and 21 samples of olive oil foots, as follows:

OLIVE OIL:	Minimum	Maximum	Average	Suggested Limits
Iodine No. (W)	80.3	88.7	84.4	80 to 89
Crismer value	68.2	70.6	69.3	68 to 71
Sap. value	...	...	...	189 to 195
Titer	...	...	...	17 to 25
Unsaponifiable	...	...	...	Maximum 1.5%
Free fatty acids	1.1%	5.7%	4.2%	Maximum 5%*
Moisture	0.04%	0.94%	0.21%	Maximum 1%*

*These values would apply to the commercial and not edible grades. Halphen, Coin, Silver Benzoate and Beilstein tests to be negative.

OLIVE OIL FOOTS:	Minimum	Maximum	Average	Suggested Limits
Sap. value	186.0	192.8	190.1	186 to 193
Iodine value	77.1	83.2	79.8	77 to 86
Titer	17	24.4	21.3	17 to 24
Free fatty acids	33.7%	62.6%	52.4%	.....
Moisture	1.00%	2.40%	1.82%	Maximum 2.00%
Unsaponifiable	1.32%	2.18%	1.87%	Maximum 2.00%
Total M. I. U.	2.86%	4.48%	3.73%	.....

R. C. Stillman agrees with Dr. Jamieson that a satisfactory way to arrive at values for oils from Algeria, Tunis, Morocco and Dalmatia would be to determine the characteristics on samples obtained for this purpose. He also feels as Mr. Sheely indicates, that limits for free fatty acidity and for moisture should be included in our classification. The following figures are submitted by him for consideration as typical olive oil foots, having approved in general the basic values for olive oil that were presented him for comment.

From the preceding data, Mr. Stillman concludes that while the values I submitted agree fairly well with what he has found, perhaps my limits on iodine and titer values are somewhat too narrow.

Summing up, it would seem that we are not far from substantial agreement. A good start has been made. We hope to take up the study of oils from other localities than Italy and Spain just as soon as the chairman can obtain the necessary samples. Meantime he is in receipt of some comment from the trade which, together with additional data from the committee, will appear in a subsequent report. We repeat our invitation to the olive oil trade to favor us with comment and criticism, in order that we may submit a draft of tentative values for adoption at the fall meeting.

OLIVE OIL FOOTS.

	Max.	Min.	Avg.	Mean Deviation	Limits*
	32 samples				
Saponification No.	199.0	189.5	194.5	1.6	189 to 200
Iodine value	88.3	84.8	83.3	3.2	73 to 93
Titer	25.0	17.7	21.5	1.4	17 to 26
	33 samples				
Saponification value	199.7	187.5	193.3	1.6	188 to 199
Iodine value	89.8	76.8	82.7	2.3	75 to 90
Titer	23.0	17.5	20.5	1.1	17 to 24

*Based on a limiting value equal to Avg. ± 3 times the mean deviation.

13 samples

Saponification value .....avg. 194.2
Iodine value .....avg. 85.0
Titer .....avg. 20.4

OILS AND FATS

By O. E. JONES

ADDRESS GIVEN AT ANNUAL CONVENTION OF THE NATIONAL COTTONSEED PRODUCTS ASSOCIATION, MEMPHIS, TENN., MAY 27, 1935

THE program committee requested me to take part in this program, and further asked that I handle the subject of oils and fats. Before attempting to picture the world situation, and, possibly, the price trend in oils and fats, we must first consider the political and commercial tendencies represented nationally and internationally. This is necessary because we are attempting to point out that trade obstacles are on the increase, and that the normal flow of goods has been intercepted by hitherto unheard of governmental, political, and commercial relations dealing with devaluation of currency, restriction of production and rather wild schemes to promote an immediate return to more normal times. In times of stress nations try to build a wall around themselves and think first of treating their own ills. Generally speaking, there has been a distinct turn towards nationalism in every respect, nearly all countries encouraging supply and requirements of their own production, restricting importation. Clearly this is a short-sighted nationalistic policy, because a reduction in world production does not make for normal trade movement and the necessary expansion of international commerce, nor for the full employment of men and resources.

National trade encouragement is too artificial. Subsidies are granted, import quotas imposed, and production restricted, destroying the very traditions made up of conclusions of generations of men who successfully operated industries and trade.

