent. In 1959, 132,925 tons of fishmeal were imported. Compared to 1955, this represents an increase of 35.6 percent. Relative contributions from the principal countries were as follows: Peru 38.0 percent, Canada 29.4 percent, Angola 15.6 percent, and Union of South Africa 7.3 percent.

During 1954-56, U.S. imports of fish solubles ranged between 3,000 and 3,600 short tons annually (table 11). From 1957 to 1959, imports climbed rapidly to a record peak of 26,630 tons (wet weight)--an increase of over 700 percent during this period. In 1959, imports from Denmark were 18,723 tons, from the Union of South Africa 2,303 tons, Norway 2,211 tons, Federal Republic of Germany 1,705 tons, and Canada 1,660 tons. In 1960, imports of fish solubles abruptly declined and will probably be about 3,000 tons, or equivalent to imports for the 1954-56 period.

The bulk of the fish oil (excluding liver, whale, and sperm oils) produced in the United States is exported (table 7). Imports are relatively small, mainly herring oil from Canada. Menhaden oil has been the principal U.S. fish oil produced in recent years and exported. Exports dropped to 47,022 short tons in 1958, but rose to 72,240 tons in 1959. Normally, most of the fish oil goes to the Netherlands and West Germany (table 12). In 1959, however, because of the failure of the Norwegian winter herring catch, Sweden bought 20,356 tons of U.S. fish oil.

SOUTH AMERICA

ARGENTINA

In former years fishmeal production in Argentina was based on a species of fresh-water fish of the Rio La Plata and its tributaries. As conservation measures to prevent depletion were applied, production declined. Only 10 fishmeal plants now operate on these rivers. Total production of these plants in 1959 amounted to 1,342 short tons of meal and 765 tons of oil.

In 1959 a new reduction plant was built at Puerto Deseado to use various types of fish (chiefly hake) for reduction; this plant has a capacity of 33 short tons a day of meal and 6 or 7 tons a day of oil. Owing to a lack of fishermen, this plant and one in Bahia Bustamante

are not operating. Probable production costs of fishmeal at Puerto Deseado are estimated at the equivalent of US\$88.18 per ton, if fishermen can be found to supply the raw material.

Four plants in Mar del Plata produce fishmeal from marine fish. The Mar del Plata plants use chiefly cannery wastes for raw material--formerly paying about US\$1.68 per short ton. The plants now receive these wastes free of charge as the cost of delivery is less than the cost of other means of disposal. The price of whole fish, mostly hake and sardines, for reduction is about US\$13.36 per ton.

In 1958, Argentine exports of fishmeal amounted to 7,427 tons, principally to the Netherlands, the Federal Republic of Germany, Belgium, Italy, Sweden, and the United States. Fish body oil was exported in minor quantities to the Netherlands and the Federal Republic of Germany.

BRAZIL

The fish reduction industry in Brazil is small, and with no apparent plans for immediate large-scale expansion. Brazil's fishmeal production amounted to only 2,809 short tons in 1958, and 4,290 tons in 1959. Production of fish body oil was 323 tons in 1958 and only slightly more in 1959. Sixteen fishmeal plants use, as raw material, offal and wastes from canning and filleting operations. Because of the high price, whole fish is used only occasionally to increase the protein content of the meal. Foreign trade in these commodities consists of small amounts of meal and oil imported from various sources.

CHILE

The Industry

Fishmeal production in Chile has increased slowly from about 8,000 short tons in 1953 to more than 33,000 tons in 1959 (table 13). The industry consists of 41 reduction plants located at the following ports (figure 6).

| | | | |
|-------------|---|-------------|----|
| Arica | 4 | Coquimbo | 2 |
| Iquique | 5 | Quintero | 1 |
| Mejillones | 1 | Valparaiso | 2 |
| Antofagasta | 4 | San Antonio | 2 |
| Tocopilla | 1 | Talcahuano | 19 |

Two small plants in Talcahuano are said to be closed. Four additional plants are planned in the Arica-Iquique area. Total annual productive capacity of fishmeal is estimated at over 80,000 short tons, and with

TABLE 13 .--CHILE: PRODUCTION OF FISH MEAL AND OIL, 1953-59
(IN SHORT TONS)

| YEAR | FISHMEAL | FISH OIL |
|------|----------|----------|
| 1953 | 8,218 | 84 |
| 1954 | 8,196 | 62 |
| 1955 | 17,201 | 218 |
| 1956 | 14,368 | 127 |
| 1957 | 18,300 | 182 |
| 1958 | 20,725 | 496 |
| 1959 | 33,811 | 3,307 |

NOTE: FISHMEAL PRODUCTION FOR 1958 INCLUDES SHELLFISH MEAL.

SOURCES: INFORMACIONES ESTADISTICAS SOBRE PESCA (STATISTICAL INFORMATION ON FISHING), VALPARAISO, 1953-57; U. S. FOREIGN SERVICE DESPATCHES, 1958-59.

TABLE 14 .--CHILE: EXPORTS OF FISHMEAL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|--------------------------------|-------|-------|-------|-------|-------|--------|----------|
| UNITED STATES | 1,763 | 1,036 | 5,917 | 1,188 | 1,159 | 7,483 | 7,160 |
| FEDERAL REPUBLIC OF GERMANY | 1,102 | 165 | 873 | 1,225 | 2,199 | 1,582 | 4,902 |
| UNITED KINGDOM | 561 | 261 | 76 | - | 482 | 1,199 | 114 |
| NETHERLANDS | 99 | - | 2,681 | 2,099 | 960 | 391 | 4,441 |
| OTHER | 146 | 66 | - | - | 166 | 1,336 | 1/ 2,445 |
| TOTAL | 3,671 | 1,528 | 9,547 | 4,512 | 4,966 | 11,991 | 19,062 |

1/ INCLUDES 1,120 TONS EXPORTED TO VENEZUELA.

SOURCES: CHILE, COMERCIO EXTERIOR (FOREIGN TRADE), 1953-57; ESTADISTICA CHILENA (CHILEAN STATISTICS), 1957; U.S. FOREIGN SERVICE DESPATCHES, 1959-60.

the construction of the new plants may reach 100,000 tons.

Most of the reduction plants are operating below capacity because raw materials have been lacking. Mainly responsible for this lack of supply is the inadequacy of the Chilean fishing fleet; fishing vessels are obsolescent and there has been little construction of vessels and of maintenance facilities.

New steel fishing vessels are to be constructed by a Santiago firm. Most of these vessels will probably be used in fishing for reduction plants. Designed especially for seining, the vessels will have unusually large hold space for carrying the catch. The first of three similar vessels, built in Seattle, has been shipped to Chile. Anchoveta and other schooling fish will be caught, but the vessels can readily be converted to trawling for hake or other bottom fish.

A plant for the production of fishmeal for human use (fish flour) was planned in 1956 at Quintero, and was to have been jointly constructed by the United Nations and the Chilean Government. Proposed capacity is to be 330 short tons per year. Construction of this plant, halted for many months, has been resumed. A Chilean company has reportedly taken over the plant. It is also reported that a company in San Antonio has purchased German equipment for processing edible fish flour from hake.

In northern Chile, the anchoveta (*Engraulis ringens*) is used in reduction. Plants in Valparaiso and Talcahuano utilize the southern hake (*Merluccius gayi*) as the major raw material for fishmeal. In southern Chile another hake (*M. polylepis*) is also used. More than two-thirds of the entire Chilean hake catch is sent to the reduction plants; the remainder is used as food. A sardine (*Sardinops sagax musica*) is also used in reduction by plants located between Arica and Concepcion. Two species of herring (*Clupea bentincki* and *C. fuegensis*) are also used at Talcahuano and the more southern plants. Offal and wastes from fish and shellfish processing plants

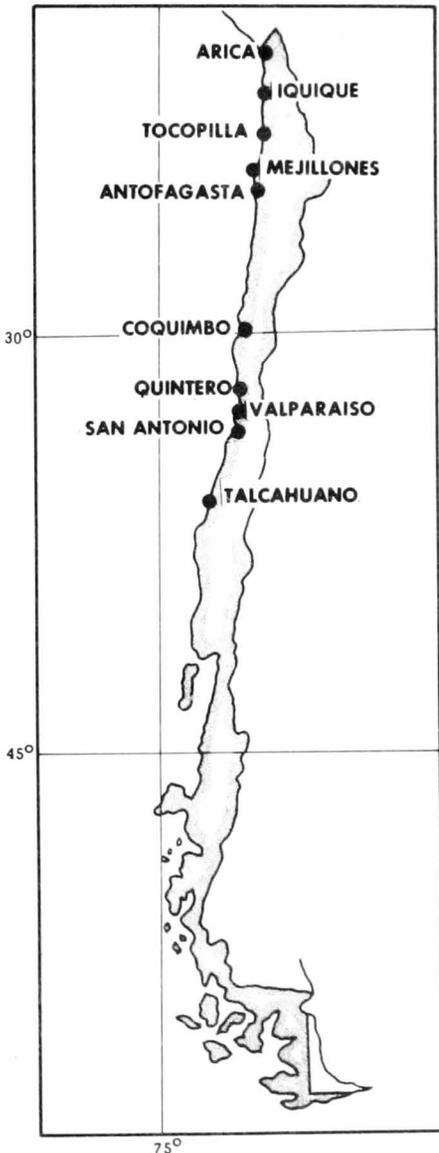


FIGURE 6.--CHILE: LOCATION OF FISH-REDUCTION PLANTS

account for a part of the Chilean production of fishmeal.

The trend to increase fishing for reduction plants has decreased the percentage of the catch destined for the canneries. In 1948, about 62 percent of the fish sent to processing plants went to the canneries and only 32 percent was used in reduction; in 1957, only 16 percent was canned, and 77 percent was used in reduction.

The change occurring in the Chilean reduction industry is demonstrated by the export records for ports of embarkation. Exports of fishmeal from Arica and Iquique are increasing, whereas those from the rest of the country are declining; in 1959, 71 percent of Chilean fishmeal exports was from Arica and Iquique, whereas in the first half of 1960 about 93 percent was from these ports.

Government Policies

In 1959, a law was passed permitting Chilean industries to import machinery duty free. Some reduction plants took advantage of this law to improve their installations. In 1959, the Chilean Government, through its development organization (Corporacion de Fomento de la Produccion) extended credit to the fishing industry to assist it in building up its fleets. Laws were modified in that year to permit foreign-flag vessels to fish in Chilean waters as far south as the southern boundary of Antofagasta Province, provided they delivered their catch to Chilean fish byproducts factories in Antofagasta and Tarapaca Provinces.

A law of March 31, 1960, to encourage the building up of the fishing industries, authorizes special concessions for individuals or companies. Among its provisions are: A reduction in taxes on profits and earnings; a reduction in real estate taxes to the fishing industries; exemption from all taxes affecting distribution, sale, or purchase of certain fishery products, including fishmeal and fish oil; and exemption from import duties on much of the equipment and machinery necessary to build an effective fishing fleet and a processing industry. To protect the domestic reduction industry, imports of fish meal and oil are subject to an import deposit of 1,500 percent for 90 days. In order to bolster the economy of the Departments of Arica and Iquique, special import and export privileges and subsidies have been granted by the Chilean Government. The subsidies to fishmeal and fish oil amount to 30 percent of the cost of raw material and 20 percent of the f.o.b. price. The privileges and subsidies in Arica and Iquique are in addition to the general concessions to the fishing industries granted by decree No. 266 of March 31, 1960.

Prices and Costs

In 1960, Arica and Iquique boatowners were paid about the equivalent of US\$6.05 per short ton for anchoveta. In San Antonio the same price was paid for hake, and it was reported that this price also prevailed in Talcahuano for sardines for reduction. In Antofagasta and Valparaiso plant owners stated that they were paying US\$6.91 per ton for whole fish for reduction.

In Santiago, the local price of fishmeal was the equivalent of US\$108.86 per short ton. This price appears to be artificially maintained as the export price in October 1960 was between US\$58.06 and US\$60.78 per ton, f.o.b. Chilean ports. Fish body oil in drums was quoted at the equivalent of US\$104.32 per short ton, f.o.b. Chilean ports. Operators' export losses in July 1960 were made up by a government export subsidy of approximately 40 percent.

Foreign Trade

Most of the Chilean production of fishmeal is exported. Local consumption is now reported to be less than 10,000 tons annually. Exports have increased from less than 5,000 tons in 1957, to nearly 20,000 tons in 1959 (table 14). The United States, the Federal Republic of Germany, and the Netherlands are the principal markets. The production of fish body oil is small. Most of the oil produced is used domestically, with only negligible amounts exported. In 1959, 69 tons were exported, mostly to Italy. Minor amounts of fish oil have been imported by Chile from time to time.

PERU

The Industry

The reduction industry in Peru first started by using offal and wastes of the tuna and bonito canneries. In 1948, the export of about 700 short tons of fishmeal from this source marked the birth of the fishmeal export industry. Afterward, because of increased competition in world tuna markets, Peruvian canners made greater efforts to expand fishmeal production. Tuna boats, during their short off-season, caught the anchoveta (*Engraulis ringens*) for reduction. Later, boats went to full-time fishing for anchoveta. The first fishmeal reduction plant for anchoveta was built in 1950. In 1953, total production of fishmeal was 13,330 tons (figure 7, table 15), of which 33 percent was from cannery residues. In 1959, of the 366,351 tons produced, less than 2 percent was from residues. A production of 500,000 tons of fishmeal has been estimated for 1960.

By reason of the tremendous increase in anchoveta fishing for reduction plants, Peru rose from 26th place in world fishery landings in 1956 to 5th place in 1959. During 1953-59, the quantity of raw fish used by Peruvian reduction plants was as follows:

| Year | Quantity <u>short tons</u> |
|------|-------------------------------|
| 1953 | 44,400 |
| 1954 | 54,441 |
| 1955 | 75,378 |
| 1956 | 150,979 |
| 1957 | 367,575 |
| 1958 | 832,814 |
| 1959 | 2,241,733 |

According to latest available information, 90 Peruvian factories produce fishmeal. Some are complete reduction plants, some are connected with canneries (using cannery waste and offal as raw material), and some are a combination using whole fish and wastes and offal. The plants are located at the following ports (figure 8):

| | | | |
|----------|----|----------|---|
| Callao | 33 | Casma | 2 |
| Chimbote | 26 | Lima | 2 |
| Huarmey | 7 | Samanco | 2 |
| Huacho | 6 | Paita | 1 |
| Supe | 4 | Pucusana | 1 |
| Chancay | 3 | Mollendo | 1 |
| Ilo | 2 | | |

About 45 percent of the tonnage of fishing vessels in Peru is engaged in fishing for the reduction plants. Most of the vessels being built for anchoveta fishing are of 50-ton capacity, although some up to 150 tons are in service and more are being built. The fishery is conducted mainly by diesel-powered purse seiners in the coastal waters just beyond the surf. In many ports, suction pumps transfer the fish from the vessels to trucks or directly to the reduction plants.

Most of the Peruvian fishmeal which is exported has a 65 to 70 percent protein content. Inferior grades are made from fish wastes and "machete" (*Ethmidium chilcae*). Until 1960 fish solubles were not produced. With the decline in fishmeal prices, however, more interest is being shown in stickwater recovery for the manufacture of "whole" meal. In 1960, many plants were installing equipment for the recovery of the protein solids in stickwater.

Prices and Costs

In late 1959, reduction plants were paying about the equivalent of from US\$7.62 to US\$8.28 per short ton for anchoveta in Callao and Chimbote. Fishermen's wages in the anchoveta fishery are reportedly much greater than those of workers in any other employment in Peru, crew members receiving as much as 1,000 soles (US\$36.52) per day.

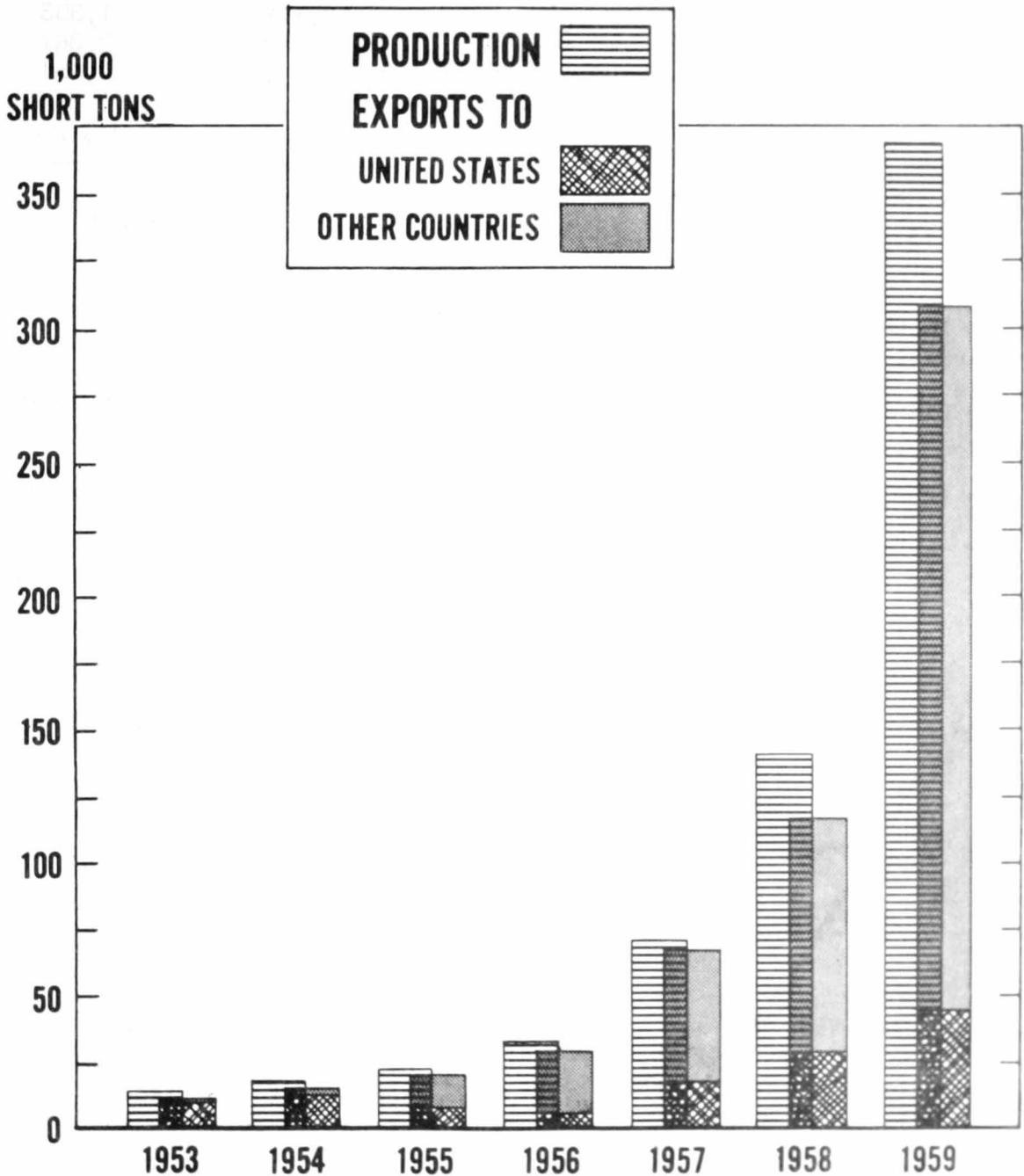


FIGURE 7.--PERU: PRODUCTION AND EXPORTS OF FISHMEAL, 1953-59

TABLE 15.--PERU: PRODUCTION OF FISH MEAL AND OIL, 1953-59
(IN SHORT TONS)

| YEAR | FISHMEAL | | | FISH OIL |
|------|------------|----------------|---------|----------|
| | WHOLE FISH | CANNERY WASTES | TOTAL | |
| 1953 | 8,880 | 4,450 | 13,330 | 462 |
| 1954 | 10,747 | 7,475 | 18,222 | 835 |
| 1955 | 15,372 | 6,744 | 22,116 | 1,353 |
| 1956 | 29,048 | 5,079 | 34,127 | 3,367 |
| 1957 | 66,655 | 4,402 | 71,057 | 8,451 |
| 1958 | 136,510 | 3,344 | 139,854 | 11,319 |
| 1959 | 360,560 | 5,791 | 366,351 | 26,120 |

NOTE: FISH SOLUBLES HAVE NOT BEEN PRODUCED IN PERU.

SOURCES: PUBLICATIONS OF THE MINISTRY OF AGRICULTURE, LIMA; U.S. FOREIGN SERVICE DESPATCHES.

In the fourth quarter of 1958, fishmeal prices varied (according to protein content) from US\$143.00 to US\$170.00 per short ton, f.o.b. Callao. In the fall of 1959 prices began to decline, and in December 1960 were quoted at an average of US\$55.34 per short ton, 65 percent protein content, f.o.b. Peruvian ports.

The cost of a medium-sized reduction plant, producing 500 to 800

metric tons of fishmeal a day, is about US\$180,000, of which about US\$110,000 is for the plant, machinery, and equipment, and about US\$70,000 for fishing vessels to supply the raw materials.

