

# The Fish Oil Industries

## Describing the Production and Utilization of Fish and Marine Animal Oils

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(Continued from February issue)

### Sardine Oil (Cont.)

It is possible to ship the oil direct to the consumer in tank cars from the California reduction plants since almost all such plants have railroad siding facilities for shipping the canned product. This is practically the only place in the United States in the fish oil industry where it is possible to ship the oil without transporting it first to shipping centers.

Part of the production in California is consumed locally by paint dealers but the bulk is shipped East for use in soap. In 1925 and 1926 some was used (about 700,000 pounds) for lard compound. Of the 15,000 tons of fish meal the bulk is used locally for animal food and for fertilizer. The exportable surplus is shipped mainly to Japan.

### Pilchard Oil

In 1925 the Canadian government by an Order in Council permitted the use of pilchards for reduction purposes in Canada. Later they permitted the use of herring in certain districts. During the first season one machinery company sold six plants that were installed on the west coast of Vancouver Island, which is the only place in Canada where pilchards are taken.

The pilchard was first noticed by the herring fishermen when they appeared in large quantities in 1918. It is a California sardine

that has migrated north, and scientifically it is a sardine. However the oil is imported into the United States as herring oil.

Since 1925 about twenty-five plants have been installed.

The Canadian pilchard yields more oil than the California sardine and I have seen them average 50 to 75 gallons of oil per ton of fish. In California they average only about 35 gallons per ton.

A few salmon canneries have canned the pilchard but apparently they have not made much money or else they would not have requested the government to permit their use for reduction purposes. The extent of the pilchard resources are not accurately known, but from my personal experience I think they are capable of supporting a large industry, and a steady supply will be available although the runs will be sporadic. The coast line from Barclay Sound to Quatsine Sound is rugged and the pilchard schools enter the numerous bays for food or else for shelter. As the fishermen study the runs they may also discover where the schools are when they are not in the bays and consequently the production may be increased. Its progress may be as startling as the sardine oil production of Madras, India has been. In 1915 it was very small and now large quantities of oil are produced. This is indeed remarkable since the 600



*Interior view of large sardine canning plant*

producing plants use antiquated methods.

The methods employed in the Canadian pilchard industry are similar to those used in the California sardine industry. However, during the past season some reduction plants have been installed of the same type as used in manufacturing menhaden oil. This type of plant I consider wasteful and inefficient. There is an opportunity for some individual to develop a system which will be more efficient and supplant those now in use. The plants in use now leave from 5 to 12% oil in the meal and take from 5 to 8 tons of fish to make one ton of meal, whereas an efficient plant should produce one ton of meal from four tons of fish. Since oil is worth about  $6\frac{1}{4}c$  per pound and meal worth only  $3c$  per

pound this extra 5 to 12% oil should be recovered.

The plants in use lose large quantities of nitrogenous material and albuminoids by using the wet rendering method. They use this type of plant because they are in use elsewhere and because they will not experiment with a new type. I have examined the products of these plants and found that the emulsion of oil and water contains 25% solids.

Canadian pilchard oil is produced from April to December and some operators are experimenting with new fishing methods in hopes of being able to fish the year around.

Only small quantities of the oil are consumed in Canada, over 50% is exported to the United States for use principally in soap. The balance is exported to Europe.

The Canadian oil sells for approximately the same price as Alaska herring oil. (The United States tariff is 5c per gallon.)

### Herring Oil

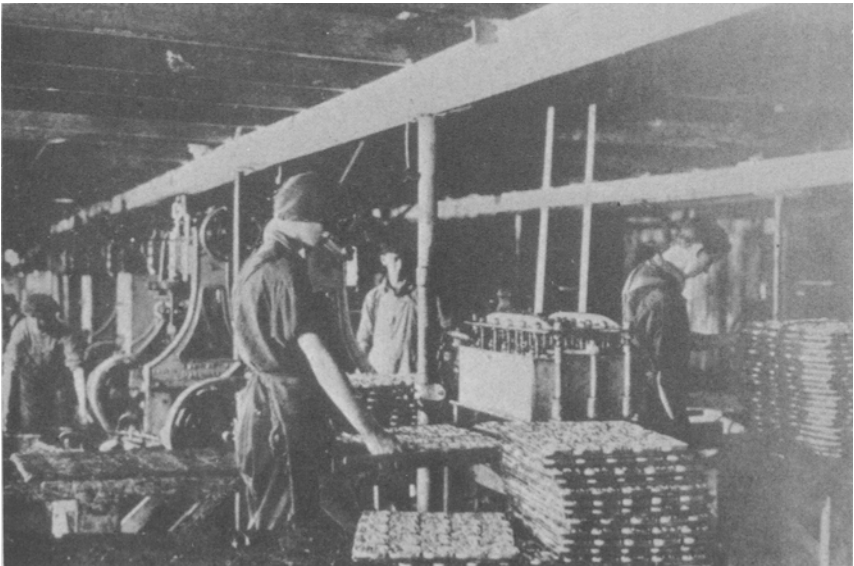
Herring oil is manufactured in Alaska and in Maine. The Maine industry is conducted as a by-product of the sardine industry and the production is only about 1,000,000 pounds a year while the Alaska production is about 20,000,000 pounds per year.