Government aid may be necessary at times, but it should even then conform to basic economic laws and trade customs, yet in the large majority of cases legislation along protective lines has been definitely opposed to well-established practice.

It seems to me there are two courses to follow; either nations can produce all of their requirements, utilizing bonuses, quotas, and restrictions, which will result in higher living costs, and a reduction in competitive power and exports. This policy has never kept people employed and has not cut down administrative costs permanently, because the system itself cannot last under the present methods of production and distribution. The other course is to demand reduction in trade barriers to make for reasonable international commerce. This would mean we would still have duties, each country collecting revenues according to its trade and needs.

Unemployment has grown to be a major world problem. Many and varied solutions are offered, each nation seeking its own panacea ranging from:

1. Government loans.

2. Reduction of production to increase wealth, rather than learning how to move goods intelligently where they are required.

3. Arbitrary price increases through an attempt to bring back prosperity in reverse fashion. To explain further: In good times rising purchasing power causes higher prices, but artificially raised prices will not cause increased purchasing power. Arbitrary price raises attempt to produce the effect, feeling the cause will follow.

Logical methods for elimination of *world* unemployment would seem to be the removal of the artificial restrictions which stand in the way of trade and individual initiative. If these restrictions were removed the following would result:

A. Further development of land, which has always worked out successfully in the past.

B. Emigration.

C. Greater stimulation of individual effort.

D. Strict adherence to basic economic principles in attempting to arrive at any solution.

Having considered, then, the various trade obstacles, we can pass on to a consideration of the general picture on oils and fats at the beginning of 1934.

We find tremendous carry-over stocks which show that the early part of that year made low prices on all oils and fats; prices barely giving charges for handling, preparation for shipment, freight, and insurance.

In April, 1934, the average price of oils and fats was 40 per cent below pre-war level, while the average price of all commodities was only 10 per cent below pre-war level. The general market improvement at the close of 1934 was due principally to natural causes.

There were three reasons for the sharp advances of oils and fats towards the close of 1934:

1. General crop shortages brought on by the mid-summer drought, which was *world-wide,* causing grain prices to rise, oilseeds to follow.
2. *World monetary situation.*
3. United States legislation:
   A. Gold and silver policy.
   B. Excise tax on foreign oils.
   C. Agricultural Adjustment program as pertaining to cattle and hogs.
   D. Cotton Crop Control program.

We have considered thus far the political and commercial tendencies as exhibited throughout the world, paying particular attention to those manifestations in the United States. We will pass on and consider conditions in other countries relative to stocks of oils and fats on hand at the end of 1933, production and consumption for 1934, subsequent stocks on hand at the end of 1934, and, further, the estimated production and consumption for the year 1935.

In addition to the drought affecting crops in the United States, we find it extended practically worldwide. The Far East and India were particularly hard hit, the following crops being shortened: Soya beans from Manchukuo, which is the principal area for this crop, sesame seed from both India and China, palm kernels, hempseed, cottonseed, sunflower seed, copra, and castor seed. It will be noted that the *world peanut* crop was abnormally large in 1934, even though it had to withstand severe climatic conditions, the effect of which will be felt in 1935, since it is predicted that a sizeable decrease in production will occur.

In the Far East heavy floods interfered with the shipment of products to the market. In India the drought struck quite hard, as well as in West Africa. In the Philippine Islands, Ceylon, and Straits sections unusual torrential rains and typhoons occurred. Temporarily, then, nature has solved the problem of oils and fats.

The price of oil cake is an acknowledged contributing factor to the price of finished oils. The drought again has solved the problem of low prices on oilseed cake, for production of such cereals as wheat, corn, barley, oats, and the like has been seriously decreased. Corn suffered the greatest loss in the United States, which emphasizes the point that the United States would experience a sizeable decrease on lard and beef fat.

The year 1934 brought about a higher level of value for all fats, which will adjust demand to supply.

The principal sources of edible oils and fats are as follows:

Butter
Peanuts
Cottonseed
Copra (Cocoanut Oil)
Olive Oil
Soybeans
Lard
Whale Oil
Sunflower Seed Oil
Palm Oil
Beef Fat
Rapeseed
Sesame Seed
Fish Oil
All others.

