Trimming blubber from whale for recovery of oil at shore station. Note extreme thickness of blubber

The Case of Whale Oil Vs Tallow

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In the earlier days of the Norwegian Antarctic whale fisheries, every factory ship was its own tank transport.

A NEW contender has entered the international arena of competition in oils and fats. "New" in the sense in which it is employed in this instance is a purely relative term for whale oil, to which I am referring has been an article of commerce for eight or nine centuries at least, but began to assume an aspect of importance and attract the attention of producers and consumers alike of oils and fats only since the close of the late war. The advances made in the past 12 years have been truly remarkable in several different ways.

Perhaps the most striking change that has occurred in this period has been the substitution of floating factories for shore stations and the small operations of rendering or trying out the blubber in open kettles on the decks of the old-time whalers. However, the latter method that I have described had been largely discarded in favor of shore stations by the time these in turn commenced to be superseded by the floating factories. (Of course, there are still a number of land units that are being conducted profitably especially in the Antarctic, Australia and the southern and southwestern coasts of Africa.) There is one such floating factory serving in the Antarctic capable of stowing 120,000 bbls. or 45 million pounds of oil or a couple of million pounds more oil than the apparent consumption in the United States in 1924, and would be about the same quantity as 120 carloads of "City Extra" or "Packers' Prime" tallow. During the 1930-31 season there were also at least eight floating factories with a capacity of 80,000 bbls. apiece and altogether 40 of these sea-going rendering plants in commission that season according to "Register of the Whaling Fleet," with facilities for carrying upward of 17,000 bbls. each. The steady expansion in whaling operations which would have made necessary a journey by the factory ships of many thousand miles to consuming markets at the peak of the season's activities brought about the conversion of a number of once-proud and palatial ocean liners into speedy auxiliaries for these floating factories. This type of vessel

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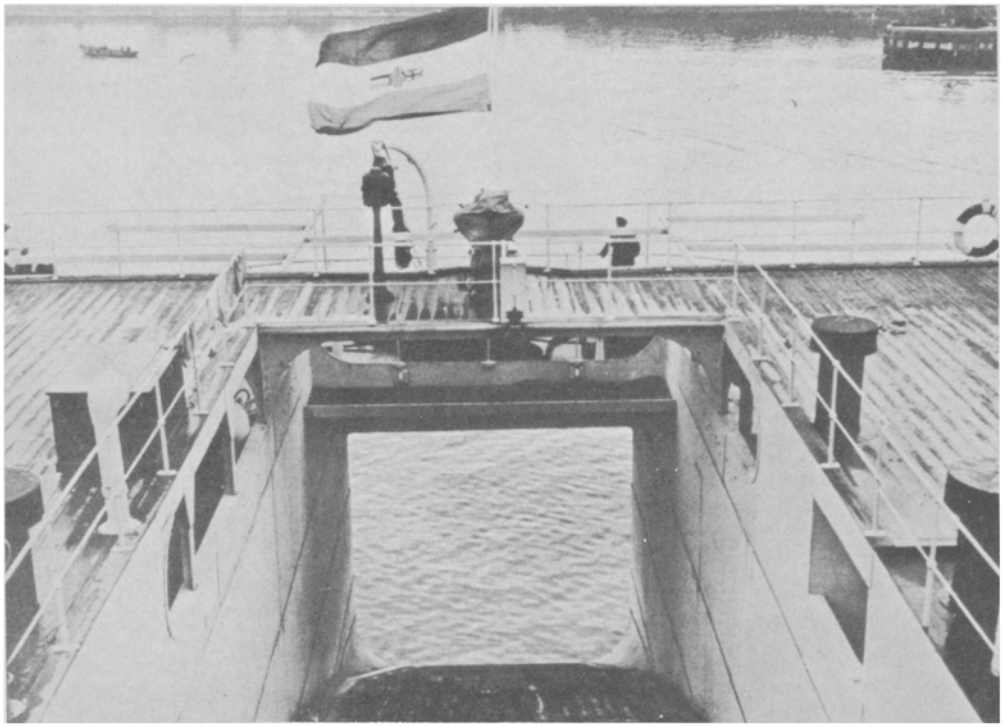
is equipped with deep tanks so that it can relieve the floating factory of its accumulated production of whale oil and thus make it possible for the latter to carry on operations until the close of the season without the necessity of leaving the whaling field. These transports as they are called have another advantage in that they permit the whaling companies to spread their deliveries of oil somewhat.

