priation to revise all of our methods in order that they may have the same general format and that duplications be replaced by cross references. This is quite a large undertaking, but it has been given considerable thought by the Uniform Methods and Planning Committee and other members of the Society. We are ready now to prepare a format and a general scheme for the revision of methods, which will be submitted to the members of the Uniform Methods and Planning Committee, the officers, and committee chairmen for suggestions or criticisms. When the replies have been received, the Uniform Methods and Planning Committee will decide upon a course of action and through Mr. J. T. R. Andrews hope to get the work under way promptly.

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Fatty Oils in National Defense*

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AN ADEQUATE supply of fats and oils is a leading consideration in any nation's defense preparations. Europe learned this in the 1914-1918 conflict, when a shortage of these vital materials in the blockaded zone was one of the factors in the ultimate outcome of that war. Most European nations are still dependent upon overseas imports for the bulk of their fats and oils needs, which are subject to blockade and wartime shipping dangers. The products finally reaching them carry increased transportation charges and the higher cost of wartime production in the supplying countries.

Therefore, Europe searched for both alternate and synthetic materials that could be procured with the least expenditure of foreign exchange and, so far as possible, from either domestic sources or colonial possessions. Germany concentrated on this program, particularly during the past ten years. Their development of synthetics and the reclamation of fats from former waste materials are too well known to your members to repeat in this discussion. They re-established their Antarctic whaling fleet in 1936 after a lapse of 70 years, and this oil became the leading ingredient in their margarine production—the largest in the world. In addition, they competed yearly with England for Norway's whale oil output and were the principal buyer of Manchuria's soybeans. These transactions were on a barter basis and conserved Reichsmarks formerly spent for 300 million pounds yearly of American lard. Substantial stocks of fats and oils were stored in Germany for government account for many months before the present war. However their dependence upon imports for fats for food purposes is still a weak link in the German economic system.

The theory of self-sufficiency, while more pronounced in Germany, was manifested in other countries, by tariff barriers of various forms, such as exchange controls, higher duties, quantitative quotas, internal consumption taxes on imported products, and requirements for blending with domestic raw materials. Countries having colonial possessions facilitated production and imports therefrom. Industrial nations favored trade with agricultural countries who bought their finished goods. The United States, while a surplus agricultural producer, was no exception in this race for bigger and better tariffs on imported products.

The resulting constriction in trade had serious effects on our own agriculture, particularly as some of it was based on Europe's wartime demands. Among other farm products, we lost normal foreign outlets for cottonseed oil and lard. In 1921 we exported 20 percent of our cotton seed oil production; in 1929 it was 2 percent; and in 1940, with about the same production as in 1921, exports were only 1 percent of the output. In 1921 we exported 65 percent of the federally-inspected lard production; in 1929 it was 50 percent, and in 1940, with a larger production than in 1921, exports were only 13 percent of the output. Lard exports reached very low levels during the drought period of short hog supplies in the years 1934 to 1937, and the present war interrupted a resumption of this trade that was under way in 1939 when we were again on a normal surplus basis.

The effect of the loss of foreign markets for half a billion pounds of lard yearly has not been serious until the past two years when we resumed producing hogs on an export basis, with few export markets still open. Our hogs are largely of the lard type, fattened on corn, and usually providing the most profitable method of marketing that grain. It was necessary to sell most of this hog-fat on the domestic market last year, and our total consumption of lard rose to a record of nearly 2 billion pounds, in addition to which large amunts were diverted to the soap kettle. The price in 1940 was at the lowest level in 6 or 7 years. Lard stocks have been unusually heavy in recent months.

The British market was our leading foreign outlet for lard before the present war, taking yearly a volume equal to that shipped all countries in 1940. However, during the years 1934-1938, when there were inadequate hog and lard supplies in the United States, England expanded its shortening production, as was also the case in our own country. Most of the ingredients in the British shortening are in the form of vegetable oils from their colonial possessions, and whale oil from their own and the Norwegian Antarctic fleet. England stored large amounts of these fats and oils for national defense purposes at the outset of the present war. No lard has been shipped there since August 1940, but some recent indications of a possible resumption of this trade have been among the several stimulating

* An address before the annual meeting of The American Oil Chemists' Society at New Orleans, La., May 15, 1941.

factors in the United States' fats and oils markets at the present time.

In February of this year large amounts of coconut oil left the United States for unusual destinations. Japan became an importer of American glycerine, instead of a surplus shipper to this country, and then appeared in the unusual role of a buyer of substantial amounts of lard from the United States. They bought more American lard than any other nation in March, 1941.

With the increasing difficulty of obtaining adequate shipping to bring in our needs for coconut oil from the Philippine Islands and the necessity for conserving the essential glycerine supplies, export controls were recommended by the National Defense Advisory Commission to the Administrator of Export Control and were made effective March 10 by Presidential Proclamation. This control included copra, coconut oil, palm kernels and palm kernel oil, fatty acids obtained from these oils, and glycerine.