PEANUT OIL

India

India is the largest producer and exporter of peanuts, which are called Ground Nuts in Europe. China and West Africa are also large producers. There was an abundant crop of peanuts in both India and West Africa in 1934. It is estimated, however, that 1935 will show a 25 per cent to 30 per cent all around crop reduction. The reason for this decrease is due to a reduced acreage enforced by nature, since unusual heavy torrential rains, typhoons, and the like have caused washouts of many of the usual acreage areas. It is estimated that India produces an average of 2,500,000 tons of peanuts a year, of which 800,000 tons are exported. Practically no oil is exported from India, but the nuts find their way into Italy, France, Germany, Great Britain, Belgium, Holland, and Denmark, who in turn export large quantities of the oil.

It is estimated that there will be a sizeable decrease in the world peanut production for the year 1935.

Cocoanut Oil and Copra

The Philippine copra crop was damaged by typhoon and drought during 1934, which will mean decreased production for 1935. However, the 1933 carry-over was quite large and in the early part of 1934 Philippine copra was offered to Europe on a forced sale basis, which, naturally, made prices hit new lows. This continued until September, when a prospective oil and fat shortage in the United States caused them to enter the market for copra and cocoanut oil, causing a general strengthening which continued throughout the rest of 1934 and into 1935 thus far. In Java the low price of copra caused by forced sale methods used in the Philippines induced the natives to produce just sufficient for their own consumption. It is important to note that the coming year should show as well a very noticeable strengthening in consumption of cocoanut oils throughout the East, principally India, where the soya

bean crop shortage will cause them to decrease exports. This same applies to China. Ceylon Mill cocoanut oil, which is the criterion, experienced in the last five years a 70% decrease in market price. Towards the end of 1934, strengthening of the market caused crushers to buy more copra. We estimate that the copra and cocoanut oil production will remain steady; consumption tending to increase, and the price will be influenced by competing fats in the world market.

PALM AND PALM KERNEL OIL

Palm kernels saw a 60 per cent price decline during the past seven years. During early 1934 prices stayed very low, due to large carry-over, so that the natives failed to bring down a normal supply of kernels to the crushers. The United Kingdom and Germany are the largest crushers of palm kernels. Since Germany put a ban on certain oilseeds for crushing, and palm kernels was one of them, it would seem that their withdrawal from the market would further depress it. However, the United States oil and fat shortage caused the market to hold up since the United States had to buy large amounts of oil.

Nothing spectacular in price movement occurred to palm kernel oil during 1934, since the competitive situation on cocoanut oil caused most of the palm kernel oil to be consumed at home. The outlook for 1935 would seem to indicate steady prices with a slight up trend.

WHALE OIL

The whale oil production has grown from 1918—342,000 bbls. to 1934—2,478,000 barrels. The general shortage in oils during 1934 saw increased demand for whale and fish oils to an extent where it brought about a sizeable reduction in the carry-over. The catch agreed upon for 1935 is again 2,500,000 barrels, and with the continued shortage of many oils and oil seeds, the price of whale oil should remain steady to the strong side.

SOYBEAN OIL

Practically all the soybeans in the Orient are raised in Manchuria and production of soybeans ranks in tonnage the second largest of any oil bearing material, running up to 4,300,000 tons with about 1,400,000 scattered over the rest of the world with about 500,000 tons in the United States and Japan each. Exports from China have been for the years 1932, 1933, and 1934, respectively, 94,000 tons, 62,000 tons and 80,000 tons of oil and for Japan approximately 35,000 tons each year. Exports of beans have run into tremendous tonnages with Germany taking an average of a million tons per year and the United Kingdom about 175,000 tons and Denmark about 250,000 tons.

During 1934 due to general flood conditions throughout the east, particularly Manchuria, the soybean crop was about 1,000,000 tons below average. It is fair to assume that in 1935 with average weather and growing conditions the crop will be normal. Considering along with that the general shortage in oils and fats, the trend in value of soybean oil should be steady to the up side.

SUNFLOWER SEED OIL

Accurate figures on Sunflower Seed Oil production are not available; however, Russia is the most important producer. The production of seed is estimated at about 2,500,000 tons per year. Most of this seed is sold on the street like peanuts in the United States, and only a comparatively small amount finds its way into export either in the form of oil or as seed.