The Whaling Industry Now Centered Chiefly in Antarctic

ALTHOUGH some whaling was carried on in the South Georgia and South Shetland fields just prior to the war, the major exploitation of the Antarctic came immediately after the war. In the fall of 1923, the "C. A. Larsen," a floating factory ship, accompanied Admiral Byrd to the Ross Sea and remained to pass the season in those waters, thus opening up a new field in which the season's yield of oil rose from 17,299 bbls. in 1923-24 to 185,592 bbls. five seasons later. The area that has yielded the largest production in one season (exclusive of the past two seasons for which detailed data are not yet available) is the West Antarctic and the coast of Patagonia where the production was reported as 629,217 bbls. in the season of the 1928-29. Contrast this with the season of 1925-1926 when only 17,184 bbls. were reported. Undoubtedly this very great gain can be attributed in part to a shift of the blue and fin species of whales, which supplied most of the catch, from other waters to this particular area. Incidentally whales are migratory in their habits and besides moving from the Antarctic each summer to breeding grounds in the coastal waters of South America, Africa and Australia, also may desert one area for another if their food, i. e., minute algae, becomes scarce. This probably accounts for the presence of much greater numbers in the West Antarctic in the season of 1928-1929 (it would be well perhaps to explain that the "season" in the Antarctic usually opens the first of October, late March or early April generally winding up the activities of most of the companies. A short or summer season then ensues in the breeding areas with a much smaller complement of vessels operating. Figures whenever quoted should be understood to include both the winter season and that of the following summer).

The Antarctic Ocean taken as a whole has provided a steadily ascending percentage of the world's catch of whales, from 67 per cent of the total in the season of 1919-1920 to slightly more than 90 per cent for the past season (1930-



Whales are pulled through this slip into the "Factory Ship" and then cut up and rendered into oil
(Galloway photo)

1931). By way of comparison it might interest some of the readers of this article to know that since just preceding the Civil War in the heyday of the New Bedford whalers, we have dropped to a minor place as a whale oil producer with annual production about 10,000 bbls. most of it from whales taken in Alaskan waters.

VESSELS engaged in whaling are registered under the flags of many countries including under the flags of many countries including among others Norway, Great Britain, United States, Japan and Portugal. Norway is easily in the lead and Norwegian companies have supplied from 51 per cent to 63 per cent of the world's production during the past 12 years with an annual average of 57 per cent. The activities of the Norwegian fleet center briefly in the Antarctic as is shown by the fact that in the season of 1929-1930 only 89,000 bbls. out of a total of nearly 1,800,000 bbls. credited to Norway were produced in other fields.

At this point a few statistics are in order. The table below is based on official Norwegian government data and Bureau of the Census (U. S.) figures.