Government Policies

The fishmeal industry in Peru has developed entirely through private initiative and without government subsidy or other form of aid. As the industry expanded, the increase in anchoveta fishing met with resistance from the guano industry and agricultural interests, since the anchoveta is the food supply of the guano birds. Regulations limiting the expansion of the fishmeal industry were put in force in 1956, though the industry continued to expand slowly through the granting of

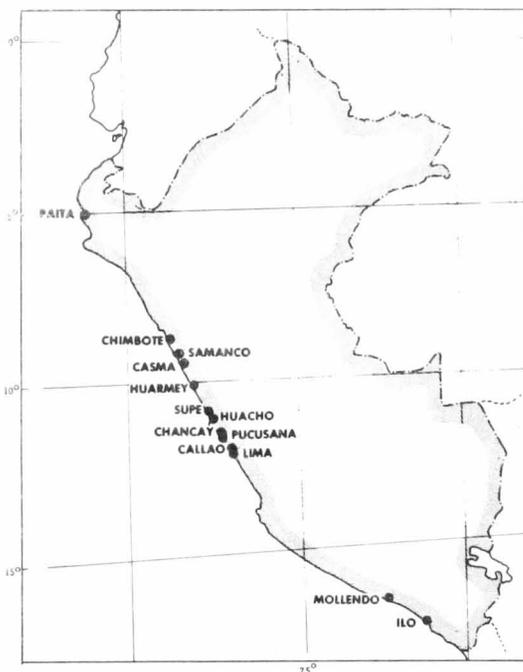


FIGURE 8.--PERU: LOCATION OF FISH-REDUCTION PLANTS

special licenses. Certain limitations were placed on fishing for reduction plants within a specified distance from the coast and from the guano islands, and in designated areas where the guano birds feed in large numbers.

The provision prohibiting the establishment of new reduction plants and the expansion of existing plants was lifted, with certain regulations, by Supreme Decree of October 9, 1959. This decree limited reduction plants to land installations and provided that plant operators must own their own fishing vessels. This last proviso was to protect the fresh-fish and canning industries by preventing vessels fishing for these industries from entering the anchoveta fishery. Closed seasons can be established, if necessary, to prevent depletion. The establishment of fishmeal plants is not permitted in certain zones. Control is retained by the government in the issuance of licenses to establish or expand plants. Thus, the industry could be controlled within certain production limits in case scientific investigation or industry developments showed it to be advisable.

An export quota for 1961 of 661,380 short tons of fishmeal was accepted by the Peruvian delegates to an international conference held in Paris in 1960. It is reported that this quota has been given the force of law by the Government of Peru. A consortium of most of the producers was established to provide orderly marketing of fishmeal and to prevent speculation and price manipulation. Sales are to be effected only through this cooperative.

Peru has an export tax on fishmeal of 10 percent of the difference between the officially recognized production cost (established at the equivalent of US\$58.35 per short ton in 1956) and the price on the U.S. Pacific Coast, less freight and insurance. An additional 10 percent ad valorem tax on exports is added when the export price exceeds by 25 percent the officially recognized production cost.

Foreign Trade

The major part of Peru's fishmeal production is exported; in 1959, the value of fishmeal exports to the Peruvian economy ranked third, after cotton and sugar. Domestic consumption of fishmeal, primarily for poultry and swine raising, has risen from only 1,551 short tons in 1953 to 22,114 tons in 1959 (table 16). Exports of fishmeal, however, have risen from 11,691 tons in 1953 to 67,932 tons in 1957 and 306,501 tons in 1959. In 1959, the principal purchasers of Peruvian fishmeal were the Netherlands, the Federal Republic of Germany, the United States, the United Kingdom, and Belgium (table 17).

In the first quarter of 1960, fishmeal was the second most important export product of Peru, and constituted between 85 and 90

TABLE 16.--PERU: PRODUCTION, STOCKS, EXPORTS, AND CONSUMPTION OF FISHMEAL, 1953-59
(IN SHORT TONS)

| YEAR | PRODUCTION | STOCKS FROM PREVIOUS YEAR | TOTAL SUPPLY | EXPORTS | INTERNAL CONSUMPTION | STOCKS AT YEAR END |
|------|------------|---------------------------|--------------|---------|----------------------|--------------------|
| 1953 | 13,330 | 304 | 13,634 | 11,691 | 1,551 | 392 |
| 1954 | 18,222 | 589 | 18,811 | 15,472 | 1,546 | 1,793 |
| 1955 | 22,116 | 1,794 | 23,910 | 20,626 | 2,433 | 851 |
| 1956 | 34,127 | 796 | 34,923 | 30,626 | 1,850 | 2,447 |
| 1957 | 71,057 | 2,447 | 73,504 | 67,932 | 4,249 | 1,323 |
| 1958 | 139,854 | 1,322 | 141,176 | 116,566 | 11,775 | 12,835 |
| 1959 | 366,351 | 12,839 | 379,190 | 306,501 | 22,114 | 50,575 |

SOURCE: PERU, ESTADISTICA ECONOMICA DE LA INDUSTRIA PESQUERA (ECONOMIC STATISTICS OF THE FISHERY INDUSTRY, 1959.

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TABLE 17.--PERU: EXPORTS OF FISHMEAL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------------|--------|--------|--------|--------|--------|---------|---------|
| NETHERLANDS | 332 | 1,074 | 6,081 | 17,896 | 29,893 | 36,285 | 110,671 |
| UNITED STATES | 11,239 | 13,080 | 9,190 | 7,010 | 18,121 | 30,582 | 44,361 |
| FEDERAL REPUBLIC OF GERMANY | 67 | 685 | 2,365 | 2,758 | 12,645 | 29,369 | 80,737 |
| UNITED KINGDOM | 53 | 148 | 517 | 205 | 1,439 | 11,913 | 36,241 |
| BELGIUM | - | 163 | 2,169 | 1,857 | 2,510 | 5,692 | 23,373 |
| OTHER | - | 322 | 304 | 900 | 3,324 | 2,725 | 11,118 |
| TOTAL | 11,691 | 15,472 | 20,626 | 30,626 | 67,932 | 116,566 | 306,501 |

SOURCES: PUBLICATIONS OF THE MINISTRY OF AGRICULTURE, LIMA; U. S. FOREIGN SERVICE DESPATCHES.

percent of total fishery exports by quantity and between 70 and 80 percent by value. A first quarter comparison of fishmeal exports is as follows:

| Year | Quantity <u>short tons</u> | Value <u>US\$1,000,000</u> |
|------------------|-------------------------------|-------------------------------|
| 1958 (Jan.-Mar.) | 26,990 | 2.4 |
| 1959 (Jan.-Mar.) | 56,730 | 5.9 |
| 1960 (Jan.-Mar.) | 163,241 | 13.0 |

Exports of fishmeal during January to September 1960 were reported to have been 422,842 short tons.

Peruvian fishmeal exports, by port of shipment, 1957-59, were as follows:

| Port | 1957 | 1958 <u>short tons</u> | 1959 |
|----------|----------|---------------------------------------|---------------|
| Callao | 16,331 | 49,328 | 120,959 |
| Chancay | 8,917 | 8,442 | 9,127 |
| Chimbote | 36,530 | 43,461 | 133,827 |
| Huacho | 1,455 | 5,572 | 12,435 |
| Ilo | 3,212 | 5,874 | 10,685 |
| Matarani | 427 | 216 | 1,856 |
| Mollendo | - | 111 | 11 |
| Paita | 334 | 1,257 | 1,821 |
| Pisco | 536 | - | 227 |
| Supe | 190 | 2,305 | 1,575 |
| Huarmey | <u>-</u> | <u>-</u> | <u>13,978</u> |
| Total | 67,932 | 116,566 | 306,501 |

Peru also exports the bulk of its fish oil (table 18). Exports of fish oil rose from 157 tons in 1953 to 18,916 tons in 1959. The principal purchasers in 1959 were the Netherlands, the Federal Republic of Germany, Norway, and Denmark (table 19). Apparent local consumption of fish oil totaled 8,952 short tons in 1959, compared to 428 tons in 1953. Small amounts of hydrogenated fish oils and fats are imported, chiefly from Denmark, amounting to 468 tons in 1958.

VENEZUELA

Venezuelan consumption of fishmeal is currently estimated at about 8,000 short tons annually. In 1959, about 2,530 tons were produced locally and the remainder imported from the United States, Peru, and Mexico. The bulk of the fishmeal produced in the five plants on

TABLE 18.--PERU: PRODUCTION, STOCKS, EXPORTS, AND CONSUMPTION OF FISH OIL, 1953-59
(IN SHORT TONS)

| YEAR | PRODUCTION | STOCKS FROM PREVIOUS YEAR | TOTAL SUPPLY | EXPORTS | INTERNAL CONSUMPTION | STOCKS AT YEAR END |
|------|------------|---------------------------|--------------|---------|----------------------|--------------------|
| 1953 | 462 | 141 | 603 | 157 | 428 | 18 |
| 1954 | 835 | 18 | 853 | 325 | 470 | 58 |
| 1955 | 1,353 | 58 | 1,411 | 102 | 1,194 | 115 |
| 1956 | 3,337 | 115 | 3,452 | 1,897 | 1,368 | 188 |
| 1957 | 8,451 | - | 8,451 | 4,780 | 3,422 | 249 |
| 1958 | 11,319 | 250 | 11,569 | 1,810 | 7,507 | 2,251 |
| 1959 | 26,120 | 2,251 | 28,371 | 18,916 | 8,952 | 503 |

SOURCE: PERU, ESTADISTICA ECONOMICA DE LA INDUSTRIA PESQUERA (ECONOMIC STATISTICS OF THE FISHERY INDUSTRY, 1959).

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TABLE 19.--PERU: EXPORTS OF FISH OIL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------------|------|------|------|-------|-------|-------|--------|
| FEDERAL REPUBLIC OF GERMANY | 57 | 61 | - | 991 | 1,284 | 592 | 4,156 |
| NETHERLANDS | 63 | 262 | 99 | 840 | 2,475 | 616 | 10,170 |
| ITALY | 37 | - | - | 32 | 221 | 601 | 578 |
| OTHER | - | 2 | 3 | 34 | 800 | 1 | 4,012 |
| TOTAL | 157 | 325 | 102 | 1,897 | 4,780 | 1,810 | 18,916 |

SOURCES: PUBLICATIONS OF THE MINISTRY OF AGRICULTURE, LIMA; U. S. FOREIGN SERVICE DESPATCHES.

the Gulf of Cariaco is from sardine offal and wastes from the canneries located in this area. The sardine (Clupanadon pseudohispanicos) is the source of most of this raw material, though some comes from the offal and wastes of tuna, and some whole sardine (Cetengraulis edentulus) is used. The combined meal capacity of these five plants is 24 short tons of raw material per hour. Two new plants are under construction to produce meal and oil; one will also produce solubles which will be reintroduced into the meal. The five operating plants do not produce oil or save stickwater.

The fishermen, using beach seines, are on a salary basis during the fishing season. The height of the season is between November and August. A bonus is paid for each boatload of fish. A salary equaling about US\$2.25, plus a bonus of about US\$0.15 per boatload, brings the total wage to about US\$2.40 or more per day. The factory provides the fishing gear and picks up the fish.

Import duties on fishmeal in Venezuela amount to about US\$41.00 per gross short ton. Duty on industrial fish oil is also high, amounting to more than US\$0.16 per gross pound. Prices for domestic fishmeal run from about US\$132.00 to US\$152.00 per short ton, f.o.b. plant, depending on the size of the purchase. It is reported that locally produced meal must be used before meal can be imported. No severance taxes are charged on fish for canning or for reduction.

EUROPE

BELGIUM-LUXEMBOURG

The reduction industry of Belgium is largely a byproducts industry using offal and other wastes from the processing of edible fish. Two reduction plants are located at Ostend, one at Schoten, and one at Denderleeuw. They have a combined annual production capacity of about 10,000 short tons. Production of fishmeal amounts to between 6,000 and 10,000 tons annually, the greater part of which is herring meal.

During the first quarter of 1960, Peruvian fishmeal was selling at the equivalent of US\$109.20 per short ton on the Belgian market. By April 1960 the average price paid for imported fishmeal was US\$100.40 per ton, which was about 35% lower than the average for April 1959.

As the demands of agriculture for fishmeal have increased and Belgian production has remained static, a rise in imports has taken place. Although Norway and Angola had previously been the principal suppliers, Peru in 1959 furnished more than two-thirds of fishmeal imports of 32,915 short tons (table 20). About 2,000 tons of fishmeal are exported annually, chiefly to the Federal Republic of Germany,

TABLE 20.--BELGIUM-LUXEMBOURG: IMPORTS OF FISHMEAL,
BY COUNTRY OF ORIGIN, 1956-59
(IN SHORT TONS)

| COUNTRY | 1956 | 1957 | 1958 | 1959 |
|---------|--------------|--------------|--------------|--------------|
| NORWAY | 12,615 | 10,733 | 10,285 | 7,162 |
| ANGOLA | 4,642 | 7,743 | 10,843 | 1,066 |
| PERU | 1,532 | 1,912 | 5,593 | 22,581 |
| OTHER | <u>3,032</u> | <u>1,375</u> | <u>4,244</u> | <u>2,106</u> |
| TOTAL | 21,821 | 21,763 | 30,965 | 32,915 |

SOURCE: BULLETIN MENSUEL DU COMMERCE EXTERIEUR DE L'UNION ECONOMIQUE BELGO-LUXEMBOURGEOISE, (MONTHLY BULLETIN OF FOREIGN TRADE OF ECONOMIC UNION OF BELGIUM-LUXEMBOURG), 1956-59.

Austria, and the Netherlands.

The official Belgian statistics do not separate fish body oil and marine mammal oil. Consequently, statistics on production and imports of marine oil include both fish body oil and whale oil. Domestic production of marine oils does not fill the increasing needs of industry, and imports have risen from 13,278 short tons in 1956 to 19,786 tons in 1959 (table 21). The fish-oil market in Belgium is fairly stable. Fish oil is used principally for sulfonation, the manufacture of certain kinds of ink and dyes, and in lubricating compounds. Less than 1,000 tons of fish oil and marine mammal oil are exported. The Federal Republic of Germany, the Netherlands, and France are the principal buyers.

There are no import duties nor quantitative restrictions on the

TABLE 21.--BELGIUM-LUXEMBOURG: IMPORTS OF FISH AND MARINE ANIMAL
OILS, BY COUNTRY OF ORIGIN, 1956-59
(IN SHORT TONS)

| COUNTRY | 1956 | 1957 | 1958 | 1959 |
|-------------|--------------|------------|--------------|--------------|
| NORWAY | 5,736 | 5,188 | 1,212 | 312 |
| NETHERLANDS | 4,249 | 2,812 | 4,362 | 5,028 |
| JAPAN | 95 | 3,470 | 11,440 | 9,603 |
| OTHER | <u>3,198</u> | <u>876</u> | <u>4,261</u> | <u>4,843</u> |
| TOTAL | 13,278 | 12,346 | 21,275 | 19,786 |

SOURCE: BULLETIN MENSUEL DU COMMERCE EXTERIEUR DE L'UNION ECONOMIQUE BELGO-LUXEMBOURGEOISE, (MONTHLY BULLETIN OF FOREIGN TRADE OF THE ECONOMIC UNION OF BELGIUM-LUXEMBOURG), 1956-59.

import of fishmeal and fish oil, though a sales tax of eight percent is applicable to imported as well as domestic fishmeal, and five percent to imported and domestic fish oil.

DENMARK

The Industry

The first commercial fishmeal plant in Denmark was built at Skagen in 1931. Today, 21 fishmeal factories are in operation. In 1959, these factories produced more than 78,000 short tons of fishmeal (figure 9, table 22) and nearly 22,000 tons of fish oil, and have a capacity for greater production. Denmark is primarily an exporter of fishmeal and oil. Domestic use of fishmeal by farmers and feed manufacturers is reported to have been about 22,000 tons annually in recent years. In 1959, the reduction industry utilized more than 450,000 tons of raw material, including wastes and offal from the filleting and canning industries. The fishmeal industry is concentrated at the ports of Esbjerg, Fredrikshavn, Hirtshals, and Skagen, and on the island of Bornholm (figure 10).

The recently developed North Sea fishery for sand lance has helped increase Denmark's fishmeal production. In 1957, the sand lance constituted about 20 percent of the fish caught for reduction; 60 percent was herring and the rest groundfish and other unspecified fish.

Fish solubles came to the market in Denmark about 10 years ago

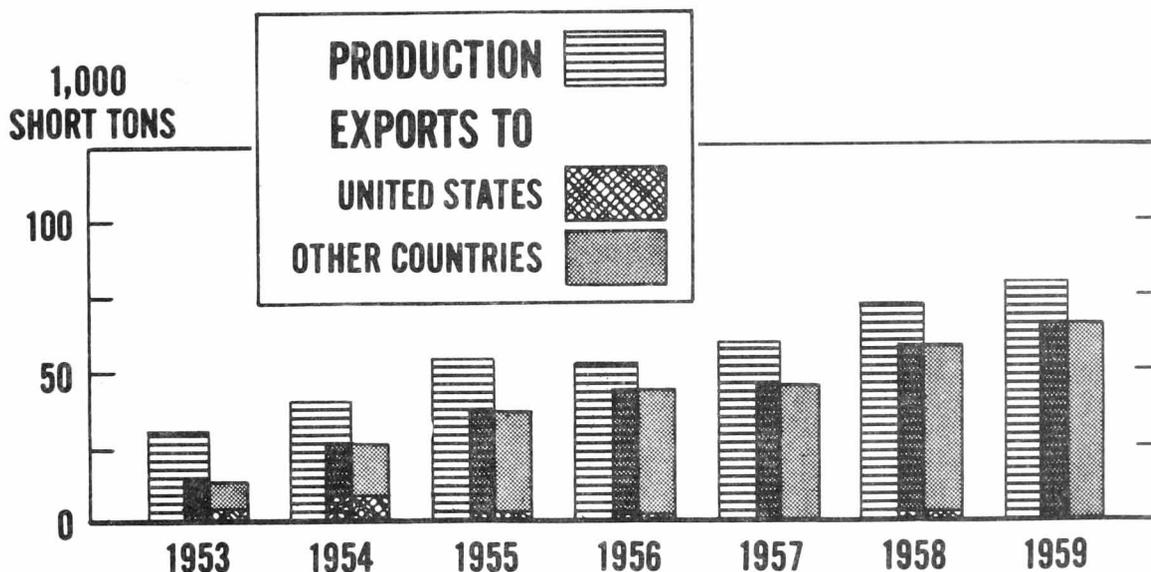


FIGURE 9.--DENMARK: PRODUCTION AND EXPORTS OF FISHMEAL, 1953-59

and are now used in feed compounds. Accurate figures on production cannot be given as they are not recorded separately, but are included with other products under a heading "animal products-other goods."

The production of margarine, which is made principally from fish oil, uses more than one-half the total supply of this oil in Denmark. The fish oil situation in 1958 and 1959 was as follows:

| Item | 1958 | 1959 |
|-----------------------|-------------------------------|--------|
| | <u>short tons</u> | |
| Stocks on January 1 | 2,532 | 4,167 |
| Production | 18,712 | 21,599 |
| Imports | 5,791 | 9,011 |
| Exports | 12,507 | 14,932 |
| Consumption | 10,340 | 16,353 |
| Stocks on December 31 | 4,188 | 3,492 |

Prices and Costs

The average Danish export price of fishmeal was reported to be the equivalent of US\$78.93 per short ton in June 1960, compared with US\$152.59 per ton at the same time in 1959. Stocks of fish meal and oil have been accumulating in Danish warehouses with a consequent pressure for lower prices for fish for reduction. It has been reported that the price paid for fish for reduction has fallen almost 50 percent since December 1959 at the plants at Esbjerg and that many industrial trawlers have turned to fishing for the fresh-fish market. Danish

TABLE 22.--DENMARK: PRODUCTION OF FISH MEAL AND OIL, 1953-59
(IN SHORT TONS)

| YEAR | FISHMEAL | FISH OIL |
|------|----------|----------|
| 1953 | 30,986 | 10,767 |
| 1954 | 39,193 | 12,335 |
| 1955 | 53,133 | 24,041 |
| 1956 | 51,699 | 15,286 |
| 1957 | 60,456 | 14,542 |
| 1958 | 72,319 | 18,712 |
| 1959 | 78,242 | 21,599 |

NOTE: FISH SOLUBLES NOT INCLUDED WITH FISHMEAL.

SOURCES: DENMARK, FISKERI BERETNING (FISHERY STATISTICS), 1953-59; U. S. FOREIGN SERVICE DESPATCHES.

fishermen attempting to market their catches abroad have found comparable price reductions in Norway and the Netherlands. Fish solubles, exported to the United States in 1959 at US\$80 to US\$95 per short ton, have been offered in 1960 at US\$35 per ton, freight included.

Government Policies

Exports of fish and fish products are subject to authorization by the Danish Government. Licenses are required for exports outside the dollar and European Payments Union areas, when bilateral trade agreements make them necessary. Modernization of the fishing fleet is aided by credit facilities of the Danish Fishing Bank. Loans and credit are facilitated on a long-term basis. Imports of fish meal and oil have been liberalized.