In Alaska a reduction plant is an essential adjunct to a herring saltery because it has a large amount of waste available. In central and westward Alaska the salting of the fish is the major industry since about 90% of the fish are very large. In the important southeastern district 85% of the fish are small so that the manufacture of meal and oil is the principal indus-

try and salt herring is a minor product. In 1926 about 85% of the total of Alaskan herring oil was produced in Southeast Alaska.

The herring strike in at Cape Commansy in June and continue to run until October. These are pelagic fish that live in the open ocean and enter the bays at certain times of the year. I believe that it will be hard to deplete the supply of fish permanently though it might be possible that intensive fishing would decrease the catch for a number of years.

The methods used in manufacturing herring oil are typified by the following description of a large plant. This company employs 3 purse seine boats to catch its supply of fish and operates a saltery in conjunction with the manufacture of meal and oil. Like the other reduction plants it is a complete settlement by itself. It has a suit-



*Automatic machines for filling sardine cans with oil. Thousands of barrels of cottonseed and other oils are used annually in packing sardines*



*"Kildonan," an up-to-date cannery on the west coast of Vancouver Island*

able harbor, adequate water supply, and storage and warehouse facilities.

The reduction plant is of the continuous type and like the fifty other plants in Alaska is as automatic as it is possible to make it. It has conveyors and elevators to carry the fish instead of manual labor as used in the menhaden industry. The fish are cooked, pressed and dried in equipment similar to that of the sardine industry.

With infrequent steamer service it is necessary to have large storage capacity and like all fishermen the men are optimists, for they believe in having capacity to store their largest catches, and warehouse facilities for storing large quantities of meal.

These plants in Alaska are over a thousand miles from Seattle and have steamer service about every ten days. The oil is carried to Seattle in tanks aboard the steamers. The East Water Way Dock, built during the war to handle ship-

ments of imported Oriental oils, now handles fish oil and fish from the Pacific Coast. It is one of the finest docks in the United States for handling oil and meal. From storage tanks on the docks the oil is pumped into tank cars that carry it to the consumer. Prior to shipment representative samples of the oil and meal are tested and the products are sold upon the results of these tests.

Some herring oil is shipped to the East in tank car quantities; however it is estimated that from 85 to 90% of the production is used on the coast. The meal is consumed on the Pacific Coast for feeding and fertilizing purposes and about two thousand tons are exported to Japan.

### Salmon Oil

In the important salmon canning industry on the Pacific Coast, a large portion of the waste fish is discarded in certain localities. It is dumped overboard because it has



*Forty thousand British Columbia salmon just unloaded into receiving chutes of a large cannery*

not been economically possible to utilize it. If it were manufactured into salmon oil and meal, production in Washington, British Columbia and Alaska would be quadrupled. Domestic production at the present time is only two hundred thousand gallons annually.

The salmon reduction industry is carried on as an adjunct to the salmon canneries, and in three or four places as a separate industry. At Ketchikan, Alaska, for example, a company collects the offal from the ten canneries there. At several large canneries small by-products plants have been installed to save the waste.

The wet rendering system is employed in connection with handling the waste from an individual

salmon cannery. These plants are of the continuous type but are adapted to handle salmon. The heads and backbone, left from the canning process, are crushed and thoroughly cooked. Salmon offal requires considerably more cooking than herring in order to release the oil cells. It was not until 1923 that plants of this type were used.

The central rendering plants generally use the batch system, with either wet or dry rendering. At the present time I believe there are only three plants operating, although there were five at one time on Puget Sound alone.

Salmon oil is used for tanning leather, in the manufacture of paints and soap. When properly manufactured it is considered a

high grade fish oil. Some salmon oil averages less than one per cent free fatty acid, but the free fatty acid content of the oil will vary with each plant according to the individual process used.