OLIVE OIL

The production of olive oil is fairly stable with Spain being the leading producer and averaging 350,000 tons of oil per year. Italy follows next with 160,000 tons per annum, Greece with about 100,000 tons, France with a similar amount when her African possessions are included such as Tunis, and other countries including Portugal averaging around 70,000 tons.

In Spain and Italy the green olives are harvested during October and November and these are used for pickling. The ripe olives are harvested from December to April and the best quality olive oils are available for export during February, March forward. Again we find the active selling season from October to March, but olive oil is available all the year around and is actively traded in throughout the year.

The above figures might indicate that this tremendous tonnage of oil would have quite an effect on world markets, but due to the high price and special efforts made in Spain and Italy to curtail imports of fats and oils, practically all but a very small percentage will be required for domestic use.

KAPOC OIL

This oil is similar to cottonseed oil. The Kapoc seed grows on trees of twelve different species, mostly in Java, some in Africa, and the Kapoc is harvested from the month of September on through March, during which time the oil is available for shipment from new season's crop. No cultivation is practiced except for about 10 per cent of the trees, which incidentally bear for fifty years or longer. Accurate production figures are not available, however, we estimate the amount of oil to be sold on the world market as being small, and probably limited to 6,000 to 10,000 tons.

SESAME OIL

Sesame oil, like most Northern Hemisphere crops, is planted in the spring and harvested in the late summer and early fall, depending upon the latitude. Approximately 500,000 tons of seed are grown annually in India and about 80,000 tons in the Yangste River Valley in China and Manchuria. New seed crop is usually offered during July and August, with offerings diminishing through February, March, and after that just occasional lots coming out for late spring and early summer shipment. Practically all of the sesame seed grown in India is consumed in that country, and in no year during the last four has international trading amounted to over 25,000 tons of oil. The United States has been and is the largest importer of seed, except Japan, accounting for 10,000 tons. in 1934, 20,000 tons in 1933, and 9,000 tons in 1932. However, 1935 will find the United States with at least 60,000 tons among its imports.

The outlook for 1935 is one of reduced acreage for India and a normal crop for China.

LINSEED OIL

Inasmuch as linseed oil is used for edible purposes in some foreign countries, it should not be overlooked in the fat and oil position. It is grown principally in the Argentine, Russia, India, United States, and Canada. It is estimated that the production will remain steady to some increase in the new crop.

The production of oil from the remaining oil producing seeds, as well as corn, plays only a small part in the world oils and fats picture.

BUTTER

World production of butter during 1934 was slightly under 1933,

and no estimates are available for 1935 production, but it seems reasonably safe to believe that the 1935 production will be very close to the 1934 production.

BEEF FAT

The chief beef fat producing countries of the world are South America, United States and Australia; the largest production of edible beef fat being in Argentina and Brazil. Likewise these two countries are the largest exporters of beef fat.

Estimates place yearly production of edible beef fat in Argentina and Brazil at 275,000,000 pounds, or 688,000 barrels. In 1933 the United States produced 1,500,000 barrels of inedible beef fat and 200,000 barrels of edible, all of the edible being consumed in this country.

Production figures for Australia are not available. However, their exports of beef fat amount to approximately 300,000 barrels per year.

Estimated yearly world production of edible and inedible beef fat is 1,068,000,000 pounds, equivalent to 2,670,000 barrels. Of this amount it is estimated 650,000 to 700,000 barrels was edible product. The coming year should be one of somewhat increased production of beef fat.

MARGARINE

The United States Department of Agriculture report for the first quarter of 1935 shows an increase of 74 per cent over the first quarter of 1934. This is equivalent to 108,474,000 pounds. Assuming that the balance of the year production equaled the first quarter would mean a yearly production of 443,884,000 pounds. A Bureau of Census report shows that cottonseed oil constituted 25 per cent of the ingredients for the year 1934 versus 1935. On this basis the Margarine Industry will use during the calendar year of 1935, 108,435,000 pounds of cottonseed oil, and permit me to take this opportunity to remind you that the cottonseed milling industry and this association were the prime movers back of having cottonseed oil introduced into the oleo margarine field, and the cottonseed milling industry owes a vote of thanks to those individuals who labored long and hard for this program.

PURE LARD

United States produced pure lard probably has a greater influence on cottonseed oil values than other oils and fats.