Foreign Trade

Denmark has been both an importer and exporter of fishmeal (table 23). Imports of fishmeal, chiefly from Iceland and Norway,

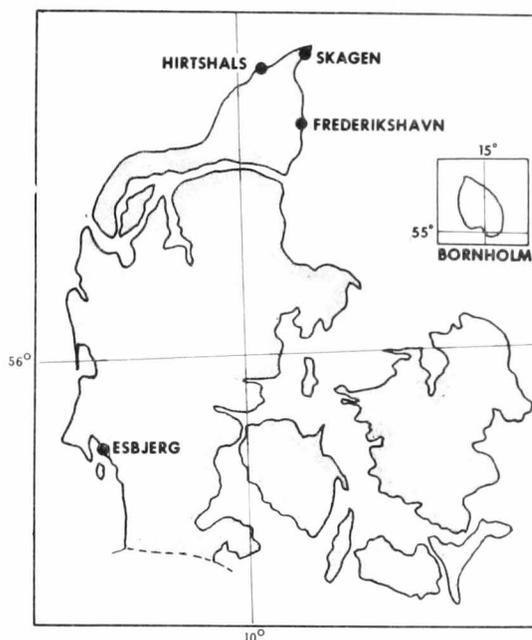


FIGURE 10.--DENMARK: LOCATION OF FISH-REDUCTION PLANTS

TABLE 23.--DENMARK: SUPPLY AND EXPORTS OF FISHMEAL, 1953-59
(IN SHORT TONS)

| YEAR | SUPPLY | | | EXPORTS |
|------|------------|-----------|--------|---------|
| | PRODUCTION | IMPORTS | TOTAL | |
| 1953 | 30,986 | 8,535 | 39,521 | 13,385 |
| 1954 | 39,193 | 16,021 | 55,214 | 27,682 |
| 1955 | 53,133 | 13,274 | 66,407 | 36,806 |
| 1956 | 51,699 | 16,139 | 67,838 | 44,104 |
| 1957 | 60,456 | 7,595 | 68,051 | 45,972 |
| 1958 | 72,319 | 11,955 | 84,274 | 59,007 |
| 1959 | 78,242 | 1/ 14,809 | 93,051 | 64,762 |

1/ PRELIMINARY.

NOTE: FISH SOLUBLES NOT INCLUDED.

SOURCES: DENMARK, FISHERI BERETNING (FISHERY STATISTICS), 1953-58;
U. S. FOREIGN SERVICE DESPATCHES.

TABLE 24.--DENMARK: IMPORTS OF FISHMEAL, BY COUNTRY OF ORIGIN, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 ^{2/} |
|------------------------|------------|--------------|--------------|--------------|------------|--------|--------------------|
| NORWAY | 7,438 | 7,911 | 4,915 | 6,546 | 4,764 | 4,223 | 4,641 |
| ICELAND | 277 | 3,831 | 3,440 | 5,474 | 2,051 | 7,732 | 9,838 |
| PORTUGAL ^{1/} | - | 997 | 2,617 | 3,099 | 379 | - | - |
| OTHER | <u>820</u> | <u>3,282</u> | <u>2,302</u> | <u>1,020</u> | <u>401</u> | - | <u>330</u> |
| TOTAL | 8,535 | 16,021 | 13,274 | 16,139 | 7,595 | 11,955 | 14,809 |

^{1/} APPARENTLY INCLUDES IMPORTS FROM ANGOLA.

^{2/} PRELIMINARY ESTIMATE.

SOURCES: DENMARK, FISKERI BERETNING (FISHERY STATISTICS), 1953-58; U. S. FOREIGN SERVICE DESPATCHES.

TABLE 25.--DENMARK: EXPORTS OF FISHMEAL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|---|--------------|--------------|--------------|--------------|--------------|--------------|-----------------|
| FEDERAL REPUBLIC OF GERMANY AND EAST GERMANY | 972 | 1,153 | 5,190 | 4,763 | 3,086 | 7,012 | 3,919 |
| UNITED KINGDOM | 2,118 | 2,931 | 8,632 | 12,749 | 26,968 | 28,734 | 33,978 |
| NETHERLANDS | 4,431 | 11,539 | 16,843 | 21,012 | 14,055 | 18,230 | 15,023 |
| UNITED STATES | 4,719 | 9,895 | 3,086 | 469 | - | 1,092 | - |
| OTHER | <u>1,145</u> | <u>2,164</u> | <u>3,055</u> | <u>5,111</u> | <u>1,863</u> | <u>3,939</u> | <u>1/11,842</u> |
| TOTAL | 13,385 | 27,682 | 36,806 | 44,104 | 45,972 | 59,007 | 64,762 |

^{1/} INCLUDES 2,253 TONS EXPORTED TO SWITZERLAND, 2,100 TONS TO SWEDEN, 1,964 TONS TO FINLAND, AND 1,515 TONS TO EAST GERMANY.

SOURCES: DENMARK, FISKERI BERETNING (FISHERY STATISTICS), 1953-58; U. S. FOREIGN SERVICE DESPATCHES.

TABLE 26.--DENMARK: IMPORTS OF HERRING OIL, BY COUNTRY OF ORIGIN, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|---------|-------|-------|------|-------|-------|-------|----------|
| NORWAY | 1,167 | 1,373 | 121 | 556 | 208 | 424 | 210 |
| SWEDEN | 53 | 195 | 57 | 56 | 692 | 526 | 571 |
| ICELAND | 310 | 219 | 2 | 15 | - | 1 | - |
| OTHER | 704 | - | - | 1,143 | 1,968 | 4,818 | 1/ 8,230 |
| TOTAL | 2,234 | 1,787 | 180 | 1,770 | 2,868 | 5,769 | 9,011 |

1/ INCLUDES 5,889 TONS FROM THE FEDERAL REPUBLIC OF GERMANY AND 1,216 TONS FROM PERU.

SOURCES: DENMARK, FISKERI BERETNING (FISHERY STATISTICS), 1953-58; U. S. FOREIGN SERVICE DESPATCHES.

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TABLE 27.--DENMARK: EXPORTS OF HERRING OIL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|---|-------|--------|--------|-------|-------|--------|---------|
| FEDERAL REPUBLIC OF GERMANY AND EAST GERMANY | 4,817 | 5,512 | 5,732 | 3,026 | 1,635 | 2,273 | 4,516 |
| SWEDEN | 1,563 | 4,195 | 5,290 | 1,995 | 5,799 | 7,804 | 1,964 |
| OTHER | 1,033 | 791 | 2,719 | 3,992 | 2,035 | 2,430 | 1/8,452 |
| TOTAL | 7,413 | 10,498 | 13,741 | 9,013 | 9,469 | 12,507 | 14,932 |

1/ INCLUDES 5,138 TONS EXPORTED TO NORWAY, AND 2,766 TONS TO THE NETHERLANDS.

SOURCES: DENMARK, FISKERI BERETNING (FISHERY STATISTICS), 1953-58; U. S. FOREIGN SERVICE DESPATCHES.

amounted to 14,809 tons in 1959 (table 24). In that year, however, exports of fishmeal reached a peak of 64,762 tons (table 25). It is reported that fishmeal exports in the first four months of 1960 amounted to only 10,845 tons, valued at a little more than US\$1,000,000, compared with 28,652 tons, valued at almost \$4,000,000 in the same period in 1959.

Denmark also imports and exports herring oil (Tables 26 and 27). During 1953-57, imports did not exceed 3,000 short tons, but rose to 9,011 tons in 1959. Exports of herring oil, however, ranged between 7,413 tons in 1953 and 14,932 tons in 1959; the principal buyers were the Federal Republic of Germany, East Germany, and Sweden.

Fish solubles have been exported chiefly to the United States. In 1959, most of the 25,346 short tons exported went to that country, with small amounts to the Federal Republic of Germany and the Netherlands. Exports of fish solubles for the first four months of 1960 are reported to total no more than 142 tons.

FRANCE

Fishmeal production in France depends almost entirely on the wastes and offal of the fish canning and salting industries. In 1958, of a total production of about 15,428 short tons, only about 1,102 tons was produced from whole fish. Fish meal and oil are produced by about 40 plants, located along the Atlantic Coast and in the Paris area. Domestic fishmeal production increased from about 12,122 tons in 1956 to about 19,841 tons in 1959. Until 1960, imports of fishmeal were principally from Norway, Morocco, and the Union of South Africa, with smaller quantities from Angola, Iceland, and Peru. Imports were approximately 46,300 tons in 1958 and 44,080 tons in 1959. In 1960, Peru became the principal supplier; during the first seven months of the year, French imports of fishmeal were 20,693 tons, of which 9,080 tons were from Peru. Fishmeal exports are negligible.

Fish oil production in France amounted to about 3,300 short tons in 1959. Imports--chiefly from Morocco and Norway, with smaller quantities from Japan, Portugal, and other countries--increased from about 4,850 tons in 1958 to 5,951 tons in 1959. Exports are negligible.

The price paid by the reduction plants for whole fish depends on the price of fishmeal, and was between US\$18.40 and US\$29.40 per short ton in August 1960. The price for wastes and offal was a little over US\$9.00 per short ton.

Fishmeal coming from member countries of the General Agreement on Tariffs and Trade (GATT) is theoretically subject to a 15 percent duty;

however, in practice, the duty has been 10 percent since 1955. The duty for fishmeal of Common Market origin was reduced on July 1, 1960, to 8 percent, and is due to disappear gradually. There are no quantitative restrictions on fishmeal imports. Oil of fish, other than halibut, from the United States or other GATT countries is theoretically subject to 18 percent duty, but this duty has been suspended since 1955. Imports of fish oil from Common Market countries are exempt from duty. Crude herring oils, edible fluid oils, and refined oils are subject to quota restrictions. Other fish oils and fats are free of quantitative controls.

FEDERAL REPUBLIC OF GERMANY

The Industry

Although one of Europe's major fishmeal producers, the Federal Republic of Germany is a net importer of fish meal and oil, as demand far exceeds domestic production. The supply of fishmeal has increased in the past six years, largely through expanded imports (table 28, figure 11).

TABLE 28.--FEDERAL REPUBLIC OF GERMANY: SUPPLY AND EXPORTS OF FISHMEAL, 1953-59
(IN SHORT TONS)

| YEAR | SUPPLY | | | EXPORTS |
|------|------------|---------|---------|-----------|
| | PRODUCTION | IMPORTS | TOTAL | |
| 1953 | 77,205 | 50,256 | 127,461 | <u>1/</u> |
| 1954 | 77,079 | 85,369 | 162,448 | 1,051 |
| 1955 | 92,486 | 90,881 | 183,367 | 1,376 |
| 1956 | 83,375 | 103,580 | 186,955 | 1,162 |
| 1957 | 86,714 | 142,786 | 229,500 | 1,727 |
| 1958 | 83,335 | 136,982 | 220,317 | 1,295 |
| 1959 | 98,078 | 166,055 | 264,133 | 211 |

1/ NOT AVAILABLE.

NOTE: AS THE OFFICIAL GERMAN STATISTICS DO NOT INCLUDE FISHMEAL PRODUCED BY SMALL PLANTS NOT EMPLOYING 10 PERSONS, ADD 4,400 SHORT TONS TO PRODUCTION FIGURES FOR TOTAL GERMAN PRODUCTION. ORIGINAL SOURCES DO NOT STATE WHETHER OR NOT FISH SOLUBLES ARE INCLUDED IN FISHMEAL FIGURES.

SOURCES: JAHRESBERICHT UBER DIE DEUTSCHE FISCHWIRTSCHAFT (YEARBOOK OF THE GERMAN FISHERIES), BERLIN, 1953-59; U. S. FOREIGN SERVICE DESPATCHES, 1960.

Under German law, reduction plants employing 10 or more persons are required to report their production. In 1959, there were 22 such plants located chiefly in the northern states of Schleswig-Holstein, Niedersachsen, and Nordrhein-Westfalen. In addition, more than 80 smaller plants produced small quantities of fishmeal, amounting to a total of less than 5,000 short tons annually. The 22 larger plants utilize about 93 percent of the raw materials used in reduction.

Slightly more than one-third of the raw material used for fishmeal is whole fish caught for reduction, and the rest is offal and waste from the processing industries. In 1959, reduction plants used 434,028 short tons of raw materials, of which 160,146 tons (or 37 percent) were whole fish, the rest offal and wastes. Herring and sand lance comprised 64,862 tons of the whole fish caught for reduction. The greatest yields of the sand lance fishery occur when the supply of other raw materials is low, thus tending to level seasonal fluctuations in the reduction industry.

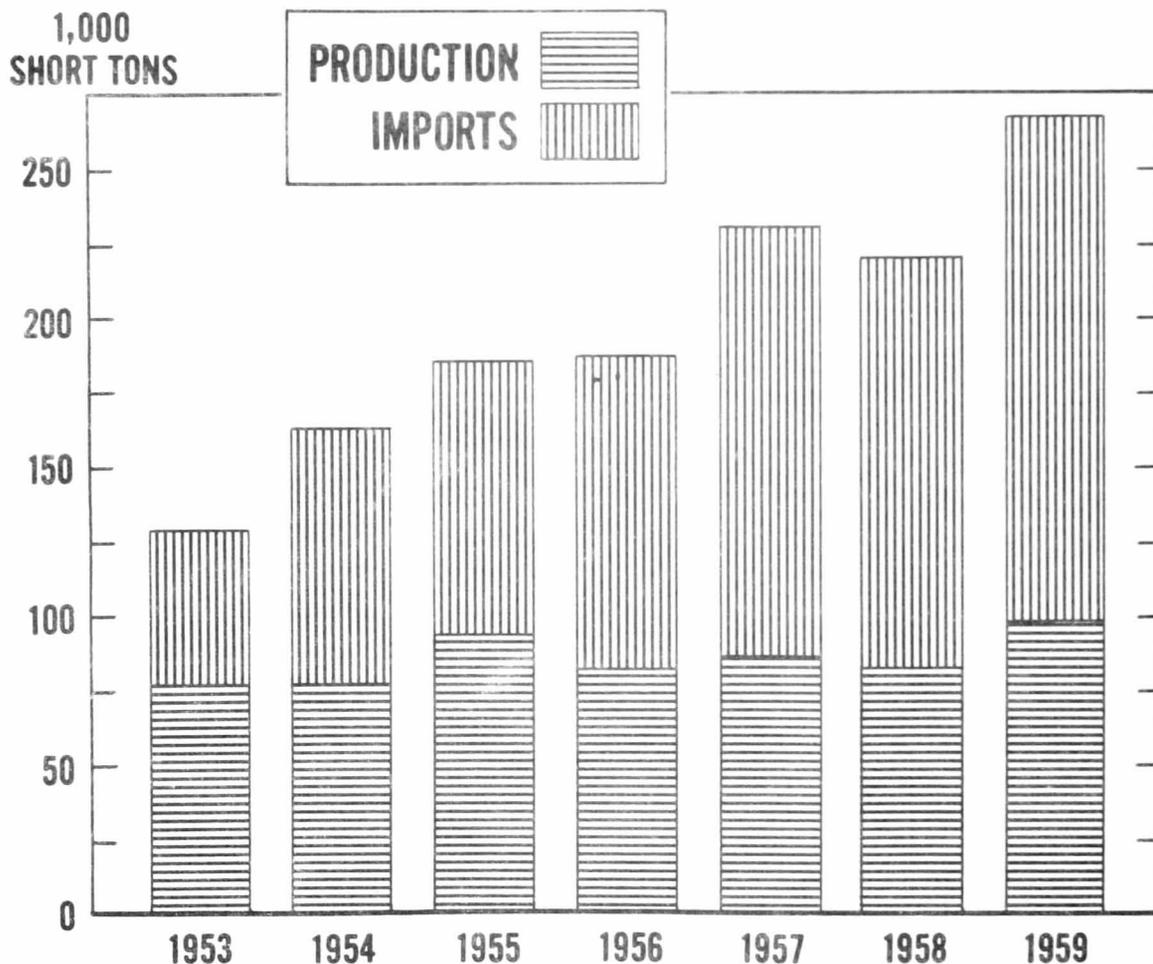


FIGURE 11.--FEDERAL REPUBLIC OF GERMANY: PRODUCTION AND IMPORTS OF FISHMEAL, 1953-59

TABLE 29.--FEDERAL REPUBLIC OF GERMANY: SUPPLY AND EXPORTS
OF FISH OIL, 1953-59
(IN SHORT TONS)

| YEAR | SUPPLY | | | EXPORTS |
|------|------------|---------|---------|---------|
| | PRODUCTION | IMPORTS | TOTAL | |
| 1953 | 22,950 | 91,118 | 114,048 | 4,352 |
| 1954 | 23,207 | 120,286 | 143,493 | 6,005 |
| 1955 | 31,814 | 74,864 | 106,678 | 15,075 |
| 1956 | 21,751 | 92,515 | 114,266 | 8,591 |
| 1957 | 21,079 | 73,846 | 94,925 | 12,097 |
| 1958 | 19,516 | 70,897 | 90,413 | 16,217 |
| 1959 | 27,622 | 60,020 | 87,642 | 28,635 |

SOURCES: JAHRESBERICHT UBER DIE DEUTSCHE FISCHWIRTSCHAFT (YEARBOOK OF THE GERMAN FISHERIES), 1953-58; U. S. FOREIGN SERVICE DESPATCHES.

Production of fishmeal has varied between 77,079 tons in 1954 and 98,078 tons in 1959 (table 28). The increase in production in 1959 was due largely to an increase in the rejection of fish for human consumption.

Production of fish body oil which reached a high point of 31,814 tons in 1955, amounted to 27,622 tons in 1959 (table 29). Consumption of fish oil has declined steadily since 1956 due mainly to smaller requirements of the margarine industry which is using increased amounts of vegetable oils.

Prices and Costs

The prices paid by the Federal Republic's reduction industry for whole fish vary with the species, herring bringing the best price and cod the lowest. The annual average price paid for all species (including starfish) rose from the equivalent of US\$26.16 per short ton in 1958 to US\$27.74 per ton in 1959. The average price in April 1960 was US\$20.23 per short ton. The Fischereihafen-Betriebsgesellschaft (Fishery Port Operations Organization) stated that on August 3, 1960, the official price for whole herring for reduction would be US\$19.43 per ton, and the price of herring offal and wastes would be reduced to US\$15.11 per ton.

Peruvian fishmeal, 65-70 percent protein content, was quoted in July 1960 at US\$80.96 per short ton (ex-railroad at German seaports). At the same time, domestic fishmeal was quoted at US\$104.62 per ton, f.o.b. factory.

Prices for fish oil have dropped considerably from 1957 to 1959.

TABLE 30.--FEDERAL REPUBLIC OF GERMANY: IMPORTS OF FISHMEAL, BY COUNTRY OF ORIGIN, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 | |
|------------------------|------|--------|--------|--------|---------|---------|---------|---------|
| ANGOLA | 1/ | 12,362 | 25,399 | 32,441 | 41,297 | 9,730 | 3,573 | |
| MOROCCO | 1/ | 3,065 | 3,883 | 4,879 | 10,082 | 3,798 | 3,870 | |
| UNION OF SOUTH AFRICA | 1/ | 1,128 | 2,569 | 952 | 2,852 | 4,773 | 1,888 | |
| PERU | 1/ | 606 | 2,664 | 3,120 | 17,963 | 40,399 | 98,667 | |
| JAPAN | 1/ | - | 842 | 14,691 | 3,800 | 12,516 | 20,073 | |
| DENMARK | 1/ | 1,392 | 4,722 | 4,515 | 3,531 | 5,501 | 3,109 | |
| ICELAND | 1/ | 9,080 | 6,811 | 6,792 | 14,586 | 21,979 | 6,171 | |
| NETHERLANDS | 1/ | 3,098 | 1,990 | 1,574 | 3,038 | 3,078 | 5,157 | |
| NORWAY | 1/ | 40,413 | 23,689 | 21,742 | 24,298 | 17,189 | 6,343 | |
| PORTUGAL ^{2/} | 1/ | 3,662 | 5,730 | 4,196 | 9,949 | 10,850 | 6,314 | |
| OTHER | 1/ | 10,563 | 12,582 | 8,678 | 11,390 | 7,169 | 10,890 | |
| TOTAL | | 50,256 | 85,369 | 90,881 | 103,580 | 142,786 | 136,982 | 166,055 |

1/ NOT AVAILABLE.

2/ PROBABLY INCLUDES MEAL TRANSSHIPPED THROUGH PORTUGAL FROM ANGOLA.

SOURCES: JAHRESBERICHT UBER DIE DEUTSCHE FISCHWIRTSCHAFT (YEARBOOK OF THE GERMAN FISHERIES), 1953-58; U. S. FOREIGN SERVICE DESPATCHES.

TABLE 31.--FEDERAL REPUBLIC OF GERMANY: IMPORTS OF FISH OIL, BY COUNTRY OF ORIGIN 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------|------|--------|---------|--------|--------|--------|-----------|
| DENMARK | 1/ | 6,490 | 7,076 | 3,347 | 1,805 | 2,583 | 5,319 |
| UNITED KINGDOM | 1/ | 13,984 | 2,402 | 2,158 | - | 560 | 560 |
| ICELAND | 1/ | 4,577 | 930 | 10,416 | 6,376 | 8,295 | 277 |
| NETHERLANDS | 1/ | 24,185 | 6,686 | 5,608 | 2,337 | 3,070 | 3,669 |
| NORWAY | 1/ | 10,765 | 8,637 | 9,563 | 7,914 | 8,423 | 5,836 |
| ANGOLA | 1/ | 9,791 | 6,830 | 3,890 | 11,845 | 7,705 | 3,186 |
| UNION OF SOUTH AFRICA | 1/ | 6,346 | 2,517 | 217 | 5,140 | 10,184 | 1,321 |
| UNITED STATES | 1/ | 37,665 | 35,022 | 43,030 | 31,438 | 23,466 | 24,228 |
| CANADA | 1/ | 2,952 | 1,361 | 6,014 | 453 | 1,813 | 1,707 |
| OTHER | 1/ | 3,531 | 3,403 | 8,272 | 6,538 | 4,798 | 2/ 13,917 |
| TOTAL | | 91,118 | 120,286 | 74,864 | 92,515 | 73,846 | 70,897 |

1/ NOT AVAILABLE.

2/ INCLUDES 7,824 TONS FROM PERU AND 4,177 TONS FROM JAPAN.

SOURCES: JAHRESBERICHT UBER DIE DEUTSCHE FISCHWIRTSCHAFT (YEARBOOK OF THE GERMAN FISHERIES), 1953-59; U. S. FOREIGN SERVICE DESPATCHES.