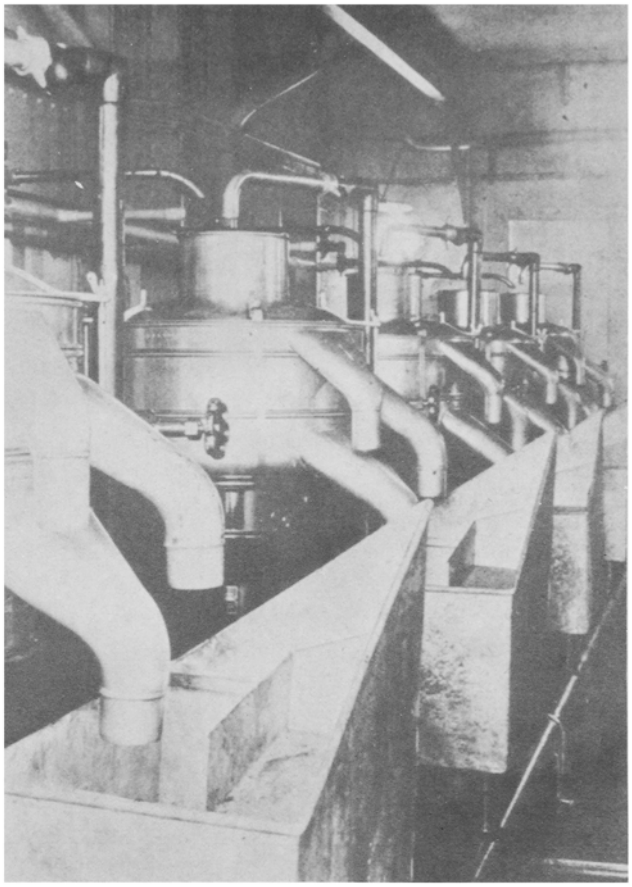
WHALE OIL

Year	World Production (In 1,000 Pounds)	U. S. Net Available for Consumption*	Per cent of World Production
1920	152,748	23,845	15.6
1924	268,592	43,419	16.2
1926	432,207	58,860	13.6
1927	442,143	60,035	13.6
1928	494,735	66,209	13.4
1929	717,318	71,022	9.9
1930	1,081,613	61,568	5.7
1931	1,494,351		

*Imports and domestic production plus (or minus) change in position of stocks during year.

World Production Expands 900 Per Cent in 12 Years

THE world production of whale oil for the season of 1930-1931 represent approximately 5 per cent of the total supplies of oils and fats in the world based on the latest available production data. Note from the table above that our estimated consumption in terms of percentage of world production apparently underwent a marked decline in 1929 and 1930 after remaining practically stationary for the years 1926-1928 inclusive. This was due of course to the greatly increased production of whale oil in the 1928-1929 and 1929-1930 seasons which was not accompanied by a correspondingly larger consumption in the United States. To prove this point, the following import figures are cited:



Whale oil separators on "factory ship"

1920	1,339,000 lbs.
1924	38,057,000 lbs.
1926	63,434,000 lbs.
1927	39,750,000 lbs.
1928	68,386,000 lbs.
1929	54,532,000 lbs.
1930	74,663,000 lbs.
1930 (9 mos.)	74,273,000 lbs.
1931 (9 mos.)	137,888,000 lbs.

Actual consumption of whale oil in the United States during the present year will be considerably above 1930 if the net amount available for consumption during the first nine months can be regarded as an accurate criterion. For the period indicated last year this was 47,601,000 pounds and for the corresponding number of months of the present year 63,023,000 pounds. There is usually a very small importation of whale oil in the final quarter of the year, therefore, it may be assumed that imports up to the end of September of this year will be virtually the total arrivals for the year. Receipts are heaviest during the months of April-June inclusive which coincide with the termination of the Antarctic season. Imports up to September 30th this year were 137,887,000 pounds (a little over 9 per cent of last season's production for

the world). This was nearly twice as much as came in for the entire year of 1930. Stocks on September 30th were 132,248,000 pounds which plainly indicates that much of this oil has not yet entered channels of consumption.

Action of Buyers a Curb to Whaling Activities

TWO years ago the leading consumers of whale oil in Europe and this country made common cause in respect to their purchase requirements. They agreed to take the production of the 1929-1930 and the 1930-1931 seasons in the Antarctic. The contract price was £25 per ton of 2240 lbs. (about .06 1/6 per lb. duty paid and landed N. Y.). Of course they predicated this commitment on the allowance made for a reasonable increase in the catch of whales. Production in the last two seasons as has already been stated was so much greater than had been anticipated that coupled with reduced requirements for oils and fats in general, consumers were forced to call a halt by announcing that they would be entirely out of the market for a year; in other words, that they could not be regarded as potential buyers of whale oil produced during 1931-1932 season. There resulted an abandonment of plans for sending out the fleets to Antarctic waters this fall and a decision by the different companies to lay up their vessels. Operations had ceased during the spring and summer in the other less important fields because of the unprofitable returns realized. However, two prominent British firms departed from the otherwise unanimous decision and have dispatched to the Antarctic several floating factories and their complements of whale catching auxiliaries on the alleged grounds that they had need of new supplies of fresh oil for edible purposes.

One company with three floating factories and one land station in operation as well expects to produce 350,000 barrels this coming season according to a recent report from the Consulate General at Oslo.

Of these surplus stocks carried over from last season 100,000 bbls. were reported moved several months ago at the price of £8 ($1.74 per 100 lbs. at normal exchange) to a combination of independent margarine churners in Germany who were thus the owners of whale oil at a price less than one-third of that paid by the "buying pool" when it made its commitments two years ago. According to a dispatch from Oslo under date of September 1st, the sale of 6,000 tons to Russia had been negotiated at a price of approximately $.03 per lb. for bulk deliveries in tank steamers and $.036 for shipment in drums. Later in the same month a sale of 10,000 tons (60,000 bbls.) was closed with a British oil company at £15 or $.03¼ per pound f. o. b., Norwegian points of shipment, the Commercial Attache at Oslo informed the Bureau in a recent letter.