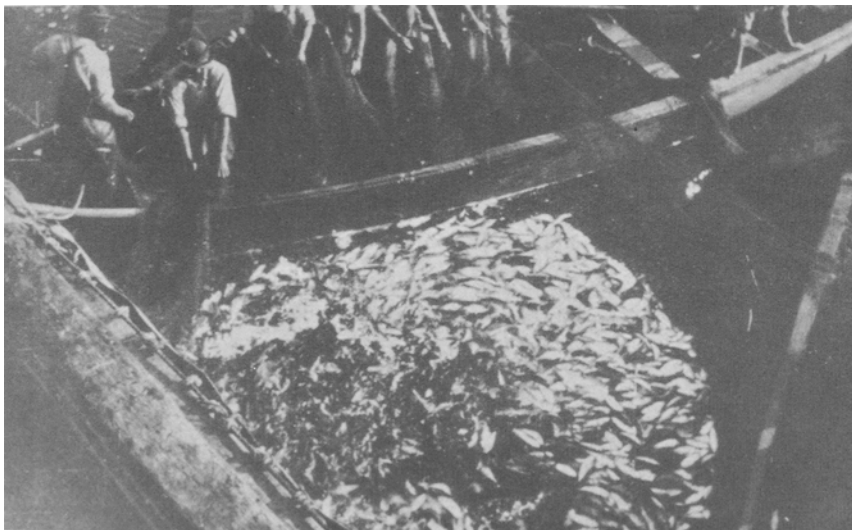
#### Solvent Process

The solvent process is relatively unimportant but has possibilities. It has been used in the past in California and in Washington but the plants have been closed due to inefficient operation. They have also had trouble with obtaining standard solvents. Some of the plants used gasoline and attribute their failure to the lack of good grades of gasoline. Their products were also very poor in comparison to the products produced by the other systems, for example, the oil was very dark and sometimes contained some of the solvent. It should have been filtered by the use of infusorial earth or some similar filter aid. If these companies had conducted research they would

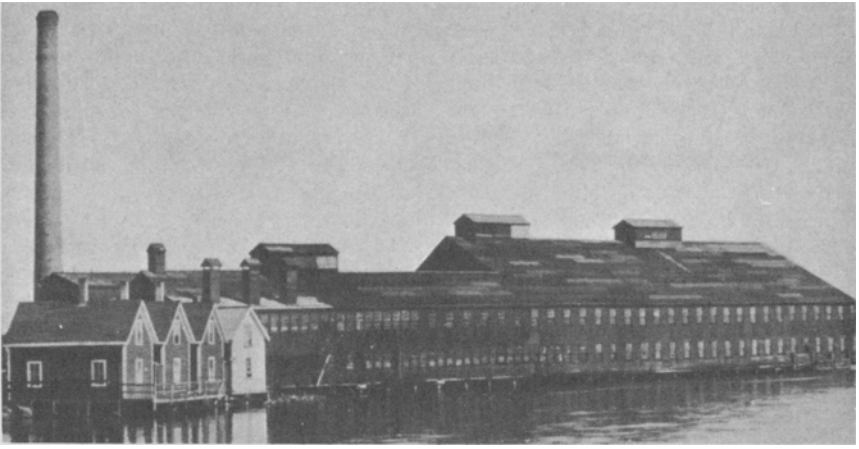
probably have been successful since this type of plant is used in several of the European countries and has proven very profitable. Its use should become more general in the future provided adequate research is conducted prior to installation of the plants.

#### Governmental Co-operation

Scientific research has been the means of bringing about a large number of improvements in fishing methods; preservation of the fish by refrigeration in the menhaden industry; rendering methods; refining methods; and hardening of the oils. The Bureau of Fisheries have a sum of \$30,000 in the deficiency bill which they hope passes Congress this winter so that it may be used for securing additional men for research. One of their greatest problems is to work out a method that will economically handle small quantities of fish waste. The Bureau is studying methods to prolong the life of the



*A good haul—lifting seine with menhaden*



*One of the largest herring canneries on the Maine coast, has packed as much as 300,000 cans of herring daily*

fishing gear by the use of new net preservatives; studying the life history of the fish so they may know more about its habits, and can maintain a permanent supply.

The individual States, in which the fishing is prosecuted, have control over their respective fisheries while the Federal government has control of Alaskan fisheries and of inter-



*Over one thousand trolling boats in Neah Bay, Washington, farthest point north in the United States*

state shipments of meal and oil. In Alaska the Bureau has limited the herring fishing season from June to October, and also has specified a closed season from Saturday evening until Monday morning. When someone develops a small machine that will handle the waste from the salmon canneries the salmon cannery will be enabled to save two million dollars' worth of salmon offal that is now dumped overboard.

The United States Tariff Commission makes two distinctly different kinds of investigations:

- (1) They make formal investigations on various subjects under the tariff act of 1922, as requested by the interested parties. These include a study of domestic and foreign situations, including production, imports, exports, uses, cost of production and the competitive situation. Under this act the President has the power to raise or lower the tariff after an investigation by the Tariff Commission.
- (2) The second function of the commission is to prepare surveys on the various articles included in the tariff act. These reports are generally printed for use by the trade and for congress. For ex-

ample, the writer is now preparing one, "Fish and Marine Animal Oils." These reports can be secured by writing the Tariff Commission.

The studies made under the act of 1922 and the regular surveys include the advantages and disadvantages of the foreign and domestic situations as well as statistical data.

### Future of the Industry

The future of the industry depends upon—

- (1)—The conservation and preservation of the supply;
- (2)—Greater efficiency in reduction plants which will decrease the cost of production;
- (3)—Better methods of producing and refining the oil;
- (4)—Increased use of the oil for edible purposes and new uses of the oil for inedible purposes;

It has only been during the last five years that the consumption of fish oils in the United States has increased substantially. At the present time it looks as though fish oils will be more prominent in the future than they have been in the past.