TABLE 32.-FEDERAL REPUBLIC OF GERMANY: EXPORTS OF FISH OIL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-------------|------|-------|-------|--------|-------|--------|--------|
| DENMARK | 1/ | - | - | 1,292 | 2,644 | 4,351 | 4,638 |
| NETHERLANDS | 1/ | 3,053 | 1,711 | 1,970 | 2,025 | 1,775 | 2,822 |
| NORWAY | 1/ | 363 | 9,410 | 734 | 188 | 2,061 | 16,169 |
| SWEDEN | 1/ | 463 | 3,769 | 2,953 | 6,761 | 7,720 | 5,006 |
| OTHER | 1/ | 2,126 | 185 | 1,642 | 479 | 310 | - |
| TOTAL | | 4,352 | 6,005 | 15,075 | 8,591 | 12,097 | 28,635 |

1/ NOT AVAILABLE.

SOURCES: JAHRESBERICHT UBER DIE DEUTSCHE FISCHWIRTSCHAFT (YEARBOOK OF THE GERMAN FISHERIES), 1953-58; U. S. FOREIGN SERVICE DESPATCHES.

In 1957 import prices (c.i.f. German border points) ranged from US\$169.91 per short ton for Japanese oil to US\$235.77 for Norwegian herring oil. In 1959 prices ranged from US\$132.13 per ton for Moroccan oil to US\$182.44 for Norwegian oil. Prices for domestic fish body oil have dropped from an average of US\$179.85 per ton in 1957 to US\$141.81 in 1959.

Government Policies

There are no quantitative restrictions or tariffs on fishmeal imported into the Federal Republic of Germany. Certain standards must be met for the German market in matters of sacking and of sterilizing against bacterial infection.

Fish body oil with more than 50 percent fatty acid pays a three percent import duty if imported from Common Market countries, and four percent from all other countries. A compensatory turnover tax of four percent is levied when there is a domestic Federal sales tax. Body oil containing less than 50 percent fatty acid is free of import duty or compensatory tax.

Government aids to the fishing industry include (1) loans and credits at favorable interest rates for fishing and processing equipment and machinery, (2) a subsidy for diesel fuel used by the herring and cutter fleets, and (3) a special price for bunker coal used by deep-sea trawlers. There is no direct government aid specifically to the reduction industry.

Foreign Trade

Fishmeal is imported into the Federal Republic through 55 importing firms. Purchases come from almost every fishmeal producing country of the world, though the largest amounts come from Peru, Iceland, Norway, Angola, Japan, Morocco, and the Union of South Africa. Imports increased from 50,256 short tons in 1953 to 166,055 tons in 1959 (table 30). During 1959 and the first part of 1960, the market was dominated by imports from Peru, which accounted for nearly three-fifths of total imports. Small amounts of fishmeal have been exported each year, as follows:

| Year | Quantity <u>short tons</u> |
|------|-------------------------------|
| 1954 | 1,051 |
| 1955 | 1,376 |
| 1956 | 1,162 |
| 1957 | 1,727 |
| 1958 | 1,295 |
| 1959 | 211 |

The Federal Republic's pattern of imports of fish body oil changed significantly from 1954 to 1959. Total imports declined from 120,286 short tons in 1954 to 60,020 tons in 1959 (table 31). The United States continued to account for the major share of imports, but Denmark, Peru, and Japan developed into volume suppliers also. At the same time, imports from Iceland, Angola, and the Union of South Africa declined. Exports of fish oil increased from 6,005 tons in 1954 to 28,635 tons in 1959 (table 32). This change in foreign trade in fish oil is attributed to the decline in the use of fish oil by local industries.

ICELAND

The Industry

The fish-reduction industry of Iceland consists of about 45 plants located chiefly on the north coast, principally in Siglufjordhur. In 1959 production reached a peak of 71,640 short tons of fishmeal (figure 12, table 33) and 29,211 tons of fish body oil. Icelandic fishmeal

TABLE 33.--ICELAND: PRODUCTION OF FISH MEAL AND OIL, 1956-59
(IN SHORT TONS)

| YEAR | FISHMEAL | | | | FISH BODY OIL |
|------|-------------------------|---------|---------|--------|---------------------|
| | FROM OFFAL AND WASTE | REDFISH | HERRING | TOTAL | |
| 1956 | 23,589 | 11,354 | 8,267 | 43,210 | 12,456 |
| 1957 | 22,928 | 11,244 | 14,881 | 49,053 | 15,653 |
| 1958 | 24,030 | 16,534 | 7,606 | 48,170 | 11,464 |
| 1959 | 28,550 | 18,729 | 24,361 | 71,640 | 29,211 |

SOURCE: ICELAND, AEGIR, 1957-60.

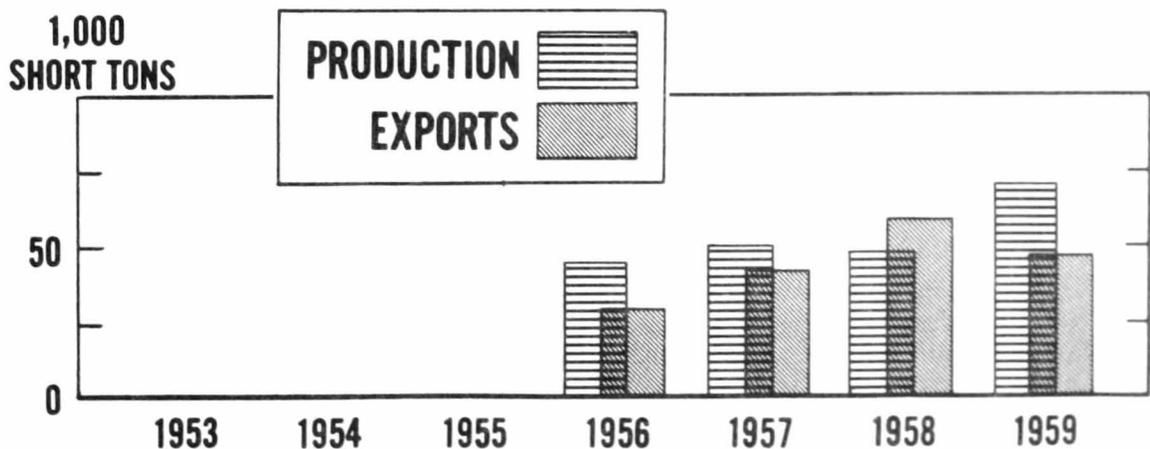


FIGURE 12.--ICELAND: PRODUCTION AND EXPORTS OF FISHMEAL, 1956-59

TABLE 34.--ICELAND: EXPORTS OF FISHMEAL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| DENMARK | 805 | 4,691 | 3,378 | 5,566 | 2,452 | 8,929 | 10,109 |
| SWEDEN | 4,225 | 1,328 | 982 | 592 | 4,412 | 3,255 | 12,338 |
| UNITED KINGDOM | 1,669 | 3,306 | 4,906 | 6,475 | 8,693 | 8,770 | 6,936 |
| FEDERAL REPUBLIC OF GERMANY | 5,456 | 10,831 | 7,648 | 7,859 | 13,253 | 21,603 | 5,672 |
| POLAND | 2,204 | 2,203 | 2,757 | 1,653 | 1,652 | 1,635 | 2,645 |
| IRELAND | 3,783 | 3,419 | 2,500 | 2,324 | 976 | 2,816 | 646 |
| NETHERLANDS | 3,300 | 3,689 | 2,233 | 407 | 4,131 | 5,086 | 59 |
| CZECHOSLOVAKIA | - | 551 | 220 | 2,327 | 2,156 | 3,261 | 3,690 |
| FINLAND | 1,341 | 1,212 | 1,289 | 2,229 | 1,322 | 1,348 | 694 |
| OTHER | <u>1,677</u> | <u>2,796</u> | <u>3,418</u> | <u>1,500</u> | <u>2,050</u> | <u>3,116</u> | <u>5,157</u> |
| TOTAL | 24,460 | 34,026 | 29,331 | 30,932 | 41,097 | 59,819 | 47,946 |

SOURCE: ICELAND, HAGTIDINDI, 1953-60.

TABLE 35.--ICELAND: EXPORTS OF FISH OIL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------------|-----------|------------|------------|------------|------------|--------------|------------|
| SWEDEN | - | - | - | - | 826 | 2,709 | 981 |
| NORWAY | 2,560 | 5,036 | 5,254 | 341 | 2,064 | 2,119 | 6,117 |
| FEDERAL REPUBLIC OF GERMANY | 3,486 | 2,078 | 14 | 7,635 | 5,255 | 6,294 | 280 |
| UNITED KINGDOM | 735 | 1,438 | - | - | 2,913 | - | - |
| SPAIN | 55 | 154 | 209 | 516 | 502 | 2,202 | 296 |
| OTHER | <u>37</u> | <u>937</u> | <u>124</u> | <u>823</u> | <u>846</u> | <u>3,324</u> | <u>680</u> |
| TOTAL | 6,873 | 9,643 | 5,601 | 9,315 | 12,406 | 16,648 | 8,354 |

SOURCE: ICELAND, HAGTIDINDI, 1953-60.

is derived from three sources--herring, redfish, and the offal, scrap, and waste from other fish processing industries. Offal, scrap, and waste furnish most of the raw material for fishmeal; when the herring, however, are poor in quality and unsuitable for salting, most of the catch goes to the reduction plants. In 1955, the herring catch was of good quality and more was salted, with less diverted to reduction. In 1959, however, about 75 percent of the herring catch went to the reduction plants because the herring were relatively lean and unsuitable for salting and advance sales contracts for salted herring were small. The herring fishery is the principal source of fish body oil.

In 1958, of total Icelandic landings of 437,494 short tons of bottom fish (white fish), 5,510 tons were used in reduction; of a total catch of 117,914 tons of herring, 41,876 tons were converted into fish meal and oil. In 1960, most of the early herring catch went to the reduction plants because the fat content of the fish was low.

In May 1960, the management of the State herring factories and the Fishing Vessel Owners Association proposed to the Ministry of Fisheries a price for herring for reduction lower than the previous year's price. This proposal resulted from the drop in fishmeal prices on the world market. It is reported that even with this proposed lowering of the price for raw herring, low prices in the world market for the finished product would not cover raw material costs. Practically all storage facilities in Iceland for both meal and oil were filled with unsold stocks early in 1960.

Government Policies

Exports of fish meal and oil are carried out by various enterprises and are not centralized, although all fish exports are subject to licensing, the licenses being issued by the Fish-Export Committee. All fish products destined for export must be certified by the Fish Inspectorate.

Foreign Trade

The chief markets for Icelandic fishmeal have been the Federal Republic of Germany, the United Kingdom, Sweden, Denmark, and Poland. In 1959, 47,946 short tons of fishmeal were exported (table 34). Norway, Sweden, Spain, and the Federal Republic of Germany have been the principal buyers of Icelandic fish oil. Total exports of fish oil amounted to 16,648 tons in 1958, and only 8,354 tons in 1959 (table 35). Some fish solubles are exported, mainly to the United States.

The first four months of 1960 showed a drop in exports of fishmeal, compared with the same period of 1959. Combined exports of

herring meal, redfish meal, and other fishmeal, by country of destination, were as follows:

| Country | January-April | January-April |
|-----------------------------|-------------------------------|---------------|
| | 1959 | 1960 |
| | <u>short tons</u> | |
| United Kingdom | 1,396 | 441 |
| Sweden | 3,078 | 1,290 |
| Czechoslovakia | 1,213 | 368 |
| Denmark | 1,402 | 3,329 |
| Netherlands | 58 | 944 |
| Poland | 1,102 | 661 |
| Federal Republic of Germany | 2,013 | 1,529 |
| France | 2,003 | - |
| Other | <u>1,248</u> | <u>2,210</u> |
| Total | 13,513 | 10,772 |

ITALY

The production of fish meal and oil in Italy is negligible. A little over 1,000 short tons of meal are produced annually, mainly from wastes and offal from the processing industries. With minor fluctuations, the use of fishmeal and fish body oil has increased in recent years. Nearly 15,000 short tons of fishmeal were imported in 1959 (table 36). In July 1960, it was reported that prices of fishmeal, c.i.f. Italian ports, were the equivalent of from US\$90.00 to US\$96.00 per ton. Duties on fishmeal are 8.1 percent from Common Market countries, 9 percent from other countries. In addition there are certain administrative fees and minor taxes.

TABLE 36.--ITALY: IMPORTS OF FISHMEAL, BY COUNTRY OF ORIGIN, 1957-59
(IN SHORT TONS)

| COUNTRY | 1957 | 1958 | 1959 |
|----------|--------------|--------------|--------------|
| NORWAY | 4,229 | 4,011 | 2,829 |
| PORTUGAL | 2,493 | 5,757 | 1,800 |
| ANGOLA | 2,178 | 1,568 | 6,966 |
| DENMARK | 23 | 2,628 | 905 |
| OTHER | <u>1,585</u> | <u>1,888</u> | <u>2,111</u> |
| TOTAL | 10,508 | 15,852 | 14,611 |

SOURCE: ITALY, ISTITUTO CENTRALE DI STATISTICA (CENTRAL STATISTICAL INSTITUTE), STATISTICA ANNUALE DEL COMMERCIO CON L'ESTERO (ANNUAL STATISTICS OF FOREIGN TRADE), 1953-58.

Imports of fish body oil are included in the official Italian statistics with liver oil and oil of marine mammals. These imports dropped from 7,582 short tons in 1957 to 6,429 tons in 1958, but rose to 8,574 tons in 1959. The principal suppliers of fish body oil were Norway, the Netherlands, the Union of South Africa, Peru, and the United States. Sardine oil was quoted in August 1960 in Milan at US\$197.20 per short ton, taxes and fees paid. Fish body oil enters free of customs duty.

THE NETHERLANDS

The Industry

The Netherlands fishing industry catches fish primarily for human consumption. The only regular supply of raw materials for the five fishmeal producers is nonmarketable fish (about 10 percent of the total catch), the small quantities of marketable fish purchased in competition with wholesale traders, and the offal from processing plants bought for direct animal consumption or for reduction. The industry is located in the provinces of Groningen, Friesland, North Holland, and South Holland, especially at IJmuiden, Rotterdam, and Son. In 1958, nearly 40,000 short tons of fish and fish offal were used in reduction. Of this raw material, 20,497 tons were fish offal and wastes from the processing industries, 7,824 tons fresh herring, and the remainder mainly salted herring, undersized fish, mackerel, and sea bream.

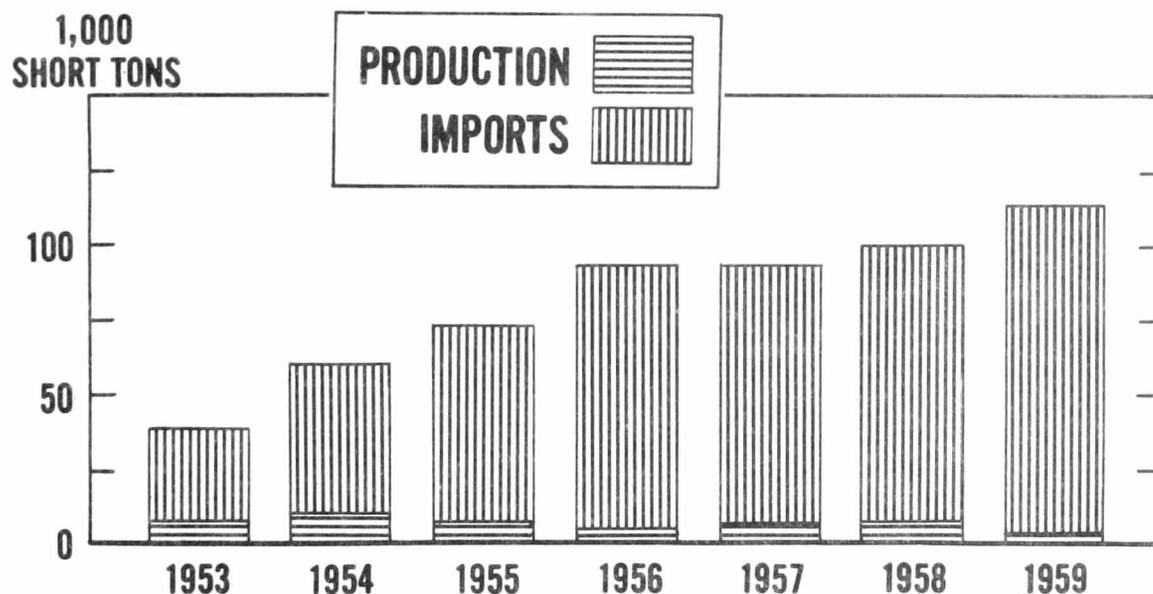


FIGURE 13.--NETHERLANDS: PRODUCTION AND IMPORTS OF FISHMEAL, 1953-59

TABLE 37.--NETHERLANDS: SUPPLY AND EXPORTS OF FISHMEAL, 1953-59
(IN SHORT TONS)

| YEAR | SUPPLY | | | EXPORTS |
|------|------------|---------|-----------|---------|
| | PRODUCTION | IMPORTS | TOTAL | |
| 1953 | 10,472 | 30,630 | 41,102 | 5,989 |
| 1954 | 11,905 | 49,903 | 61,808 | 6,229 |
| 1955 | 10,692 | 64,045 | 74,737 | 5,795 |
| 1956 | 8,267 | 87,525 | 95,792 | 5,820 |
| 1957 | 10,031 | 85,495 | 95,526 | 6,116 |
| 1958 | 10,582 | 92,507 | 103,089 | 6,725 |
| 1959 | <u>1/</u> | 110,100 | <u>1/</u> | 9,178 |

1/ NOT AVAILABLE.

SOURCES: NETHERLANDS, MAANDSTATISTIEK VAN DE IN-, UIT- EN DOORVOER PERGOEDEREN SOORT (MONTHLY STATISTICAL REPORT OF IMPORT AND EXPORT BY KINDS OF COMMODITIES); FOOD AND AGRICULTURE ORGANIZATION, YEARBOOK OF FISHERY STATISTICS.

The reduction industry in the Netherlands produces less than 12,000 short tons of fishmeal annually (figure 13, table 37). From 1956 to 1958, production ranged from 8,265 tons to 10,579 tons, consisting of between 2,000 and 3,000 tons of herring meal and the rest meal from other fish, offal, and wastes. Domestic fish-oil production was 4,876 tons in 1958 and 5,748 tons in 1959.

Foreign Trade

As the reduction industry in the Netherlands is small and the demand for fishmeal in agriculture is large, the needs are satisfied mainly by imports. In 1959, imports of fishmeal amounted to 110,100 short tons, principally from Peru, Denmark, Angola, Norway, Chile, and the Union of South Africa (table 38). Exports of fishmeal have not exceeded 10,000 tons in the past 7 years (table 39).

Netherlands statistics do not separate fish body oil from the oil of marine animals, such as whales. In 1959, imports of these oils amounted to 66,152 short tons (table 40), while the domestic production was only slightly in excess of 5,510 tons. In 1959, 12,264 tons of fish body oil were imported from the United States. Exports have been as high as 9,367 tons in 1953 and as low as 2,396 tons in 1955 (table 41).

TABLE 38.--NETHERLANDS: IMPORTS OF FISHMEAL, BY COUNTRY OF ORIGIN, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------|--------|--------|--------|--------|--------|--------|---------|
| DENMARK | 5,080 | 11,310 | 16,848 | 20,701 | 17,201 | 18,292 | 16,367 |
| NORWAY | 10,285 | 19,933 | 16,980 | 26,769 | 18,827 | 12,207 | 7,737 |
| ICELAND | 2,890 | 4,058 | 2,122 | 714 | 1,643 | 6,128 | 216 |
| PORTUGAL | 1,337 | 997 | 838 | 1,385 | 1,030 | 1,122 | 728 |
| MOROCCO | 2,358 | 675 | 742 | 377 | - | - | 377 |
| PERU | 228 | 936 | 5,861 | 17,662 | 22,367 | 26,725 | 66,208 |
| UNION OF SOUTH AFRICA | 3,655 | 5,148 | 10,021 | 6,703 | 4,199 | 5,327 | 1,922 |
| ANGOLA | 4,072 | 5,421 | 4,350 | 6,536 | 15,928 | 17,382 | 9,542 |
| CHILE | - | - | 1,640 | 3,013 | 1,182 | 798 | 2,823 |
| OTHER | 725 | 1,425 | 4,643 | 3,665 | 3,118 | 4,526 | 4,180 |
| TOTAL | 30,630 | 49,903 | 64,045 | 87,525 | 85,495 | 92,507 | 110,100 |

SOURCES: NETHERLANDS, JAARCIJFERS OVER DE VISSERIJ (ANNUAL FISHERIES STATISTICS), 1953-58; NETHERLANDS, MAANDSTATISTIEK VAN DE IN-, UIT- EN DOORVOER PER GOEDEREN SOORT (MONTHLY STATISTICAL REPORT OF IMPORTS AND EXPORTS BY KINDS OF COMMODITIES), 1959.

TABLE 39.--NETHERLANDS: EXPORTS OF FISHMEAL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------------|-------|-------|-------|-------|-------|-------|-------|
| FEDERAL REPUBLIC OF GERMANY | 4,754 | 4,038 | 3,114 | 3,436 | 4,776 | 5,072 | 8,334 |
| AUSTRIA | 372 | 852 | 1,766 | 769 | 637 | 371 | 220 |
| FRANCE | 172 | 166 | 659 | 388 | 116 | 121 | 95 |
| BELGIUM-LUXEMBOURG | 168 | 190 | 73 | 210 | 195 | 407 | 418 |
| OTHER | 523 | 983 | 183 | 1,017 | 392 | 754 | 111 |
| TOTAL | 5,989 | 6,229 | 5,795 | 5,820 | 6,116 | 6,725 | 9,178 |

NOTE: ORIGINAL SOURCE DOES NOT STATE IF FISH SOLUBLES ARE INCLUDED WITH FISHMEAL.