The price currently quoted on November 16th for foreign whale oil was $.03½ duty paid c.i.f. N. Y. No recent sales of consequence have been reported, the market being regarded as nominal as of the date cited.

The World's Production of Oils and Fats

BASED on the latest statistical information for all countries for which the data are available 28,623,000,000 pounds of oils and fats were produced throughout the world in 1929. This figure is necessarily a rough estimate and does not include an unknown volume of fatty materials that never reach organized channels of trade. Animal oils and fats represent one-third of this production; vegetable oils approximately 61 per cent; fish oils less than one per cent and whale oil as previously mentioned about 5 per cent. In the field of animal oils and fats, tallow (including edible) accounts for 6.8 per cent which represents the combined productions of U. S., Canada, Argentina, Brazil, Uruguay, New Zealand and Australia (statistics lacking for other countries might augment the tonnage somewhat but probably would affect the percentage but little). Three-quarters of the world's tallow supplies is the product of rendering and packing plants in the United States. For the United States alone the total of white, yellow and brown greases produced approaches 2 per cent of the world total for animal oils and fats production.

We can visualize from the foregoing the vast dimensions of the world's oils and fats. And thus we come logically to the next question: how much of this huge quantity of oils and fats furnishes the fatty ingredients for the American soap industry?

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Substantial Proportion of Oils and Fats Enters Soap Kettle

Through a canvass of consumption in seven major and a group of miscellaneous industries for 1929 the Bureau of the Census determined total consumption of slightly less than 4¼ billion pounds exclusive of butter. Therefore, if we deduct the quantity of butter estimated to have been churned in the world that year—6,392,000,000 pounds—we find that the United States provided consumptive outlets for approximately 19 per cent of the available supplies of oils and fats entering international trade. A little more than three-eights of this latter quantity, or to be exact, 38½ per cent was diverted to the soap kettle; hence, the soap industry of this country was the consumer of 7¼ per cent of the commercial output of the world in animal (except butter), vegetable and fish oils in 1929.

The following table depicts the relative status of the principal fatty materials entering into the manufacture of soap in the United States. Numerous other oils and fats make up the remaining 7 per cent of the supplies.

(In 1,000 pounds)

		Per cent of Total
Total consumption	1,618,953	
Tallow (inedible)	451,835	27.9
Coconut and palm kernel oils	438,446	27
Palm oil	178,851	11
Cottonseed oil	167,033	10.3
Greases (animal)	154,288	9.5
Whale oil	71,022	4.4
Fish oils	59,612	3.7
	1,521,087	93.8

A very small amount of edible tallow may have been included with the inedible in the above tabulation. Palm kernel oil included with the coconut oil comprised but 10 per cent of the total weights for these oils. The cottonseed oil is "foots" from refining operations. The greases are white and yellow hog and brown greases as only trifling quantities of other types enter into soap products. The fish oils comprise menhaden, herring and sardine of domestic origin with some sardine and pilchard oil imported.

Once more referring to the Census Bureau's report on "Factory Consumption of Oils and Fats" for 1929 we learn by the process of a little arithmetic that the requirements of our soap industry in that year were served by the diversion to such consumption of the major oils and in the percentages below:

	Per cent.
Tallow, inedible	88
Greases (animal)	68
Palm oil	90
Coconut and palm kernel oils	60
Cottonseed oil (foots)	12
Fish oils	51
Whale oil	100

Animal Fats Lead Other Fatty Materials in Soap Manufacture

Between the years 1924 and 1930 inedible tallow production in the United States increased 15 per cent and reached its highest volume in 1930. Greases on the other hand, suffered a decline of about 8 per cent so that while of these animal fats, 1930, for instance, white, yellow and brown greases represented but 30 per cent of the total animal fats (in 1924, 35 per cent), the net result was that in 1930, these greases and inedible tallows supplied but 32 per cent (in 1929 exactly the same percentage) of the fat needs of American soapers as compared with 43½ per cent in 1924 and 42 per cent in 1920. The total quantity of oils and fats (vegetable, animal and fish) available for soap consumption increased more than 44 per cent during this six year period but animal fats recorded but 7 per cent gain. Tallow exports

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Tariff Commission Announces Hearing on Gelatin

The Tariff Commission on the 8th day of January, 1932, announces that the public hearing heretofore set in the investigation of gelatin, glue, glue size, and fish glue, not specially provided for, and casein glue, for May 28, 1931, and postponed, at the request of parties interested, to a date to be announced, is now set to be held on February 15, 1932.