The available supply of Federally Inspected Pure Lard in the United States as of April 1, 1935, was	87,500,000 lbs.
It is estimated the production of Federally Inspected Pure Lard from April 1, to November 1, 1935, will be	300,000,000 lbs.
Making a total *supply* of	387,500,000 lbs.
Domestic consumption of Pure Lard from April 1, 1934, to November 1, 1934	535,000,000 lbs.
Export shipments for same period	267,000,000 lbs.
Total *consumption*	802,000,000 lbs.

Again we must consider the world position on pure lard in order to get a proper estimate of the influence of the United States position on the general fat and oil situation. The high price of pure lard combined with excessive quotas, tariffs, and exchange restrictions has had an adverse effect on all exports of pure lard. Unless something is done to bring about a change in conditions, we may some day find ourselves in the position where practically all of the United States produced pure lard will necessarily be consumed at home.

In reviewing figures covering the total exports of pure lard from the United States, we note that during the year 1934 we exported less pure lard than in any year since 1917. In 1917 we exported 40¼ per cent of our production of federally inspected lard, while in 1934 we exported only 32⅓ per cent. On account of decreased hog production, it has been estimated that the total production of lard for 1935 will be about 47 per cent less than last year; so the loss of our export business is not so serious for the moment, but we should be greatly concerned as to what the effect will be when we get back to a normal production.

The average yearly imports of lard into Germany from the United States for the years 1909 to 1913 amounted to 192,184,000 lbs. or 20⅝ per cent of our production, while for the year 1934 the imports from this country dropped to 49,124,975 lbs., or a little over 31½ per cent of our production. Since July of last year, imports of lard into Germany have been prohibited except under special permission, with the results that for the period July 1, 1934, to March 31 of this year, a little more than 6,000,000 lbs. of North American lard has been imported and largely on barter transactions.

The less important continental lard-consuming countries have also been affected by these restrictions.

Importations of lard into France in 1923 totaled almost 39,000,000, while in 1934 they imported only 381,000 pounds.

The same situation exists more or less in other Continental countries, and our total exports this year will fall far below previous years and probably 40 per cent less than last year.

England, which is now our most important market, imported last year from all sources a total of 314,460,000 lbs. Of this quantity 291,000,000 lbs., or over 92 per cent, was from the United States. Owing to the high cost of American lard, the imports into England from other countries have greatly increased, and they are now taking important quantities from Brazil and the Danube Basin. While this lard does not compare in quality to American lard, it is being offered at such a big discount under the American product that the consumption is gradually increasing.

Mexico is another important market which has been lost to American lard. The high cost, together with heavy import duties, has driven the trade to mixed lards and compounds. In 1930 the exports to Mexico from the United States amounted to 74,300,000 lbs. of lard, and in 1934 around 37,000,000 lbs., while at the present time there is practically no lard going into Mexico from this country.

As another illustration of the effect of high tariffs on exports, Colombia in 1929 imported from this country 22,500,000 lbs. of lard. In 1930 the duties were advanced from $2.27 per 100 lbs. to $6.80 per 100 lbs., and imports fell to 15,250,000 lbs. in 1930 and 9,750,000 lbs. in 1931. Again the duties were advanced to $13.60 per 100 lbs., and the imports decreased to 869,000 lbs. in 1932, and 178,000 lbs. in 1933, and less than 100,000 lbs. in 1934.

High import duties and exchange difficulties have also had an effect on the smaller markets in the West Indies, Central and South America.

The reciprocal trade agreement concluded last year with Cuba is showing results, and for the six months period since the duty was reduced, the imports totaled over 20,000,000 lbs., or twice the quan-

tity imported during the entire year of 1933.

Reciprocal trade agreements should regain important outlets for United States produced Pure Lard.

Estimated export shipments for this period are 107,000,000 pounds, This represents a 60 per cent increase. With an available supply of 387,000,000 pounds, less 107,000,000 pounds, leaves 280,000,000 pounds for local consumption. This represents approximately 50 per cent of the consumption of Federally Inspected Lard during the same period of 1934. Values will adjust Demand to Supply.