SOURCES: NETHERLANDS, MAANDSTATISTIEK VAN DE IN-, UIT- EN DOORVOER PER GOEDEREN SOORT (MONTHLY STATISTICAL REPORT OF IMPORT AND EXPORT BY KINDS OF COMMODITIES); NETHERLANDS, JAARCIJFERS OVER DE VISSERIJ (ANNUAL FISHERY STATISTICS).

TABLE 40.--NETHERLANDS: IMPORTS OF FISH OIL AND MARINE ANIMAL OIL, BY COUNTRY OF ORIGIN, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------------|--------|--------|--------|--------|--------|--------|--------|
| ICELAND | 884 | 1,938 | 992 | 493 | 1,102 | 206 | 4,297 |
| NORWAY | 4,532 | 3,892 | 2,498 | 2,164 | 1,402 | 3,208 | 3,031 |
| UNION OF SOUTH AFRICA | 2,281 | 979 | 574 | 51 | 3,331 | 6,529 | 928 |
| UNITED STATES | 5,667 | 10,727 | 15,782 | 14,019 | 7,232 | 6,629 | 12,264 |
| FALKLAND ISLANDS | 5,295 | 673 | - | 3,013 | 1,627 | 1,148 | 3,815 |
| AUSTRALIA | 8,315 | 8,127 | - | - | - | 1,451 | 1,902 |
| JAPAN | - | 52 | 3,013 | 8,589 | 11,510 | 61 | 2,839 |
| FEDERAL REPUBLIC OF GERMANY | 453 | 875 | 846 | 1,010 | 1,407 | 2,465 | 2,200 |
| UNITED KINGDOM | 126 | 9,770 | 3,825 | 457 | 505 | 367 | 123 |
| ZEE 1/ | 16,873 | 17,609 | 32,244 | 18,417 | 25,894 | 43,268 | 32,078 |
| OTHER | 1,136 | 1,822 | 3,795 | 1,427 | 2,255 | 3,610 | 2,675 |
| TOTAL | 45,562 | 56,464 | 63,569 | 49,640 | 56,265 | 68,942 | 66,152 |

1/ IMPORTS INCLUDE OILS EXTRACTED AT SEA AND LANDED BY DUTCH VESSELS, SUCH AS WHALE OIL FROM THE ANTARCTIC WHALING FLEET.

SOURCE: NETHERLANDS, MAANDSTATISTIEK VAN DE IN-, UIT- EN DOORVOER PER GOEDEREN SOORT (MONTHLY STATISTICAL REPORT OF IMPORTS AND EXPORTS BY KINDS OF COMMODITIES), 1953-59.

TABLE 41.--NETHERLANDS: EXPORTS OF FISH OIL AND MARINE ANIMAL OIL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------------|-------|-------|-------|-------|-------|-------|-------|
| BELGIUM-LUXEMBOURG | 2,757 | 1 | 9 | 18 | 22 | 259 | 1,488 |
| FEDERAL REPUBLIC OF GERMANY | 4,536 | 2,337 | 939 | 1,551 | 2,339 | 5,068 | 5,110 |
| ITALY | 583 | 327 | 61 | 48 | 11 | 281 | 130 |
| OTHER | 1,491 | 771 | 1,387 | 2,050 | 533 | 670 | 1,534 |
| TOTAL | 9,367 | 3,436 | 2,396 | 3,667 | 2,905 | 6,278 | 8,262 |

SOURCE: NETHERLANDS, MAANDSTATISTIEK VAN DE IN-, UIT- EN DOORVOER PERGOEDEREN SOORT (MONTHLY STATISTICAL REPORT OF IMPORTS AND EXPORTS BY KINDS OF COMMODITIES), 1953-59.

NORWAY

The Industry

The fish reduction industry of Norway is carried on by about 70 plants, equipped to handle 1,225,000 short tons of raw material. This industry operates mainly along the western and northern coasts of Norway; the plants are centered in the counties of Møre on the west coast and Troms on the north coast. In 1959 production of fishmeal was an estimated 141,060 short tons (figure 14, table 42), of which 121,220 tons was herring meal.

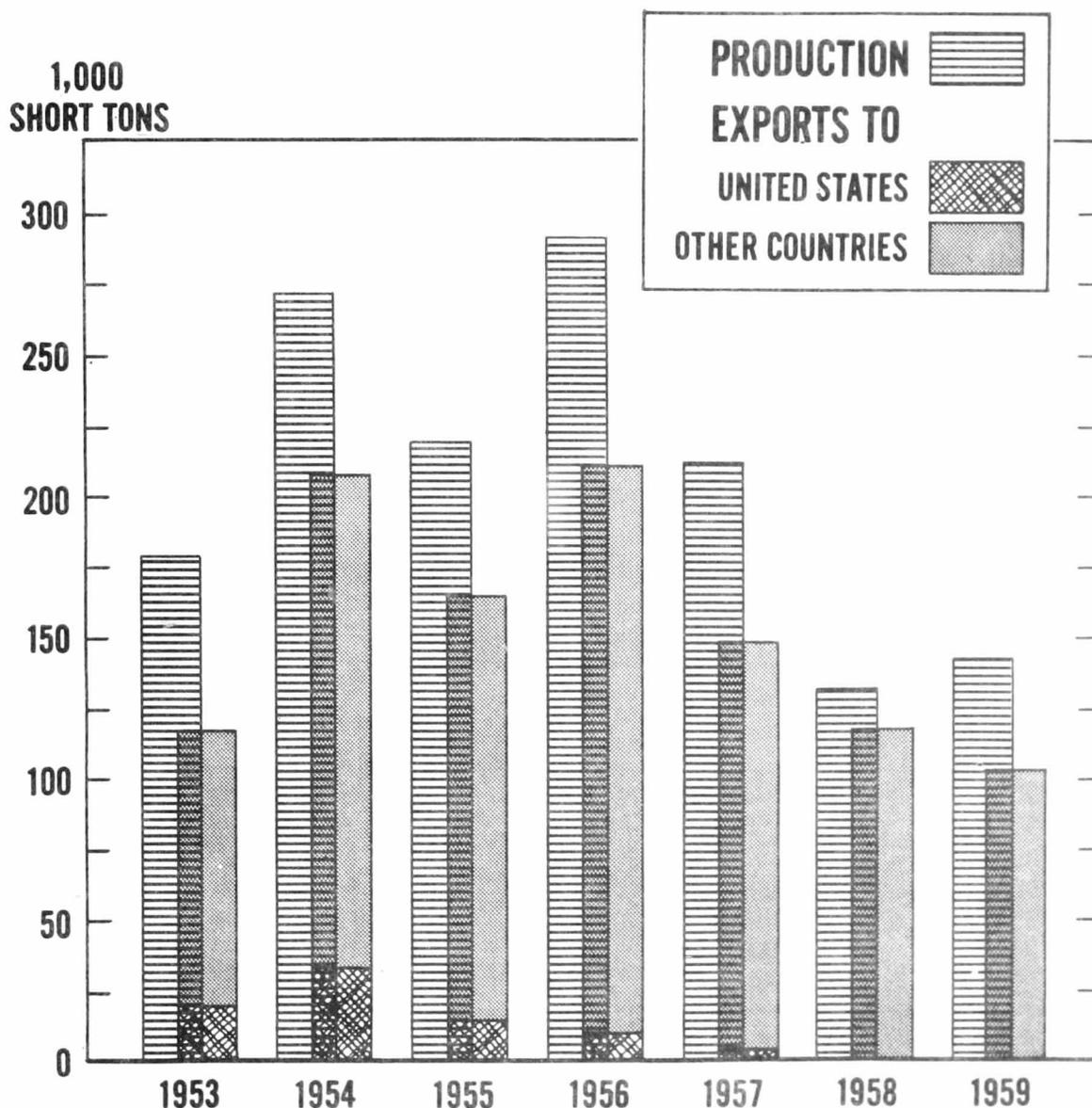


FIGURE 14.--NORWAY: PRODUCTION AND EXPORTS OF FISHMEAL, 1953-59

TABLE 42.--NORWAY: PRODUCTION OF FISHMEAL, 1953-59
(IN SHORT TONS)

| YEAR | HERRING MEAL | OTHER FISHMEAL | TOTAL ^{1/} |
|------|--------------|------------------|---------------------|
| 1953 | 159,895 | 16,860 | 176,755 |
| 1954 | 259,301 | 14,777 | 274,078 |
| 1955 | 198,360 | 19,584 | 217,944 |
| 1956 | 272,029 | 18,262 | 290,291 |
| 1957 | 193,401 | 16,725 | 210,126 |
| 1958 | 110,200 | 20,835 | 131,035 |
| 1959 | 121,220 | <u>2/</u> 19,840 | <u>2/</u> 141,060 |

^{1/} DOES NOT INCLUDE LIVER MEAL OR MEAL PRODUCED FROM CRUSTACEANS AND MOLLUSKS.

^{2/} ESTIMATED.

NOTE: FISH SOLUBLES ARE INCLUDED IN "OTHER FISHMEAL", BUT ORIGINAL SOURCE DOES NOT STATE WHETHER ON A WET OR DRY BASIS.

SOURCES: NORGES FISKERIER, (FISHERY STATISTICS OF NORWAY), 1953-57; U. S. FOREIGN SERVICE DESPATCHES.

It is reported that Norwegian reduction plants require more than 800,00 tons of raw materials to show a profit. In 1959, only 607,000 short tons of fish were delivered to the plants. Herring constituted about two-thirds of this total. Wastes and offal from bottom-fish processing plants and fish deemed unfit for human consumption were also

TABLE 43.--NORWAY: PRODUCTION OF FISH OIL, 1953-59
(IN SHORT TONS)

| YEAR | HERRING OIL | OTHER FISH OIL | COD OIL (OTHER THAN LIVER OIL) | TOTAL |
|------|-------------|----------------|--------------------------------|-----------|
| 1953 | 64,392 | <u>1/</u> | 12,893 | <u>1/</u> |
| 1954 | 104,690 | 1,763 | 12,783 | 119,236 |
| 1955 | 78,573 | 1,542 | 14,767 | 94,882 |
| 1956 | 114,388 | 1,762 | 16,861 | 133,011 |
| 1957 | 73,283 | 1,433 | 13,995 | 88,711 |
| 1958 | 37,468 | 1,764 | 16,424 | 55,656 |
| 1959 | 44,080 | <u>1/</u> | <u>1/</u> | <u>1/</u> |

^{1/} NOT AVAILABLE.

SOURCES: NORGES FISKERIER (FISHERY STATISTICS OF NORWAY), VOLS. FOR 1953-60.

TABLE 44.--NORWAY: EXPORTS OF FISHMEAL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|--------------------------------|---------|---------|---------|---------|---------|---------|---------|
| UNITED KINGDOM | 28,768 | 48,776 | 51,536 | 71,653 | 35,411 | 20,270 | 28,746 |
| FEDERAL REPUBLIC OF GERMANY | 17,870 | 40,253 | 23,195 | 21,889 | 22,949 | 15,397 | 6,614 |
| EAST GERMANY | 5,179 | 2,444 | 320 | 2,025 | 2,709 | 3,109 | 2,601 |
| NETHERLANDS | 10,122 | 22,055 | 15,396 | 28,564 | 19,275 | 12,485 | 7,708 |
| FRANCE | 4,760 | 8,258 | 14,208 | 20,070 | 16,572 | 17,482 | 16,985 |
| UNITED STATES | 19,801 | 35,599 | 14,609 | 10,632 | 4,013 | - | - |
| SWEDEN | 4,666 | 10,771 | 10,251 | 9,505 | 9,962 | 8,633 | 5,070 |
| BELGIUM-LUXEMBOURG | 7,070 | 10,105 | 7,791 | 12,328 | 10,684 | 10,555 | 6,750 |
| DENMARK | 6,999 | 9,625 | 3,489 | 6,339 | 4,580 | 4,254 | 4,470 |
| SWITZERLAND | 6,741 | 6,536 | 8,231 | 9,049 | 8,729 | 10,886 | 9,942 |
| ITALY | 262 | 1,243 | 4,207 | 7,398 | 2,787 | 3,682 | 2,603 |
| AUSTRIA | 1,936 | 4,075 | 6,672 | 5,065 | 3,081 | 4,084 | 3,133 |
| OTHER | 2,494 | 4,664 | 2,908 | 4,565 | 7,686 | 5,946 | 8,706 |
| TOTAL | 116,668 | 204,404 | 162,813 | 209,082 | 148,438 | 116,783 | 103,328 |

NOTE: FISH SOLUBLES INCLUDED, BUT ORIGINAL SOURCE DOES NOT SPECIFY WHETHER ON A WET OR DRY BASIS.

SOURCES: NORGES OFFISIELLE STATISTIKK, HANDEL (OFFICIAL NORWEGIAN STATISTICS, TRADE), 1953-57; NORWAY, MANEDSOPPGAUER OVER VAREOMSETNINGEN MET UTLANDET (MONTHLY BULLETIN OF EXTERNAL TRADE), 1958 AND 1959.

TABLE 45.--NORWAY: IMPORTS OF RAW HERRING OIL, BY COUNTRY OF ORIGIN, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|--------------------------------|--------------|-----------|--------------|------------|------------|-----------|-----------|
| SWEDEN | 1,479 | 1,426 | 2,602 | 1,901 | 1,076 | 1/ | 1/ |
| DENMARK | 26 | 57 | 2,726 | 3,224 | 1,633 | 1/ | 1/ |
| ICELAND | 262 | 3,482 | 2,806 | 213 | 2,071 | 1/ | 1/ |
| FEDERAL REPUBLIC OF GERMANY | 12 | 298 | 8,480 | 1,449 | 47 | 1/ | 1/ |
| UNITED STATES | - | 2,724 | 6,104 | 1,548 | 9,208 | 1/ | 1/ |
| PORTUGAL | 242 | 418 | 1,284 | 601 | 159 | 1/ | 1/ |
| OTHER | <u>1,278</u> | <u>40</u> | <u>1,568</u> | <u>146</u> | <u>428</u> | <u>1/</u> | <u>1/</u> |
| TOTAL | 3,299 | 8,445 | 25,570 | 9,082 | 14,622 | 7,308 | 43,517 |

1/ NOT AVAILABLE BY COUNTRY OF ORIGIN.

SOURCES: NORGES OFFISIELLE STATISTIKK, HANDEL (OFFICIAL NORWEGIAN STATISTICS, TRADE), 1953-57; U. S. FOREIGN SERVICE DESPATCHES.

TABLE 46.--NORWAY: EXPORTS OF RAW HERRING OIL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|--------------------------------|------------|--------------|--------------|--------------|------------|-----------|-----------|
| FEDERAL REPUBLIC OF GERMANY | 2,921 | 1,861 | 116 | 158 | - | 1/ | 1/ |
| NETHERLANDS | 1,257 | 1,407 | 214 | 102 | 24 | 1/ | 1/ |
| CZECHOSLOVAKIA | 827 | 1,201 | 2,550 | 56 | 165 | 1/ | 1/ |
| BELGIUM-LUXEMBOURG | 74 | 239 | 309 | 223 | 136 | 1/ | 1/ |
| FRANCE | 34 | 29 | 320 | 244 | 57 | 1/ | 1/ |
| ITALY | 283 | 123 | 162 | 186 | 19 | 1/ | 1/ |
| OTHER | <u>915</u> | <u>2,526</u> | <u>1,697</u> | <u>1,058</u> | <u>223</u> | <u>1/</u> | <u>1/</u> |
| TOTAL | 6,311 | 7,386 | 5,368 | 2,027 | 624 | 265 | 689 |

1/ NOT AVAILABLE BY COUNTRY OF DESTINATION.

SOURCES: NORGES OFFISIELLE STATISTIKK, HANDEL (OFFICIAL NORWEGIAN STATISTICS, TRADE), 1953-57; U. S. FOREIGN SERVICE DESPATCHES.

used in reduction. Less waste was available for reduction as the demand from the mink farms, which pay higher prices, has increased.

The winter or "large" herring supplies the bulk of the annual herring catch in Norway. In 1960, the third successive failure of the winter herring season resulted in more fishmeal production from small herring, which has a low oil content, and capelin with no appreciable amount of oil. The low grades of fishmeal are usually reserved for domestic consumption. A comparison of the raw materials received by the reduction plants during January to April 1959 and 1960 is as follows:

| Species | 1959 | 1960 |
|----------------|-------------------------------|--------------|
| | <u>short tons</u> | |
| Winter herring | 239,067 | 148,811 |
| Small herring | 5,908 | 63,470 |
| Capelin | 87,049 | 116,182 |
| Other fish | <u>2,205</u> | <u>4,409</u> |
| Total | 334,229 | 332,872 |

In 1956, the corresponding four-month supply of raw materials was more than 1,100,000 short tons.

In addition to herring oil, small quantities of body oil from bottom-fish wastes contribute to Norway's total production of fish oil. In 1956 when total production of fish oil was 133,011 short tons, herring oil accounted for 114,388 tons; in 1959, herring oil production was down to 44,080 tons (table 43).

It is reported that Norwegian production of fish solubles, placed at 2,205 short tons in 1957, has been declining because of low market prices. The reduction plants now mix the solubles with the meal to increase the protein content for a higher meal price. In 1958 and 1959 production figures of fish solubles are not available as the solubles have been included with "other fishmeal".

Prices and Costs

The ex-vessel price for herring was US\$35.12 per short ton in 1959 compared to US\$29.75 per ton in 1958. The ex-vessel price for herring is about US\$4.10 per ton higher during the winter season than in the spring fishery. The lower price is paid when it is determined that the fat content of the herring has fallen below a certain point. The price of Norwegian fishmeal--68 percent protein content--was reported in October 1960 to be US\$101.60 to \$114.30 per short ton, c.i.f. European markets, compared with an average of \$177.80 per short ton in 1958 and at the beginning of 1959. The average export price of herring oil in

March 1960 was US\$134.12 per ton.

Government Policies

The failure of the 1958/59 and 1959/60 winter herring fishery in Norway has seriously affected fishermen and boatowners in the fish reduction industry. An Equalization Fund for herring guarantees prices to the fishermen. The fund has been derived from exports, principally of fishmeal and fish oil. When exporters obtain a price higher than an agreed standard price, a proportion of the excess is paid into the fund. It has been reported that the fund built up to 105,000,000 kroner (US\$14,700,000) by 1960, but in that year, because of the sharp drop in the export price of fishmeal, about 50,000,000 kroner (US\$7,000,000) was paid to herring fishermen. The Equalization Fund for white fish terminated in 1957 when funds were exhausted.

Exports are centralized in a sales organization known as the Norwegian Committee for the Export of Herring Meal and Oil. Membership in this export organization is subject to review by the Ministry of Fisheries.

Foreign Trade

About three-quarters of Norway's fishmeal production is exported. Nearly 90 percent of the exports goes to European countries, with the United Kingdom, France, the Netherlands, and the Federal Republic of Germany the major buyers. Fishmeal exports decreased from 209,082 tons in 1956 to 103,328 tons in 1959 (table 44). Approximately 55,000 short tons of fishmeal are used domestically in animal feeds.

Fish oil has recently been imported in some quantity, because of a drop in Norwegian production. Imports of raw herring oil ranged from 3,299 short tons in 1953 to 43,517 tons in 1959 (table 45). Exports of raw herring oil have not exceeded about 7,000 tons in the past 7 years (table 46).

PORTUGAL

Fish meal and oil production in Portugal is of little importance. Reduction plants use chiefly wastes and offal from the sardine canneries and fish unfit for human consumption. Annual production of fishmeal by 12 reduction plants has not exceeded about 4,500 short tons. A substantial transit trade in Angolan fishmeal, however, exists in Portugal. Angolan fishmeal with 60 percent protein content was quoted on the Lisbon market in August 1960 at US\$63.50 per short ton, f.o.b. Angola. Fish oil was quoted at the same time at US\$95.20 per ton, f.o.b. Angola. There are no special government aids to the industry and no special taxes or restrictions on foreign trade.

SPAIN

In recent years Spanish production of fishmeal has increased. Output of fishmeal rose from 7,222 short tons in 1956 to 9,788 tons in 1957, to 13,677 tons in 1958, and to 19,660 tons in 1959. Of the 1958 production, 12,751 tons were feed meals and 926 tons were fertilizer. Fish-oil production has been small and fairly constant 1,258 tons in 1956, 1,839 tons in 1957, 1,786 tons in 1958, and 1,580 tons in 1959.

In 1958, the reduction industry used 26,125 short tons of whole fresh fish and 36,191 tons of fish offal and residues from other processing plants. In that year, quantitative restrictions were placed on fishmeal imports. Imports, all from Angola, were 4,395 tons in 1957, but dropped to 2,702 tons in 1958. Domestic fish-oil production is not seriously affected by imports; fish-oil imports increased from 2,848 tons in 1957 to 4,095 tons in 1958, principally from Iceland and Ireland, with small quantities from Norway.

Lack of capital and foreign exchange, and an undependable supply of raw materials, preclude any foreseeable significant enlargement of the Spanish fish reduction industry.