Public notice of this hearing has been given by posting a copy thereof for thirty days prior to said 15th day of February, 1932, at the office of the Commission in the city of Washington, D. C., and at the office of the Commission at the Port of New York, and by publication prior to said date in "Treasury Decisions," published by the Treasury Department, and in "Commerce Reports," published by the Department of Commerce.

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were a factor favoring increased availability as they shrank from 33 million pounds in 1924 to slightly in excess of 5½ million pounds in 1930. (Such exports though were in all probability edible tallow since for the past several years inedible tallow exports have been placed in a miscellaneous classification and not separately identified.) Greases likewise bolstered the net availability of supplies through a drop of 16 million pounds in this span of years. Imports of tallow have dropped sharply in the last few years from about 2½ million pounds in 1924 and an average for the years 1926 to 1929 inclusive of between ten million pounds and 14½ million pounds to a negligible amount in 1930. Thus smaller imports have tended to offset reduced exports of tallow.

Whale oil imports all of which have been destined for the soap kettle have remained practically constant in the relationship they have borne to total available supplies of oils and fats. Whale oil has comprised 5 per cent of the entire quantity of fats employed in soap each year since 1924 except in 1930 when 4½ per cent was so consumed.

Let us consider the status of vegetable oils. Palm oil has aided in supplementing tallow in making good the deficiency in soap fats. Consumption of this oil in 1930 was 2½ times in excess of 1924 thus reflecting an advance in its percentage from 9 per cent to 16 per cent of total available soap oils and fats. Although the use of coconut and palm kernel oils in soaps had increased 70 per cent in 1930 over 1924 and was more than double the quantity for 1920, approximately 4 per cent less oil from these sources entered into soaps in 1930 as compared with 1924. The percentage dropped from 30 per cent in 1920 to 26 per cent in 1924 and then advanced to 31 per cent in 1929 falling 1 per cent in 1930. (See following table.)

Cottonseed oil maintained a stationary percentage of 14 per cent for 1928 to 1930 inclusive which was 2 per cent less than either 1927 or 1926 but 1 per cent greater than 1920. Quantities of cottonseed oil available for consumption have suffered but slight variation since 1926. Fish oils have constituted 3 per cent or 4 per cent each year of the total oils available except in 1928 when 5 per cent was reported.

The data below illustrate the foregoing remarks and the details of the figures discussed.

(*Continued in February Issue*)

Vegetable Oil Industry in the State of Jalisco, Mexico

THE value of the oil production of the State is estimated at 4,000,000 pesos annually, though last year a small decrease was noted, due to the failure to secure supplies. This was on account of the condition within the State itself.

This production comes from two factories located in Guadalajara, and one in Ciudad Guzman. Their combined productions are estimated at 5,500,000 kilos of oil, with 4,000,000 kilos of this being cocoanut oil. The crops of "coquito de aceite" have been considerably increased,

LARD HYDROGENATION AND THE BOMER TEST

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less completely hydrogenated lard could be detected by this method.

Another series of analyses was then made on samples taken during the progressive hydrogenation of a prime steam lard in laboratory equipment.

EXPERIMENT No. 5

	Iodine value	Bomer No.
(a) Original lard.....	64.9	72.8
(b) Sample 1.....	63.2	72.5
(c) Sample 2.....	52.3	69.6
(d) Sample 3.....	47.9	69.3

This experiment indicated that the Bomer number decreased as hydrogenation progressed, and that the Bomer number went below 71.0 at a reduction of iodine value of between 2 and 12 points. The exact point where this occurs probably depends upon the type of reduction that occurs during hydrogenation.

From the information obtained from these experiments it appears that results by the Bomer method lower than 71.0 cannot be taken as a sure indication of the presence of beef fat in lard or hog grease, since lard stearine made by hydrogenating lard lowers the Bomer number below that point.