COTTONSEED AND COTTONSEED OIL

We shall first consider the cottonseed and cottonseed oil situation as relative to the United States. Beginning in 1890, the United States produced about three-quarters of the entire world crop. However, foreign production has gained somewhat on the United States, due to the invasion of the boll weevil, low acreage yields, and low prices. No longer does the United States maintain such an edge in production, since the foreign crop will now run about two-fifths of the total. Beginning as far back as 1929, the Federal Farm Board made quite a few attempts at production control of cotton and 1929 to 1932 saw naturally low prices, which caused a normal reduction in acreage in 1933. In 1934 the acreage was further cut by about 40 per cent, so that although abnormally high yields have been prevalent from the United States acreage, the United States, for the first time in history, produced less cotton than the foreign countries, including China. The forecast for 1935 puts the United States production at about 11,000,000 bales, and all other foreign production at 13,000,000 bales, leaving the United States far below its normal production, which has averaged very close to 60 per cent of the total world crop.

In January, 1934, the Bankhead Bill was passed, curtailing cotton acreage by 40 per cent, as mentioned above. This bill would have probably worked out in fine fashion if the shortage had not occurred in lard and beef fat. The Bill provided for limiting the production of 1934 to 10,000,000 bales; actually 9,731,000 bales were produced, as against 13,647,000 in 1933. Cottonseed produced in 1934 was 3,860,714 tons, as against 5,230,357 tons in 1933. Refined cotton oil production in 1934 was 2,981,449 barrels, as against 3,446,805 barrels in 1933.

It might be noted here that it is estimated that a domestic 13,000,000 bale crop is necessary to take care of domestic oil requirements.

An eleven million bale crop for 1935 should mean 2,750,000 barrels of oil.

The United States should retain its position as the largest producer of cottonseed (consequently cottonseed oil) in the world. Passing on from consideration of the position in the United States, we shall view the trends as exhibited in the other main producing countries; namely, India, Egypt, Brazil, China and Russia.

India

The growing season in India varies on cotton with locality and weather conditions. The seed is usually sown with the heavy rainfall and takes four and one-half months to mature. In many cases cotton is grown as a perennial and small cover crops planted between the rows, which make for a very low yield of lint and seed. Nevertheless, there has been about 2,000,000 tons of cottonseed available each year from estimated crops of 4,500,000 bales of cotton. Practically none of this seed finds its way into world markets, and in the last two years only 6,500 tons of seed have been exported. Shortages in peanuts, sesame, and rapeseed oil probably prevent any large exports this year.

The depreciated American dollar no longer allows India the export premiums they once enjoyed.

Egypt

During the last three years Egypt has produced 350,000, 725,000 and 700,000 tons of cottonseed.

The bulk of Egyptian cottonseed is shipped to the United Kingdom, small quantities are shipped to the Continent and about 150,000 to 200,000 tons of the crop is crushed in Egypt. This means that shipments of Egyptian cotton oil may originate from Alexandria or the British Isles, and after taking into consideration the necessary estimated requirements in Egypt, there will be about 225,000 tons available for export until August of this year, which finds the new crop moving in.

Brazil

Brazil has been rapidly forging to the front as a large cotton-growing country. In the northern part much tree cotton, somewhat similar to Kapok, has been mixed with the bush cotton. In the south, however, the cotton is quite similar to that of the United States, and steps have been taken to accept Brazilian cotton in Liverpool on United States contracts as a substitute for our southern cotton. The oil is, of course, like our own.

An interesting feature of cotton growing in Brazil was that until recently many growers accepted the plant as a perennial and only cultivated the crop each year. Now, we understand, they are planting annually and getting better yields. The trend is definitely on the increase in Brazil.

Other South American countries producing cotton, and consequently seed and oil, are:

Colombia	Chile
The Guianas	Argentina
Venezuela	Uruguay
Peru	China

It is estimated by good authorities that from two million to four million bales of cotton are grown annually in China, most of which is used within the country by the large native population. Records show that China has exported about 50,000 tons of seed per year the last few years, mostly to Japan, while this year several thousand tons of cottonseed oil were shipped directly from China to the United States.

Russia

Russian cottonseed oil has not played much part in the world commerce this year and its production, much like China, is a matter of conjecture.

Summing up the trend of cottonseed oil for the coming months, with a sizeable reduction in the United States, and other countries increasing their production, we probably will experience about the same *world* production in 1935 as we did in 1934.

Before finishing, a logical question is:

Can the United States isolate herself from the world fat market?

My answer is:

No. Illustrated as follows:

Recently Germany completed negotiations with Norway to take the bulk of their old and new whale oil crop.