SWEDEN

Five or six fishmeal plants in Sweden process scrapfish and wastes into fishmeal. There is no fishery solely for reduction. Annual production of fishmeal amounts to a little over 6,600 short tons a year; of fish body oil a little less than 3,300 tons. Imports of fishmeal and marine animal meal amount to about 16,530 tons, exports to about 1,100 tons. Imports of herring oil are about 6,600 to 7,700 tons annually, chiefly from the Federal Republic of Germany, Denmark, and Iceland. In addition, Sweden imports large quantities of other fish oils; in 1959, imports of fats and oils obtained from fish and marine mammals (excluding herring, whale and seal oil) were 23,401 tons, of which 16,928 tons came from the United States. Between 1,100 and 2,200 tons of fish oil are exported.

THE UNITED KINGDOM

The Industry

Production of fish meal and oil in the United Kingdom depends chiefly on offal and wastes from fish processing, and surplus or unsold catches of white fish and herring. Very little fishing is done exclusively for reduction, as prices paid by the reduction plants are



FIGURE 15.--UNITED KINGDOM:
LOCATION OF FISH-REDUCTION
PLANTS

too low to be attractive to the fishermen. Eighteen fishmeal factories, including a number of plants owned and operated by the Government's Herring Industry Board, supply less than half the fishmeal needs of the United Kingdom. Reduction plants are located at the fishing and fish processing centers of Fraserburgh, Peterhead, Bressay, Aberdeen, Stornoway, Wick, Falkirk, and Clyde in Scotland; North Shield, Fleetwood, Milford Haven, Minster (Kent), Hull, Grimsby, and Great Yarmouth, at Peel on the Isle of Man in England; and Ardglass in Northern Ireland (figure 15). In 1959, fishmeal production amounted to 87,696 short tons, a little less than the record of 99,944 tons in 1955 (figure 16, table 47).

In 1957, 316,274 short tons of white-fish offal and waste were used in reduction, compared with 2,204 tons of herring offal and waste, 39,620 tons of surplus white fish, and 28,652 tons of herring. The

TABLE 47.--UNITED KINGDOM: PRODUCTION OF FISH MEAL AND HERRING OIL,
1953-59
(IN SHORT TONS)

| YEAR | FISHMEAL | | | HERRING OIL |
|------|-----------|----------------------|--------|----------------|
| | WHITEFISH | HERRING AND OFFAL | TOTAL | |
| 1953 | 73,050 | 19,264 | 92,314 | 9,632 |
| 1954 | 76,451 | 15,347 | 91,798 | 7,645 |
| 1955 | 86,240 | 13,704 | 99,944 | 7,728 |
| 1956 | 88,480 | 7,056 | 95,536 | 3,696 |
| 1957 | 84,448 | 4,766 | 89,214 | 2,703 |
| 1958 | 83,216 | 4,527 | 87,743 | 1,880 |
| 1959 | 82,544 | 5,152 | 87,696 | 2,513 |

NOTE: PRODUCTION OF FISH BODY OIL FROM OTHER FISH IS INCLUDED WITH OIL OF MARINE ANIMALS OTHER THAN WHALES.

SOURCES: REPORT ON THE FISHERIES OF SCOTLAND, EDINBURGH, 1954; UNITED KINGDOM, HERRING INDUSTRY BOARD, ANNUAL REPORT, 1955-57; UNITED KINGDOM, WHITEFISH AUTHORITY, ANNUAL REPORT AND ACCOUNTS, 1956 AND 1959; U. S. FOREIGN SERVICE DESPATCHES.

amount of herring meal and herring oil produced in the United Kingdom has declined (as the herring catch has dwindled) from 19,264 tons of meal and 9,632 tons of oil in 1953 to 5,152 tons of meal and 2,513 tons of oil in 1959. Fish solubles are put back into the meal. It is reported that only one firm sells solubles separately to the consumer.

Prices

In late 1959 and 1960, because of the great increase in Peruvian imports, the average price of fishmeal fell from the equivalent of about US\$175.00 per short ton to US\$125.00 per ton. In January 1961, domestic herring meal (68 to 71 percent protein) was quoted at US\$125.00 per ton, ex-factory. At the same time Peruvian fishmeal, (65 percent protein, branded), was quoted at US\$90.00 per ton, c.i.f. United Kingdom ports, and Icelandic herring meal (70 percent protein) at US\$109.37 per ton, c.i.f. United Kingdom ports.

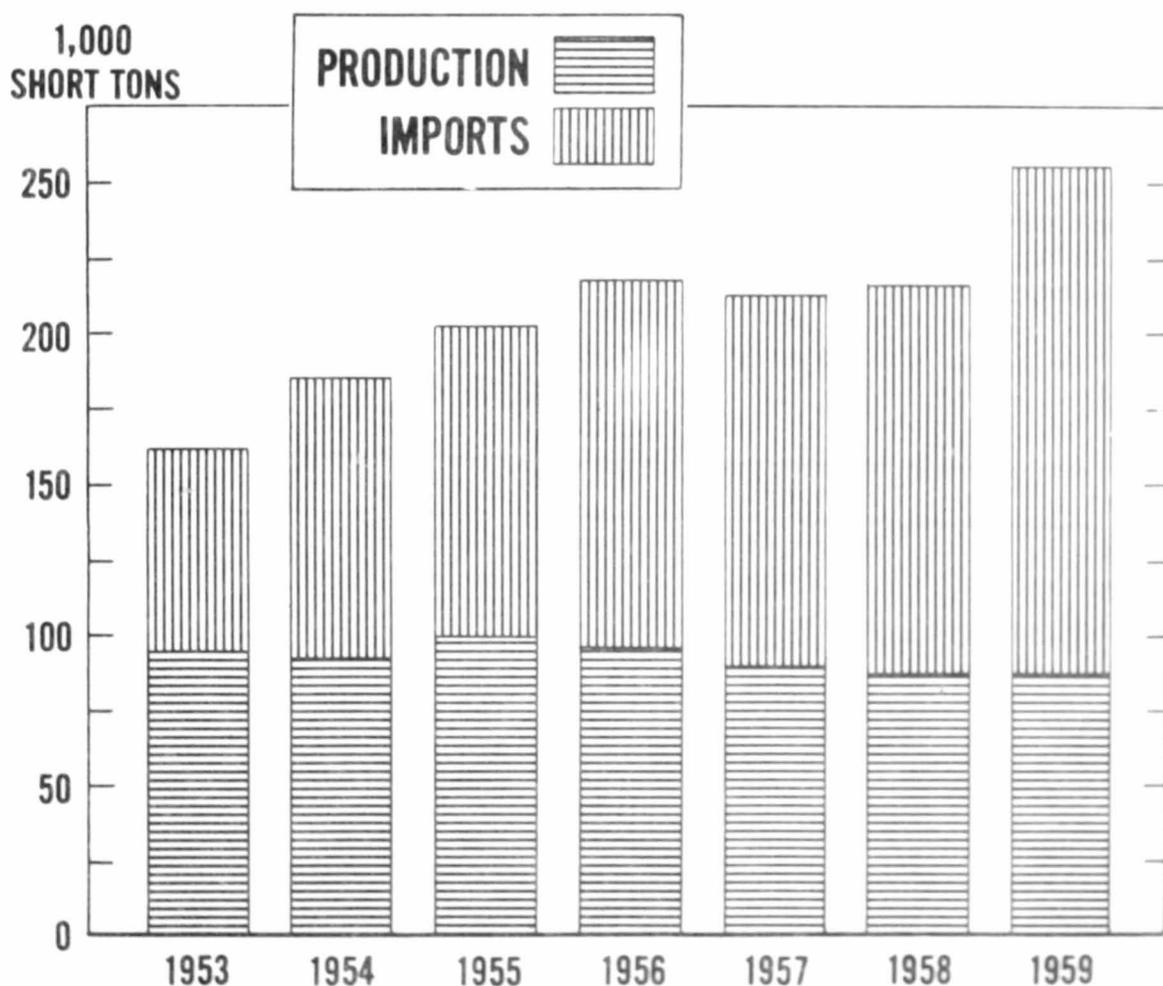


FIGURE 16.--UNITED KINGDOM: PRODUCTION AND IMPORTS OF FISHMEAL, 1953-59

In late 1959 and early 1960 prices paid in the United Kingdom for fish offal for reduction fell in a few months from US\$27.50 per ton to US\$15.00 per ton. In October 1960 the price for offal and unsold and condemned fish was US\$20.00 per ton. In 1960 prices of herring for reduction varied from US\$13.75 to US\$28.75 per ton, depending on the time of year and the location of the port of landing.

Government Policies

The United Kingdom extends credits and subsidies to the fishing industry to support landing prices or operational costs; the acquisition of vessels, engines, gear and equipment; and to assist the processing industry. Government grants for new fishing vessels and for the conversion of old vessels from coal to fuel oil amount to 25 percent of the cost, within a maximum limit; in the case of working owners, additional loans may cover 50 or 55 percent of the cost. These loans and grants are administered by the White Fish Authority and the Herring Industry Board, which borrow or are granted the necessary funds from the exchequer. The period of the loan does not exceed 20 years and the rate of interest on loans is at present 6 percent.

The White Fish Authority, a semipublic body, has the power to operate processing plants and vessels and to market the products, but has not as yet exercised this authority. Loans for the improvement of processing plants are granted by the Authority. A subsidy has been paid since 1950 in respect to white fish landed from inshore, near,

TABLE 48.--UNITED KINGDOM: SUPPLY OF FISHMEAL, 1953-59
(IN SHORT TONS)

| YEAR | PRODUCTION | IMPORTS | SUPPLY |
|------|------------|---------|---------|
| 1953 | 92,314 | 66,874 | 159,188 |
| 1954 | 91,798 | 92,637 | 184,435 |
| 1955 | 99,944 | 101,545 | 201,489 |
| 1956 | 95,536 | 120,387 | 215,923 |
| 1957 | 89,214 | 122,445 | 211,659 |
| 1958 | 87,743 | 127,031 | 214,774 |
| 1959 | 87,696 | 164,662 | 252,358 |

NOTE: SMALL QUANTITIES OF FISHMEAL HAVE BEEN EXPORTED EACH YEAR. THE EXPORT STATISTICS OF THE UNITED KINGDOM DO NOT SEPARATE FISHMEAL FROM MEAT MEAL, BONE MEAL AND WHALE MEAT MEAL.

SOURCES: ACCOUNTS RELATING TO TRADE AND NAVIGATION OF THE UNITED KINGDOM, 1953-59; ANNUAL STATEMENT OF THE TRADE OF THE UNITED KINGDOM, 1957; WHITE FISH AUTHORITY, ANNUAL REPORT AND ACCOUNTS, LONDON, 1960; U. S. FOREIGN SERVICE DESPATCHES.

TABLE 49.--UNITED KINGDOM: IMPORTS OF FISHMEAL, BY COUNTRY OF ORIGIN, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------|--------------|--------------|--------------|--------------|--------------|-----------------|-----------------|
| UNION OF SOUTH AFRICA | 30,818 | 36,618 | 30,781 | 27,609 | 36,704 | 41,684 | 41,173 |
| NORWAY | 31,278 | 47,804 | 52,698 | 69,054 | 37,706 | 19,498 | 28,128 |
| DENMARK | 1,786 | 2,939 | 8,424 | 12,627 | 24,735 | 24,347 | 34,832 |
| ICELAND | 1,222 | 2,801 | 5,135 | 5,785 | 7,531 | 9,148 | 6,274 |
| CANADA | 348 | 1,412 | 3,013 | 3,712 | 6,941 | 8,616 | 14,301 |
| OTHER | <u>1,422</u> | <u>1,063</u> | <u>1,494</u> | <u>1,600</u> | <u>8,828</u> | <u>1/23,738</u> | <u>1/39,954</u> |
| TOTAL | 66,874 | 92,637 | 101,545 | 120,387 | 122,445 | 127,031 | 164,662 |

1/ INCLUDES 13,216 TONS IMPORTED FROM PERU IN 1958, AND 39,954 TONS IMPORTED IN 1959.

SOURCES: ANNUAL STATEMENT OF THE TRADE OF THE UNITED KINGDOM, 1956 AND 1957; ACCOUNTS RELATING TO TRADE AND NAVIGATION OF THE UNITED KINGDOM, 1958 AND 1959; UNITED KINGDOM, ANNUAL REPORT AND ACCOUNTS FOR THE YEAR ENDED MARCH 31, 1960; UNITED KINGDOM, WHITE FISH AUTHORITY, LONDON, 1960.

TABLE 50.--UNITED KINGDOM: IMPORTS OF FISH OIL, BY COUNTRY OF ORIGIN, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------|------------|-----------|------------|------------|------------|------------|------------|
| UNION OF SOUTH AFRICA | 3,507 | 2,334 | 10,924 | 3,547 | 2,107 | 1,139 | 16,456 |
| NORWAY | 486 | 339 | 44 | 41 | 95 | - | 12 |
| NETHERLANDS | 220 | 329 | - | 19 | - | - | 2 |
| CANADA | 439 | 23 | 71 | - | - | - | 9,248 |
| FALKLAND ISLANDS | - | - | - | 1,227 | 961 | - | - |
| OTHER | <u>404</u> | <u>33</u> | <u>132</u> | <u>120</u> | <u>718</u> | <u>202</u> | <u>595</u> |
| TOTAL | 5,056 | 3,058 | 11,171 | 4,954 | 3,881 | 1,341 | 26,313 |

NOTE: INCLUDES FISH AND MARINE ANIMAL OIL, OTHER THAN COD AND OTHER LIVER OIL, SPERM OIL, AND WHALE OIL.

SOURCES: ANNUAL STATEMENT OF THE TRADE OF THE UNITED KINGDOM, 1956 AND 1957; ACCOUNTS RELATING TO TRADE AND NAVIGATION OF THE UNITED KINGDOM, 1958 AND 1959.

TABLE 51.--UNITED KINGDOM: EXPORTS OF FISH OIL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------------|------------|------------|------------|------------|------------|------------|--------------|
| FEDERAL REPUBLIC OF GERMANY | 132 | 9,483 | 2,540 | 281 | - | 571 | 1,191 |
| NETHERLANDS | 36 | 376 | 76 | 186 | - | 606 | 7 |
| NORWAY | - | 44 | 165 | 78 | - | - | 2,307 |
| FRANCE | 179 | 181 | 8 | 19 | - | - | - |
| UNITED STATES | 1,084 | 980 | 37 | 63 | - | - | 147 |
| OTHER | <u>980</u> | <u>447</u> | <u>464</u> | <u>266</u> | <u>250</u> | <u>422</u> | <u>2,658</u> |
| TOTAL | 2,411 | 11,511 | 3,290 | 893 | 250 | 1,599 | 6,310 |

NOTE: INCLUDES FISH AND MARINE ANIMAL OIL, OTHER THAN COD AND OTHER LIVER OIL, AND WHALE OIL, UNREFINED.

SOURCES: ANNUAL STATEMENT OF THE TRADE OF THE UNITED KINGDOM, 1956 AND 1957; ACCOUNTS RELATING TO TRADE AND NAVIGATION OF THE UNITED KINGDOM, 1959.

and middle waters by fishing vessels up to 140 feet in length.

The Herring Industry Board, a semipublic body set up by the government, owns and operates a number of fish meal and oil plants which were built at public expense. A subsidy on herring has been paid since 1957 at rates broadly comparable to those of the white fish subsidy. This subsidy has replaced an indirect subsidy formerly paid on surplus herring used for reduction to oil and meal. Herring sales are subject to minimum prices fixed by the Board. The highest price is for herring for sale in the fresh-fish market, and the lowest price is for herring used for processing. Foreign landings are included in the minimum price system.

There are no quantitative restrictions on fish imports from OEEC countries into the United Kingdom--whether as direct landings or as processed fish. Herring meal enters the United Kingdom free of duty. Other meals of meat, offal, fish, crustaceans, or mollusks, unfit for human consumption, pay a 10 percent duty, except imports from countries of the British Commonwealth of Nations. Fish and marine animal oils, other than cod liver oil and whale oil, also are taxed at a rate of 10 percent, except imports from countries of the British Commonwealth of Nations.

Foreign Trade

In recent years, imports have furnished about two-thirds of the fishmeal needs of the United Kingdom (table 48). These imports, totaling about 165,000 short tons in 1959, came chiefly from Peru, Norway, the Union of South Africa, Denmark, Iceland, and Canada (table 49). Imports of fish body oil--amounting to 26,313 tons in 1959--were received chiefly from the Union of South Africa, Norway, the Netherlands, Canada (table 50). Exports of fish oil have varied considerably, ranging from a high of 11,511 tons in 1954 to a low of 250 tons in 1957 (table 51); in 1959 they were 6,310 tons.

U.S.S.R.

Little information is available on the reduction industry of the U.S.S.R. Production of fishmeal rose from 26,889 short tons in 1953 to 44,741 tons in 1957. In 1958, 1959, and 1960, production probably continued to increase since more trawler mother-ship fleets and factory ships have been commissioned and are fishing various oceans of the world.

AFRICA

ANGOLA

The Industry

The fishmeal industry of Angola is a post-World War II development. It is estimated that about 80 percent of Angola's annual catch of fish is now reduced to meal and oil. The industry experienced relatively steady growth from 1945 to 1952, with a sizable increase in 1953. There was relative stability from 1953 to 1956.

The Angolan fishmeal industry is based mainly in the Lobito-Benguela, the Mocamedes-Porto Alexandre, and the Luanda areas (figure 17). Among the stocks of fish supporting this industry are the sardine (*Sardinella aurita*), the "carapau" (*Selar crumenophthalmus*), and the jack mackerel (*Trachurus trachurus*); waste from the tuna canneries is also sent to the reduction plants. The principal species used in reduction is the sardine; in 1957 about 60 percent of Angola's total fish catch was the sardine. An average of about 115,710 tons of sardines annually has been taken during the past five years, reaching a peak of 267,444 tons in 1957.

Angolan production of fishmeal increased from 7,356 short tons in 1947 to 46,631 tons in 1953; a peak of 93,896 tons was reached in 1957 (table 52, figure 18). In 1958, a serious decline occurred in Angolan fish production. Although the supply of "carapau" and jack mackerel remained fairly stable, the catch of sardines was smaller than in previous years, possibly due to a movement of these fish offshore. The fishing fleet of Angola is not equipped to fish far from the coast, and production of fishmeal declined. A high level of export was maintained in 1958 by selling stocks carried over from 1957.

About 90 percent of the recorded Angolan fish catch is taken by 755 motorized vessels. Also engaged in fishing are about 2,610 sail or row boats, some of which supply small quantities of fish to the reduction plants. Purse seines began to arrive in Angola in 1948. At present 267 purse seiners operate in the Angolan fisheries.

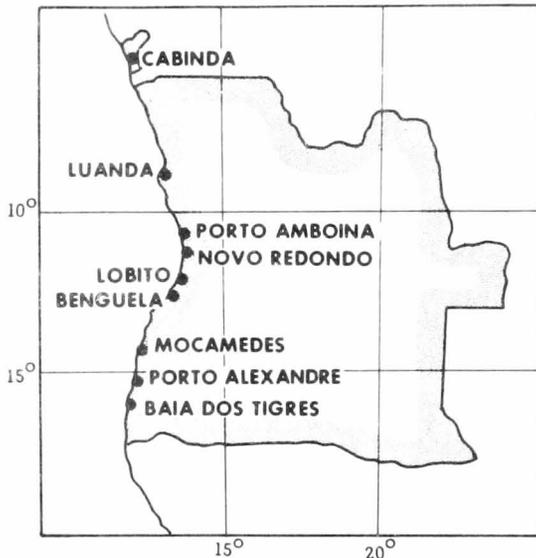


FIGURE 17.--ANGOLA: LOCATION OF FISH-REDUCTION PLANTS

TABLE 52.--ANGOLA: PRODUCTION OF FISH MEAL AND OIL, 1953-59
(IN SHORT TONS)

| YEAR | FISHMEAL ^{1/} | FISH OIL |
|------|------------------------|----------|
| 1953 | 46,631 | 6,805 |
| 1954 | 58,457 | 11,560 |
| 1955 | 58,126 | 4,618 |
| 1956 | 85,860 | 5,133 |
| 1957 | 93,896 | 7,944 |
| 1958 | 52,679 | 7,994 |
| 1959 | 61,916 | 5,354 |

^{1/} INCLUDES FISH FERTILIZER.

SOURCES: STATISTICAL PUBLICATIONS OF THE GOVERNMENT OF ANGOLA; U. S. FOREIGN SERVICE DESPATCHES.

A recession in the fishing industry has an adverse effect on the Angolan economy, and produces distress in areas such as Mocamedes where fishmeal is the second most important export product. In the last two years some reduction plants have lain idle and others have operated at far less than capacity. Some factories are fully mechanized and modernized, but many firms did not take advantage of large profits during good years to modernize their factories and are now asking for government assistance. During the first months of 1960, the factories at Mocamedes operated on a 24-hour basis but, owing to competition on the

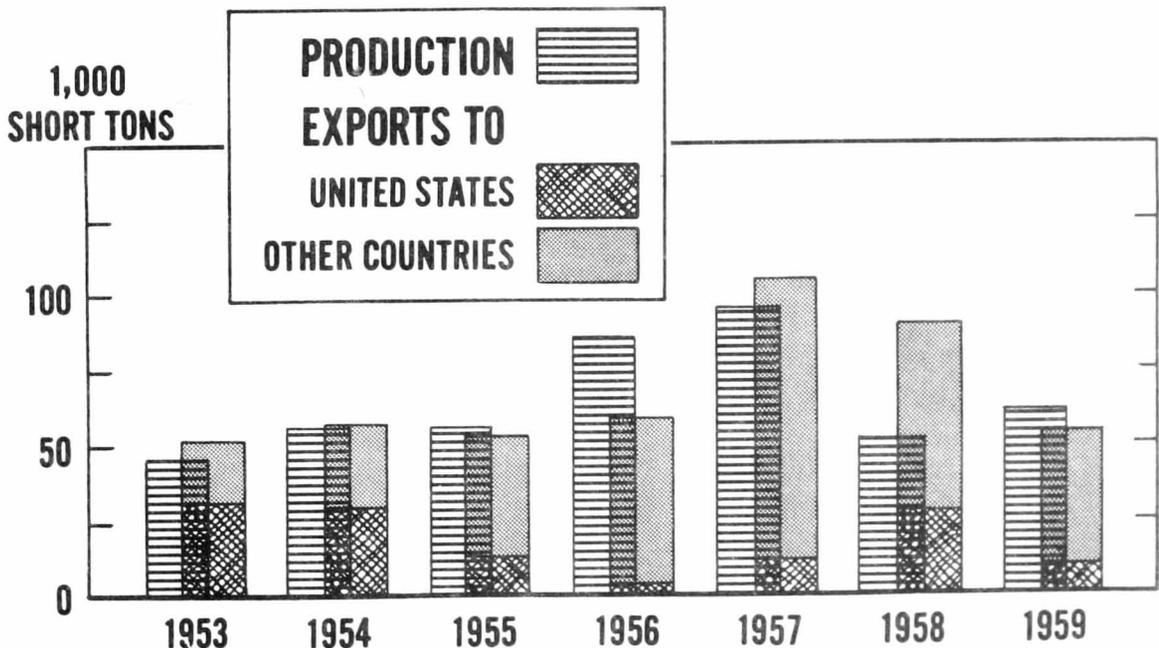


FIGURE 18.--ANGOLA: PRODUCTION AND EXPORTS OF FISHMEAL, 1953-59

TABLE 53.--ANGOLA: EXPORTS OF FISHMEAL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------------|--------------|--------------|--------------|--------------|---------------|---------------|---------------|
| FEDERAL REPUBLIC OF GERMANY | 10,708 | 15,806 | 29,580 | 30,406 | 33,645 | 5,310 | 4,258 |
| NETHERLANDS | 4,266 | 6,362 | 2,067 | 13,098 | 25,244 | 26,376 | 7,923 |
| UNITED STATES | 32,945 | 31,824 | 13,075 | 3,811 | 12,403 | 29,703 | 11,606 |
| BELGIUM-LUXEMBOURG | 110 | 1,688 | 3,522 | 3,411 | 8,904 | 10,669 | 853 |
| DENMARK | 508 | 1,090 | 2,532 | 2,284 | - | - | - |
| ITALY | - | - | 621 | 1,451 | 6,741 | 2,733 | 16,011 |
| OTHER ^{1/} | <u>3,549</u> | <u>2,086</u> | <u>3,973</u> | <u>4,558</u> | <u>16,815</u> | <u>14,739</u> | <u>15,950</u> |
| TOTAL | 52,086 | 58,856 | 55,370 | 59,019 | 103,752 | 89,530 | 56,601 |

NOTE: FISH FERTILIZER INCLUDED.

SOURCE: STATISTICAL PUBLICATIONS OF THE GOVERNMENT OF ANGOLA.

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TABLE 54.--ANGOLA: EXPORTS OF FISH OIL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------------|------------|------------|--------------|------------|------------|--------------|------------|
| FEDERAL REPUBLIC OF GERMANY | 8,215 | 11,744 | 3,926 | 4,754 | 12,666 | 8,061 | 5,206 |
| NETHERLANDS | 158 | 584 | 631 | 227 | - | - | - |
| OTHER ^{1/} | <u>813</u> | <u>252</u> | <u>1,730</u> | <u>712</u> | <u>760</u> | <u>1,371</u> | <u>396</u> |
| TOTAL | 9,186 | 12,580 | 6,287 | 5,693 | 13,426 | 9,432 | 5,602 |

^{1/} INCLUDES MOZAMBIQUE, PORTUGAL, FRANCE, ETC.

SOURCES: STATISTICAL PUBLICATIONS OF THE GOVERNMENT OF ANGOLA; U. S. FOREIGN SERVICE DESPATCHES.

world market, sales were slow and warehouses were filled with unsold fishmeal. Almost 25,000 short tons of unsold fishmeal were stored in warehouses at Mocamedes alone in July 1960.

According to government statistics, Angola has 151 factories processing fish meal and oil. Of these, 105 are licensed; it is reported that the remainder continue to operate without licenses. The reduction plants are located as follows:

Mocamedes District--43 semi-automatic factories with average capacities of 4 to 6 short tons per hour.
9 completely automatic factories with an average capacity of 7 to 8 tons per hour (3 in Mocamedes, 4 in Porto Alexandre, and 2 in Baia dos Tigres).

Benguela District --60 semi-automatic factories.
30 manual factories.

Luanda -- 2 semi-automatic factories with an average capacity of 4 to 6 tons per hour.
7 completely automatic factories.

With the distressed condition of the fishmeal industry, authorization has not been granted for the construction of new factories.

Prices and Costs

Whole fish for reduction bring prices that vary between the equivalent of US\$6.25 and US\$10.95 per short ton. Reduction plant operators have stated that their production costs in mechanized plants are about US\$100.00 per ton at Mocamedes, and about US\$85.00 at Benguela. Costs at nonmechanized plants are a little lower. Costs at mechanized plants are lower when the catch is great enough to permit them to operate at full capacity. The export price of fishmeal in July 1960 fluctuated in the neighborhood of US\$72.00 per ton.

Government Policies

Various proposals have been made to help the depressed Angolan fishing industry. Among these was a proposal to suspend all export duties on fish products. In 1958, the Government of Angola set aside more than US\$2,000,000 for new fish meal and oil processing units, with loans at 5 percent interest, repayable in 10 years. In 1959, as a relief measure the government waived payment of income tax by the fishing industries. Beginning in 1960, a navy hydrographic ship was to give technical assistance to the industry at Benguela. The price of fuel oil to the fishing industry was to have been lowered, though it is

understood that no action has as yet been taken in this matter. A subsidy of US\$10.00 per ton has been established for fishmeal exported after July 1, 1960.

Foreign Trade

Fishmeal has become Angola's third most important export product, after coffee and diamonds. Almost the entire production of fish meal and oil is exported. The total value of these exports increased from about US\$1,000,000 in 1940 to US\$17,250,000 in 1957. Unusually large catches in 1956 and 1957 resulted in a large increase in the value of exports in 1957 and 1958. Until 1955 the United States was the most important market for Angolan fishmeal, and in the last five years has remained an important buyer (table 53). The Federal Republic of Germany became a sizable market in the early 1950's, and from 1955 to 1957 was the largest buyer, with purchases of 33,645 short tons in 1957. Because of bacteria infection, competition from cheaper Peruvian fishmeal, and new German import regulations, Angolan exports to the Federal Republic of Germany dropped to 5,310 tons in 1958, and declined still further to 4,258 tons in 1959. Angola's main markets for fishmeal have recently been Italy, the United States and the Netherlands. Fish oil is exported principally to the Federal Republic of Germany, with minor quantities going to other European countries (table 54).

One of the most important problems of the Angolan fishmeal industry is Salmonella, a bacteria which sometimes infests fishmeal. In 1956, Germany was reported to have demanded the installation in Angola of sterilization plants to destroy the bacteria. When these plants were not constructed in a reasonable length of time, a number of German fishmeal importers rejected Angola as a source of supply. Also contributing to the loss of this market was a new German regulation requiring the shipment of fishmeal to Germany in five-ply paper bags with one-ply waterproof plastic.

In 1959, a new classification for Angolan fishmeal was established in order to meet new German requirements for imports. This new classification is as follows:

Type "Extra"-minimum protein content of 75%.

Type "I" -minimum protein content of 65% and other elements coming within regulation limits.

Type "Z" -or "current type"--all other fishmeal not processed in completely mechanized factories, which has no foreign elements and comes within the prescribed limits of other elements.

MOROCCO

The Industry

For many years Moroccan fish meal and oil were only byproducts of the canning industry, the wastes from sardine canneries being used in reduction. As the sardine fishery grew, sardines in excess of cannery plant needs were reduced to meal and oil. Twenty-five Moroccan factories now produce fishmeal, almost entirely from sardines. Many of the plants are connected with canneries, and utilize the offal and wastes of sardine canning and sardines declared unfit for canning. The reduction plants are located chiefly at Casablanca, Agadir, and Safi, with one each at Kenitra and Larache (figure 19).

Fishmeal was first produced in quantity in 1949, when about 7,800 short tons were exported; these exports were practically all of Morocco's production. In the years following, production increased rapidly to reach 18,073 tons in 1953 (table 55).

The Moroccan fishmeal industry suffered with the sardine fishing and canning industry in the depressed fishery from 1954 to 1957. Production of fishmeal fell to 6,502 short tons in 1956. A decline in the sardine catch was attributable partly to poor runs of sardines off the Moroccan coast and partly to strikes among the fishermen. In early 1957, reduction plants claimed that the price of sardines was prohibitive. The labor unions objected to the sale of sardines at a lower price to the reduction plants, and much of the catch surplus to cannery needs was thrown back into the sea. In 1957, however, fishmeal production began to increase. The sardine canning industry--because of high costs and a weak competitive position in world markets--continued to be in a depressed condition and large sardine catches were sold to reduction plants in late 1957 and 1958. Fishmeal production was 22,811 tons in 1958, and 19,526 tons in 1959. Seven or eight new reduction plants were built and equipped during this period.

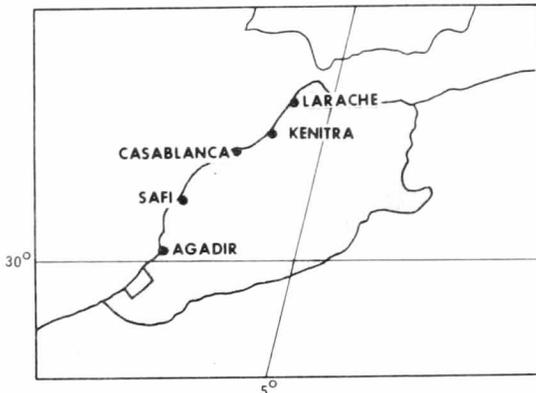


FIGURE 19.--MOROCCO: LOCATION OF FISH-REDUCTION PLANTS

Prices and Costs

The price paid in Morocco for fish for reduction is fixed by an official government agency, which also determines the distribution of fish to the plants, taking into consideration the quality of the fish and the need to supply fish for local consumption and for industrial use. Reduction plants considered the price of raw materials in July 1960 too high to

permit competition on the foreign market. At Safi, the price of fish (chiefly sardines) for reduction was the equivalent of about US\$14.35 per short ton, which, including taxes, disembarkation fees, and transportation costs, increased the total paid by the plants to US\$17.87 per ton (506 Moroccan francs = US\$1 as quoted in June 1960). The price for fish wastes from the sardine canneries had been fixed at US\$12.57 per ton. The price of Moroccan fishmeal exported to France was reported in July 1960 to be US\$111.15 per ton at the railway station at Nantes, France. Moroccan manufacturers stated that this price does not cover their costs. Unrefined Moroccan fish oil sold at US\$114.90 per ton (c.i.f., French ports).

At Agadir, 80 percent of the local 1958 sardine catch went to the reduction factories for fish meal and oil. The reduction plants were paying the equivalent of US\$19.44 per short ton for fish delivered by fishermen, compared with US\$60.47 per ton for fish sold to the canneries (420 Moroccan francs = US\$1, as quoted in May 1959). In September 1960, the Agadir price of fish for reduction ranged from US\$10.38 to US\$11.20 per ton.

Foreign Trade

Almost all Moroccan fishmeal has been exported. The United States was the biggest market from 1953 to 1957, taking between 3,320 and 6,450 short tons annually. This was between one-third to two-thirds of annual exports of fishmeal (table 56). In 1958, however, France became the most important buyer, taking 13,627 tons out of total exports of 18,351 tons. Again in 1959, France was the leading market but purchased only 8,943 tons out of total exports of 16,000 tons. The Federal Republic of Germany has also been an important and fairly consistent market for Moroccan fishmeal, taking an average of about 2,600

TABLE 55.--MOROCCO: PRODUCTION OF FISH MEAL AND OIL, 1953-59
(IN SHORT TONS)

| YEAR | FISHMEAL | FISH OIL |
|------|----------|----------|
| 1953 | 18,073 | 3,967 |
| 1954 | 11,130 | 2,204 |
| 1955 | 8,816 | 992 |
| 1956 | 6,502 | 992 |
| 1957 | 13,885 | 3,086 |
| 1958 | 22,811 | 4,188 |
| 1959 | 19,526 | 5,174 |

SOURCES: PUBLICATIONS OF THE FOOD AND AGRICULTURE ORGANIZATION OF UNITED NATIONS; U. S. FOREIGN SERVICE DESPATCHES.

TABLE 56.--MOROCCO: EXPORTS OF FISHMEAL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------------|--------------|--------------|------------|------------|--------------|--------------|--------------|
| FRANCE | 2,845 | 366 | 911 | 1,304 | 3,244 | 13,627 | 8,943 |
| FEDERAL REPUBLIC OF GERMANY | 4,543 | 1,075 | 2,917 | 1,295 | 2,989 | 2,109 | 3,243 |
| NETHERLANDS | 1,864 | 602 | 891 | 681 | 1,195 | - | 300 |
| UNITED STATES | 6,448 | 6,431 | 4,693 | 3,321 | 3,837 | 877 | 221 |
| OTHER | <u>2,410</u> | <u>1,259</u> | <u>269</u> | <u>230</u> | <u>2,732</u> | <u>1,738</u> | <u>3,293</u> |
| TOTAL | 18,110 | 9,733 | 9,681 | 6,831 | 13,997 | 18,351 | 16,000 |

NOTE: INCLUDES FISH FLOUR.

SOURCES: STATISTIQUES DU MOUVEMENT COMMERCIAL ET MARITIME DU MAROC (STATISTICS OF COMMERCIAL AND MARITIME TRADE OF MOROCCO), 1953-54; U. S. FOREIGN SERVICE DESPATCHES.

TABLE 57.--MOROCCO: EXPORTS OF FISH BODY OIL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|-----------------------------|------------|-----------|-----------|----------|-----------|------------|------------|
| FRANCE | 1,518 | 1,818 | 1,129 | 846 | 1,872 | 3,697 | 3,401 |
| FEDERAL REPUBLIC OF GERMANY | 1,572 | 351 | 3 | - | 177 | 450 | 509 |
| NETHERLANDS | 289 | 153 | 133 | 72 | 238 | 231 | 312 |
| OTHER | <u>568</u> | <u>20</u> | <u>51</u> | <u>-</u> | <u>25</u> | <u>107</u> | <u>111</u> |
| TOTAL | 3,947 | 2,342 | 1,316 | 918 | 2,312 | 4,485 | 4,333 |

SOURCES: STATISTIQUES DU MOUVEMENT COMMERCIAL ET MARITIME DU MAROC (STATISTICS OF COMMERCIAL AND MARITIME TRADE OF MOROCCO), 1953-57; U. S. FOREIGN SERVICE DESPATCHES.

tons annually during 1953-59. France is the principal market for Moroccan fish oil (table 57). The Federal Republic of Germany and the Netherlands also buy small quantities.

SOUTH AFRICA
(Union of South Africa and South-West Africa)

The Industry

The fish meal and oil industry of the Union of South Africa and South-West Africa has been treated as one unit since 1954 when the South-West African fisheries first began to be administered from the Union. Fishmeal is produced from pilchards (Sardinops ocellata) and maasbanker (T. trachurus) by 15 reduction plants in the Union and 6 in South-West Africa. These plants (figure 20) are located as follows:

| | |
|-----------------------|---|
| Union of South Africa | |
| St. Helena Bay | 6 |
| Lambert's Bay | 2 |
| Saldanha | 2 |
| Hout Bay | 2 |
| Velddrif | 1 |
| Laaiplek | 1 |
| Doornbaai | 1 |
| South-West Africa | |
| Walvis Bay | 6 |

The total capacity of the 15 plants in the Union is reported to be 240 short tons per hour. One reduction plant in Capetown uses as raw material the wastes and offal of the white fish (bottom fish) industry. Eight rock lobster plants at Luderitz (South-West Africa) utilize wastes and offal in the production of lobster meal. There is no indication that the number of fishmeal factories will be increased in the near future.

In 1953, a trial plant for stickwater recovery was installed at one west coast reduction plant. This proved so successful that by the end of the following year six plants were using stickwater and the remaining plants were installing recovery units. Fish solubles are produced for export, but a considerable amount is introduced into the fishmeal to improve the quality by raising the protein content.

Most of the South African (the Union and South-West Africa) fishmeal production has been from the pilchard and maasbanker fisheries, 15 percent from offal and waste of the trawl (white fish) fishery, and approximately 6 percent from rock lobster waste (table 58). In 1957,

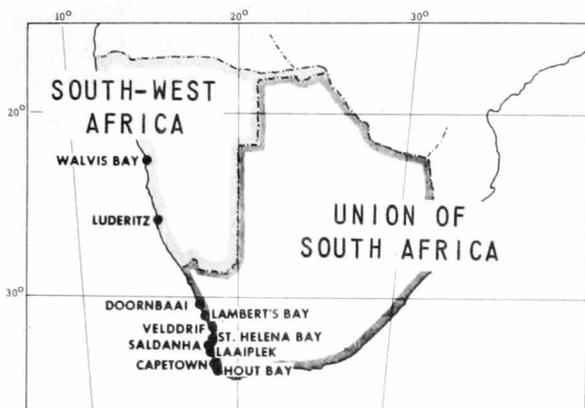


FIGURE 20.--SOUTH AFRICA: LOCATION OF FISH-REDUCTION PLANTS

that of the record 1959 year, when nearly 600,000 tons of raw fish went to the reduction plants. This is the third successive year of good catches off the Cape West Coast. The pilchards, which comprise the bulk of these catches, are large and in good condition with high oil content.

In 1952 more than 200 fishing vessels operated in the South African reduction industry. By 1960 this fleet had been reduced to about

only 17 percent of the pilchard catch was canned. The rest of the catch, as well as the waste and offal from canning, was processed in the reduction plants, as a greater demand existed for meal and oil.

During the first four months of 1960, a catch of pilchards and maasbanker was taken amounting to 210,000 short tons, compared with 136,583 tons in the same period in 1959, and 125,583 tons in January-April 1958. The catch for reduction in 1960 will probably exceed

TABLE 58.--SOUTH AFRICA: PRODUCTION OF FISHMEAL, 1953-59
(IN SHORT TONS)

| YEAR | PILCHARD AND MAASBANKER MEAL | LOBSTER MEAL | WHITEFISH MEAL | TOTAL |
|----------------|---------------------------------|-----------------|-------------------|---------|
| 1953 | <u>1/</u> 83,915 | 5,892 | 6,363 | 96,170 |
| 1954 | 90,147 | 3,712 | 6,580 | 100,437 |
| 1955 | 92,090 | 3,813 | 7,236 | 103,139 |
| 1956 | 79,136 | 2,825 | 7,384 | 89,385 |
| 1957 | 86,979 | 2,647 | 6,927 | 96,553 |
| 1958 <u>2/</u> | 99,993 | 1,935 | 7,330 | 109,258 |
| 1959 <u>2/</u> | 132,357 | 2,365 | 9,000 | 143,722 |

1/ FIGURE OBTAINED BY SUBTRACTION.

2/ INCLUDES SOLUBLES, PROBABLY ON A DRY-WEIGHT BASIS.

NOTE: SOUTH AFRICAN STATISTICS ARE ON A SPLIT-YEAR BASIS, APRIL 1 TO MARCH 31. THE CHANGE FROM CALENDAR YEAR BASIS WAS MADE IN 1952. FIGURES FOR 1953 ARE FOR 15 MONTHS, JANUARY 1, 1952 TO MARCH 31, 1953.

SOURCES: UNION OF SOUTH AFRICA, FOREIGN TRADE STATISTICS, 1953-59; UNION OF SOUTH AFRICA, DIVISION OF FISHERIES, ANNUAL REPORT, 1954-60; U. S. FOREIGN SERVICE DESPATCHES.

150, but the vessels were bigger and with more powerful motors. New 70-foot, broad-beamed vessels now in service can carry twice the load of their 50-foot predecessors and have a larger radius of fishing action. These boats can range 100 miles from port and return with loads of more than 120 tons each.

Fishmeal production in South Africa during the first five months of 1960, compared with the same period in 1959, shows a considerable increase:

| Month | 1959 | 1960 |
|----------|-------------------------------|---------------|
| | <u>short tons</u> | |
| January | 3,037 | 6,172 |
| February | 6,560 | 11,468 |
| March | 11,083 | 22,026 |
| April | 18,660 | 21,672 |
| May | <u>15,776</u> | <u>20,330</u> |
| Total | 55,116 | 81,668 |

Total production of fishmeal in 1960 will probably exceed the 1959 record production of 143,722 tons (figure 21).