What does Germany do with whale oil? They make edible spreads and cooking fats.

What fats does whale oil replace in edible spreads and cooking fats?

It replaces American Lard and Vegetable Oils.

What happens to American Lard? It is forced on the American market at a price level that will put it into consumption.

Does the American fat consumption increase and absorb this additional lard? No. This additional consumption replaces lard substitutes or shortenings, which are made principally from cottonseed oil.

What will happen to cottonseed oil? It will go to the soap kettle, unless those interested in the fat and oil industry of America develop new outlets; the most promising one at the present time being the Margarine Industry. If it is forced to the soap kettle, it means a lower value for the southern farmer, and will replace imported oils; such as cocoanut, palm, and palm kernel.

What will happen to these imported oils? They will be forced upon the world market to compete with whale oil and other vegetable oils that enter the edible channels as described at the beginning. There you have the completed circle.

From the information presented, the balance of 1935 should be one of restricted to somewhat decreased production of edible fats and oils. When one or two complete new crops have been harvested, an entirely different situation may exist.

In conclusion—the factors influencing the world oil and fat situation in their order of importance are as follows:

1. The consumers' ability to buy.
2. Supply of raw materials.
3. Tariffs and quotas.
4. Nationalistic policies.

THE DETERMINATION OF SOAP IN REFINED OILS*

By RICHARD DURST
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VARIOUS laboratories have developed methods of soap determination in the refined oils coming under their inspection. However, there is no standard method of conducting the test, and, like any other non-standard operation it wouldn't be surprising to find that the results of analysis obtained by the different analysts would not agree very closely.

The quantitative test for small percentages of soap which is being presented in this paper appeals to me as being more reliable than some of the other methods. It has its apparent weaknesses and there are one or two points that have been called to my attention wherein inaccuracies might be introduced. Perhaps by bringing the details of the test to you so that it may receive the benefits of your criticisms and suggestions it may become a tool increasing the range of our control over our charge, the vegetable oils.

In the refining process, wherein there is a reaction of the free fatty acids of the oil, and the albuminoid and proteins with caustic soda, the soap formed by this reaction is separated from the oil by the differences in their specific gravities either by the batch process or continuously by centrifugal separation. By either method the efficiency of the process is measured by the sharpness of the separation of the soap or foots from the oil, and likewise by the freedom of the foots of entrained oil. In the continuous process, the conditions may be varied to such a degree as to give an oil free of measurable amounts of soap, but in carrying the separation so far in this direction, oil is lost in the foots. Going the other direction the foots can be discharged free from oil, but in so doing more soap is discharged into the oil than the refiner will tolerate. The economics of good refining specify the minimum of oil in the foots with also the minimum of soap in the oil.

Just what limits of impurities as soap are allowed in the oil is partially dependent upon the flow sheet of operations in the individual refineries. When the refining process is followed by a washing operation the soap content of the refined oil need not be of grave concern unless it throws too great a burden upon the washing equipment. The refiner who stores his neutralized oil without further treatment than the initial removal of foots must concern himself with the most thorough separation possible, with good economics, in order that his stored oils will not be so polluted with foots and moisture as to cause the oils to deteriorate, due to the action of the moisture and the fermentation of the foots. It is the determination of the small percentages of foots about which we are now most concerned.

We are familiar with the floc which appears in soapy oil when a beaker of it is placed on a steam bath for 24 to 48 hours, and it is possible to say that one sample has more soap than another when the difference is rather great, but it is impossible to give any estimate quantitatively of the soap simply by such inspection.

Soap determinations have been made by ashing a quantity of the oil and weighing the ash. Assuming all the alkali has been converted to the carbonate and that nothing remains of the ash but this carbonate then quite easily may the corresponding soap weight be obtained. Recognizing the error of assuming the ash to be only alkali carbonate, the determination of soap is made more accurate by titrating the ash with a weak acid, thereby determining its alkalinity, making an assumption that this alkalinity is all in the form of the carbonate. Quite obviously, any free alkali which may be in the oil examined will be determined along with that which is combined with the fatty acids.

Another method of soap determination which has been practiced consists of extracting the soap from an ethereal solution of the oil with

*A paper presented at 26th annual meeting of American Oil Chemists' Society, Memphis, May 23–24, 1935.