Production of fish body oil in South Africa for the first five

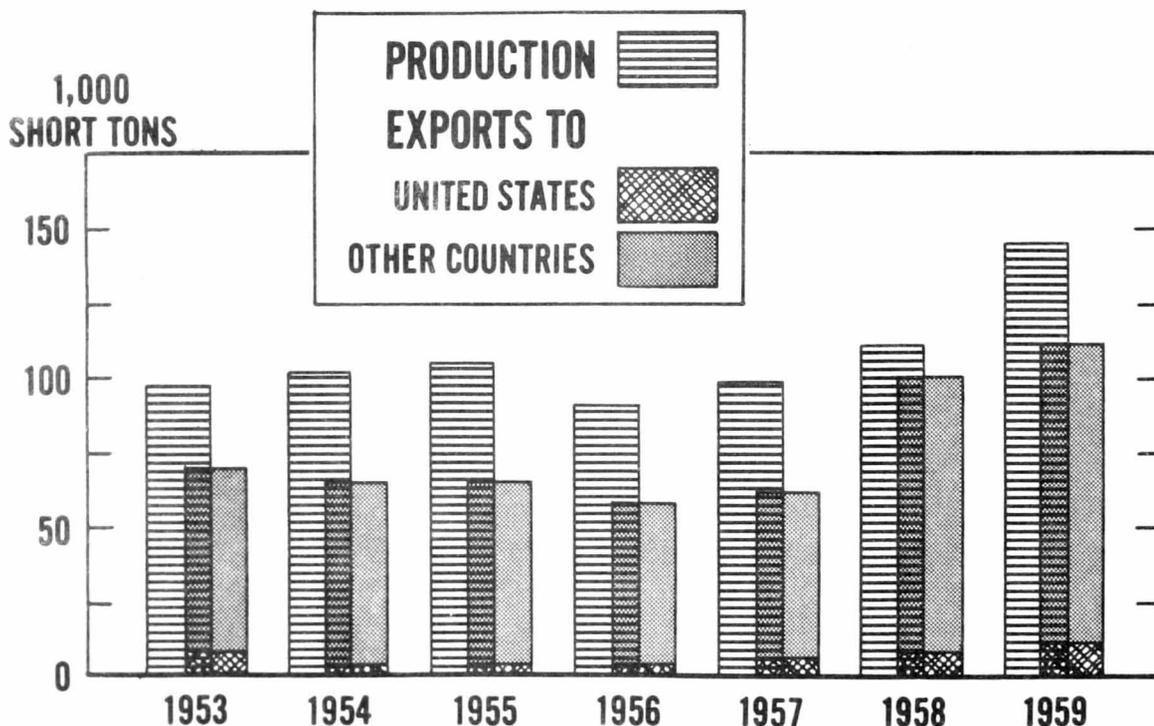


FIGURE 21.--SOUTH AFRICA: PRODUCTION AND EXPORTS OF FISHMEAL, 1953-59

months of 1960 was 22,299 tons, compared with 17,203 tons for the same period in 1959. It is estimated that the total production of fish body oil in 1960 will far exceed that of 1959 when 35,617 tons were produced (table 59). Practically the entire production of fish body oil is refined in the Union.

Record production of fishmeal by Union and South-West African factories is due in part to the temporary raising of the fishing quota, a good catch of pilchards and maasbanker, and, in part, to a reduction in cannery effort in view of a world surplus of canned fish.

Prices

Until June 1960, fishing boats in the Union were reportedly being paid the equivalent of about US\$13.00 per short ton for pilchards, maasbanker, and mackerel. Owing to a sharp drop in fishmeal prices, fishermen agreed to accept a voluntary reduction of 12-1/2 percent for the months of June and July 1960. In South-West Africa, boats were paid slightly less than US\$13.00 per ton in 1960

In July 1960, the export price of South African fishmeal was US\$87.50 per ton, c.i.f., United Kingdom, and of fish oil US\$137.50 per ton, c.i.f. United Kingdom.

Government Policies

In 1954, an annual quota limit of 250,000 tons was placed on the catch of pilchards in South-West Africa for conservation purposes. This quota was changed early in 1959 to 260,000 tons, including

TABLE 59.--SOUTH AFRICA: PRODUCTION AND EXPORTS OF FISH OIL, 1953-59
(IN SHORT TONS)

| YEAR | PRODUCTION | EXPORTS | CONSUMPTION AND INVENTORY |
|------|------------|---------|------------------------------|
| 1953 | <u>1</u> / | 16,666 | |
| 1954 | 25,878 | 9,947 | 15,931 |
| 1955 | 24,237 | 13,164 | 11,073 |
| 1956 | 20,537 | 4,999 | 15,538 |
| 1957 | 22,370 | 10,889 | 11,481 |
| 1958 | 26,047 | 17,679 | 8,368 |
| 1959 | 35,617 | 26,170 | 9,447 |

1/ NOT AVAILABLE.

SOURCES: UNION OF SOUTH AFRICA, FOREIGN TRADE STATISTICS, 1953-58;
U. S. FOREIGN SERVICE DESPATCHES.

TABLE 60.--SOUTH AFRICA: EXPORTS OF FISHMEAL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 ^{1/} | 1959 ^{1/} |
|-------------------------------------|--------------|--------------|--------------|--------------|------------|--------------------|--------------------|
| UNITED KINGDOM | 33,702 | 37,417 | 28,330 | 29,670 | 31,120 | 44,316 | 39,790 |
| ISRAEL | 3,916 | 5,480 | 7,063 | 6,824 | 4,680 | 15,313 | 14,746 |
| NETHERLANDS | 8,420 | 3,888 | 11,410 | 8,184 | 7,029 | 7,276 | 4,202 |
| UNITED STATES | 9,462 | 3,330 | 3,628 | 3,801 | 5,770 | 7,593 | 11,755 |
| FEDERAL REPUBLIC OF GERMANY | 3,222 | 4,453 | 5,197 | 3,493 | 3,735 | 4,776 | 16,332 |
| FEDERATION OF RHODESIA NYASALAND | 4,614 | 3,582 | 3,604 | 4,710 | 5,484 | 5,289 | 5,526 |
| MALAYA | 1,242 | 1,118 | 1,912 | 2,004 | 3,585 | 3,340 | 4,696 |
| BELGIUM | 2,454 | 1,471 | 399 | 140 | 449 | 83 | 223 |
| FRANCE | - | - | 55 | - | 339 | 8,847 | 3,173 |
| OTHER | <u>1,785</u> | <u>2,397</u> | <u>1,591</u> | <u>1,142</u> | <u>630</u> | <u>1,753</u> | <u>9,140</u> |
| TOTAL | 68,817 | 63,136 | 63,188 | 59,967 | 62,849 | 98,586 | 109,584 |

^{1/} FISH SOLUBLES INCLUDED, PROBABLY ON A DRY-WEIGHT BASIS.

SOURCES: UNION OF SOUTH AFRICA, FOREIGN TRADE STATISTICS, 1953-1959; U. S. FOREIGN SERVICE DESPATCHES.

TABLE 61.--SOUTH AFRICA: EXPORTS OF FISH BODY OIL, BY COUNTRY OF DESTINATION, 1953-59
(IN SHORT TONS)

| COUNTRY | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 |
|--------------------------------|--------------|--------------|------------|------------|------------|------------|------------|
| UNITED KINGDOM | 3,190 | 2,571 | 9,542 | 3,771 | 1,390 | 1,032 | 23,863 |
| FEDERAL REPUBLIC OF GERMANY | 4,571 | 1,047 | 51 | 14 | 1,488 | - | - |
| ITALY | 409 | 349 | 535 | 772 | 186 | 298 | 126 |
| NETHERLANDS | 6,757 | 4,050 | 2,292 | 233 | 7,700 | 16,149 | 1,976 |
| OTHER | <u>1,739</u> | <u>1,930</u> | <u>734</u> | <u>209</u> | <u>125</u> | <u>200</u> | <u>232</u> |
| TOTAL | 16,666 | 9,947 | 13,164 | 4,999 | 10,889 | 17,679 | 26,170 |

SOURCES: UNION OF SOUTH AFRICA, FOREIGN TRADE STATISTICS, 1953-1959; U. S. FOREIGN SERVICE DESPATCHES.

maasbanker. Soon after, the quota was raised to 300,000 tons, and to 310,000 tons in 1960. In raising the quota it was stated that the pilchard population showed that a higher catch rate could be maintained temporarily and that there was need for greater production in order to compete in world markets. The permanent quota remains at 260,00 tons, including maasbanker. A closed season on pilchards is observed from September to December inclusive.

The South-West Africa Administration, in order to maintain a stable industry, set up a strict set of regulations establishing high quality standards to keep the industry in a competitive position in the world markets. In 1958, exports of fishmeal from South-West Africa were limited to 75 percent of production.

Foreign Trade

Union and South-West African producers effect all export sales of fishmeal and fish oil through two central agencies--South African Fishmeal Producers' Association and South African Fish Oil Association. During 1953 to 1957, South African exports of fishmeal averaged about 63,500 short tons annually (table 60). In the next two years, exports increased by about 75 percent to reach nearly 110,000 tons in 1959.

In 1959, the principal markets for South African fishmeal were the United Kingdom, the Federal Republic of Germany, Israel, the United States, the Netherlands, the Federation of Rhodesia and Nyasaland, and Malaya. Exports of fish solubles are estimated at about 3,000 short tons per year, believed to be on a dry-weight basis.

Approximately two-thirds of the fish body oil production is exported to Europe; only one-third is used locally. The United Kingdom, Italy, the Netherlands, and the Federal Republic of Germany have been the principal purchasers. Fish-oil exports have ranged from a low of almost 5,000 tons in 1956 to more than 26,000 tons in 1959 (table 61), and are expected to increase in 1960.

ASIA

INDIA

There are two modern fishmeal plants in India, one at Kozhikode with a capacity of one-half ton per day, and the other at Malpe with a capacity of about 3 tons per day. In addition, considerable quantities of fishmeal are produced by more primitive methods. There is no appreciable foreign trade in fishmeal and only negligible imports of fish oil.

JAPAN

The Industry

For centuries fishmeal was produced in Japan by squeezing the liquids from fish with hand-operated presses and drying the pulp in the sun. Oil was then separated from the other liquids. In 1958, over 10,000 Japanese enterprises processed fish or fish wastes into fish cake and fishmeal. Most were small-scale enterprises using primitive methods. Modern machinery has been introduced into a number of these plants and production has increased markedly. In 1959, total fishmeal (including fish cake) production was 279,836 short tons (figure 22). Land-based operations produced 258,468 short tons (table 62). In addition, 21,368 short tons of fishmeal and 2,974 tons of fish solubles were produced by factory-ship operations in the Bering Sea (table 63). Fish-oil production (land-based) reached its high point in 1955 at 38,404 tons, and in 1959 amounted to 34,630 tons. Bering Sea operations

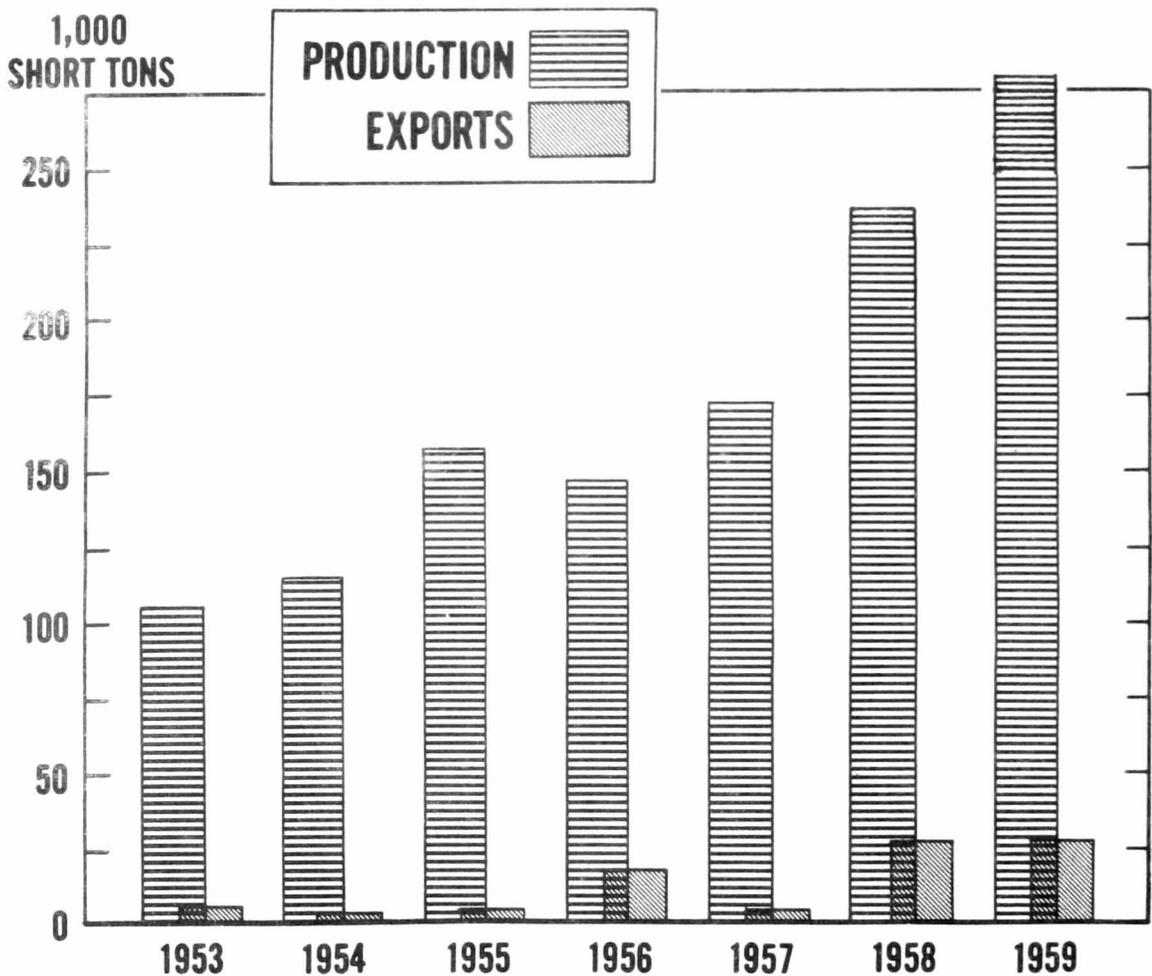


FIGURE 22.--JAPAN: PRODUCTION AND EXPORTS OF FISHMEAL, 1953-59

produced 454 tons of fish oil in 1959.

The saury is the principal species used directly for meal and oil production by the land-based plants. These fish are caught mainly during the fall months, their abundance varying widely from year to year. Through 1958, the saury accounted for more of Japan's fish meal and oil production than any other species; the remainder was chiefly from Atka mackerel, flatfishes, sardines, herring, round herring, and anchovies. Wastes and offal from other processing were reduced to fish cake and fishmeal.

In 1958, the Japanese renewed their meal and oil factory-ship operations in the Bering Sea. This fishery had been prosecuted previously during 1933-37. The 1958 operation, which included one factory ship and a fleet of 20 trawlers (table 63), was highly successful. Several other firms then wanted to shift their vessels from the limited salmon fishery to this more lucrative enterprise. The government, however, only permitted one additional fleet to enter the fishery in 1959 because it felt that the fleet which pioneered the fishery should be rewarded with one additional year relatively free of other Japanese competition. In 1960, the number of fleets increased to four--the apparent maximum number from Japan that the fishing grounds can sustain profitably for reduction purposes. The trawlers share the grounds with U.S.S.R. vessels and also with other Japanese trawlers which catch fish for factory ships equipped with filleting and freezing machinery.

So far, the Bering Sea operations have only made small contributions to total fishmeal production--5,153 short tons in 1958 and 21,368 tons in 1959. In 1960, however, the Bering Sea fleets had a production target of 59,508 short tons, of which 39,672 would be for export. Two factory ships of 13,000 and 9,200 gross tons, each equipped with two Atlas reduction plants, and each with 25 trawlers, had a total target of 33,060 short tons of fishmeal and 4,077 short tons of frozen fish. A third factory ship of 10,900 gross tons, equipped with two Atlas reduction plants and a capacity to process 551 tons of fish daily, with its 30 trawlers, had a target of 13,224 tons of fishmeal, 2,755 tons of frozen fish, and 3,306 tons of special grade fish solubles. The fourth factory ship, newly remodeled for reduction, also has two Atlas units, and 25 trawlers. The target for this fourth fleet was 13,224 tons of fishmeal and 4,408 tons of frozen fish.

The Bering Sea trawlers catch 40 to 60 percent Alaska pollock in the first half of the season; flatfishes predominate through the second half and account for 80 to 90 percent of the catch by the season's end. This industry makes a high-grade, white fishmeal. Alaska pollock is especially high in protein. The 1958 fishmeal sold for the equivalent of US\$181.44 per short ton, port of destination.

TABLE 62.--JAPAN: PRODUCTION OF FISH MEAL AND OIL BY HOME-BASED OPERATIONS, 1953-59
(IN SHORT TONS)

| YEAR | FISHMEAL | | | | | | | | FISH BODY OIL |
|------|-----------------|-----------------|---------------|---------------|--------------------------|----------|--------|---------|---------------------|
| | SARDINE CAKE | HERRING CAKE | SAURY CAKE | OTHER CAKE | FISH CAKE FROM WASTES | FISHMEAL | OTHER | TOTAL | |
| 1953 | 1/ | 1/ | 1/ | 1/ | 1/ | 1/ | 1/ | 105,374 | 14,441 |
| 1954 | 1/ | 1/ | 1/ | 1/ | 1/ | 1/ | 1/ | 114,348 | 12,988 |
| 1955 | 6,968 | 4,431 | 2/ | 64,964 | 34,124 | 45,577 | 2/ | 156,064 | 38,404 |
| 1956 | 6,023 | 1,152 | 32,430 | 17,581 | 31,314 | 45,527 | 11,284 | 145,311 | 12,837 |
| 1957 | 8,442 | 331 | 26,926 | 12,091 | 39,060 | 67,985 | 16,505 | 171,340 | 17,955 |
| 1958 | 13,573 | 103 | 49,437 | 15,708 | 39,297 | 64,222 | 49,200 | 231,530 | 29,125 |
| 1959 | 5,245 | 556 | 47,111 | 30,282 | 51,215 | 73,071 | 50,988 | 258,468 | 34,623 |

1/ BREAKDOWN NOT AVAILABLE. 2/ PROBABLY INCLUDED WITH "OTHER CAKE."

NOTE: FISHMEAL CAKE IS DRIED UNGROUND FISHMEAL. FISH BODY OIL INCLUDES OIL OF SARDINE, HERRING, ATKA MACKEREL, FLATFISH, AND OTHERS; DOES NOT INCLUDE OIL OF WHALE, SEA ANIMAL, AND SQUID.

SOURCE: JAPAN, MINISTRY OF AGRICULTURE AND FORESTRY, ANNUAL REPORT OF CATCH STATISTICS, 1954-59.

TABLE 63.--JAPAN: PRODUCTION OF FISH MEAL AND OIL BY BERING SEA FACTORY-SHIP OPERATIONS, 1958-60

| YEAR | NUMBER OF VESSELS | | PRODUCTION | | |
|----------------|-------------------|----------|------------|----------------------|----------|
| | FACTORY SHIPS | TRAWLERS | FISHMEAL | FISH SOLUBLES | FISH OIL |
| | | | |SHORT TONS..... | |
| 1958 | 1 | 20 | 5,153 | 704 | 271 |
| 1959 | 2 | 44 | 21,368 | 2,974 | 454 |
| 1960(PROPOSED) | 4 | 105 | 59,508 | 1/ | 1/ |

1/ NOT AVAILABLE.

SOURCE: U. S. FOREIGN SERVICE DESPATCHES.

Japanese fish meal and oil production may be expanded further through the use of Bering Sea herring. In 1960, two of the factory ships were planning to send fishing boats after herring on an experimental basis. The total proposed catch was to have been 8,700 tons.

Foreign Trade

Most of the output from the expanded Bering Sea fishery will probably be exported. Until recently, Japan utilized most of its fish meal and oil at home. Exports of fishmeal have increased from 4,059 short tons in 1953 to 26,483 tons in 1959. The principal buyer has been the Federal Republic of Germany, with lesser quantities bought mainly by Asiatic countries. During 1953-59, Japanese exports of fishmeal by country of destination, were as follows:

| Year | Fed. Rep. of Germany | Other | Total |
|------|-------------------------------|-------|--------|
| | <u>short tons</u> | | |
| 1955 | 3,077 | 717 | 3,794 |
| 1956 | 15,463 | 1,945 | 17,408 |
| 1957 | 1,134 | 1,974 | 3,108 |
| 1958 | 20,930 | 5,212 | 26,142 |
| 1959 | 19,626 | 6,857 | 26,483 |

Only small amounts of fish body oil have been exported from Japan. In 1956, 563 short tons were exported to the Federal Republic of Germany, and in 1958, 3,612 tons, of a total of 3,676 tons, also went to this country. In 1959 only 482 tons of fish oil were exported. In 1958, Japan imported 12,293 short tons of fishmeal, of which 7,992 tons were from the United States. In previous years imports of fishmeal had been negligible. Imports of fish oil also are negligible.

PAKISTAN

Two modern fishmeal plants are operating in Pakistan. Four more plants near Karachi manufacture fishmeal by the primitive method of grinding sun-dried fish. The total capacity of these six plants is estimated at about 140 short tons per day. In 1959 fishmeal production amounted to about 3,300 tons, of which about 2,000 tons was exported, chiefly to the Federal Republic of Germany; small amounts went to the Netherlands, the United Kingdom, and Ceylon. A new modern reduction plant with a capacity of 75 tons per day is under construction at Gwandur, and is expected to start operations in April 1961. Small quantities of fish oil are imported.

TURKEY

The first modern fishmeal plant in Turkey began operations in Trabzon in 1960. Porpoise and mackerel are the principal sources of raw material; the capacity of the plant is 25 to 30 short tons of raw material a day. Small amounts of oil are produced with primitive methods by the fishermen of the Black Sea region. A second modern fishmeal plant is under construction to utilize the increasing catch of anchovies. Customs duties on imported fish and fish products are very high.