The unusual lard exports and the possibility of further depleting supplies of other fats and oils led to the establishment of export control on April 15 of all products in this group not covered in the March 10 Proclamation. However, blanket licenses are issued for shipments to the British Empire and to countries in the Western Hemisphere.

The placing of all fats and oils under export control does not mean that there is necessarily contemplated any curtailment of shipments of products in this group that we normally export for the requirements of foreign customers of the United States in specified areas. The establishment of a control does recognize the fact that an ample supply of fats and oils is necessary for our national defense, and that this government does not intend to unnecessarily deplete these supplies by permitting large exports to unusual destinations.

We have perhaps thought of recent large stocks of lard too much in terms of their unusual volume, without considering that the domestic consumption of this product is running one-third over last season, while the production is lower because of an unfavorable corn-hog price ration in the 1940 season. This ratio has again reached a favorable level for hog production at the higher hog prices prevailing in 1941, and more lard will be ready for market next winter than last.

It is fortunate that our agriculture is better situated than that of any other large industrial nation to substantially expand supplies of food fats, which are the greatest producers of energy available in the diet of national defense workers. These food fats supply two-thirds of our annual 76 pounds per capita consumption of all fats and oils, and provide a surplus for export. Butter, lard and cottonseed oil account for over 80 percent of our consumption of edible fats.

The United States consumed 9¾ billion pounds of fats and oils in 1940; imported 1¾ billion pounds and exported about ½ billion pounds. These net imports of 1¼ billion pounds, while only 13 percent of our entire needs, consist principally of oilseeds from plants not adaptable to our soil and climate, or those not produced here in sufficient quantities to supply industrial requirements.

Among wartime uses of some of the industrial vegetable oils, coconut oil is used in the manufacture of plastics, alkyd resins, and rubber manufacture. Its principal use is in the manufacture of soap, the source of the nation's glycerine supply, from which is manufactured nitroglycerine and black powder. Palm oil is particularly desirable for the manufacture of tin plate and for the textile soaps used in making woolen textiles for military uniforms. Sulphur olive oil is essential in the degumming of the silk used in making parachutes. Perilla oil is valued in the manufacture of high-gloss paints employed in finishing the walls of hospitals. Spar varnishes prepared with tung oil are recommended in United States Navy specifications, and it also finds wide use for coating of shells and for insulating materials. Linseed oil from our domestic crop is widely used as a paint oil in expanding national defense construction activities.

American ingenuity has successfully developed several replacements to alleviate a shortage of the fast-drying oils formerly received from the Orient, imports of which have been greatly curtailed because of military operations in that area. Research chemists have developed in their laboratory work some of the remarkable processed alternates to tung oil that are reaching the commercial markets in increasing quantities. While not complete substitutes for all purposes, they displace tung oil in certain formulae. The use in the drying field of fractionated fish oil, dehydrated castor oil and of soybean oil acids processed up to an iodine value of 145 was stimulated by short supplies from war-torn Asia. It is just another example of science helping to meet the needs of industry, when war interferes with the availability of normal necessary supplies.

In addition to short supplies from Asia, imports of olive oil and codliver oil from European war zones have about reached the vanishing point. The California olive oil production has been expanded, and there has been a greater consumption in the salad and cooking oil field of domestically-produced refined vegetable oils. Whereas the liver oil of the cod was formerly depended upon almost exclusively for vitamins A and D, there are now some 600 boats in California waters fishing for sharks of the soupfin species, whose liver oil has a vitamin A content some 20 to 75 times that of cod-liver oil. Sardine oil was found to be a moderately good source of vitamin D, and tuna livers, at present mostly Japanese, are extremely potent vitamin D sources.

We are also experiencing a shipping shortage in imports from countries at present at peace, because of the withdrawal from normal routes of foreign vessels which formerly brought in much of our vegetable oil imports from the Philippines and from South America. Large supplies are available in these countries and in other producing centers throughout the world. These vegetable oilseeds and oils are accumulating at the source, and in many instances, are being stored for government account. It has been stated that copra, for example, if sundried and of good quality, can be safely stored for five years, losing moisture in the meantime but none of its oil value. At any rate, large stocks will be in the producing countries at the end of this war, and will be ready for European countries whose needs will be great, if shipping is available after the war to carry needed supplies to deficit areas. Most of these supplies will be of the raw material, requiring processing in European crushing and refining establishments which have probably shared in the ravages of war. There will probably be an immediate and large demand for finished products in the fats and oils field—American lard, vegetable shortening, refined oils, soap, and so forth.

However, in any picture of an expanded post-war market for fats and oils, it may be well to consider the accumulated supplies stored for shipment in other countries, when the opportunity is offered to market these products.

At the outbreak of the war in September 1939, prices of fats and oils advanced sharply, based on a brief speculative anticipation of increased exports to Europe. It became apparent that the belligerent countries had accumulated large supplies in this field, plans having been carefully made to control supplies, regulate prices, and to conserve foreign exchange. Europe was better prepared in this field than in 1914.

Our exports declined, domestic production increased, and prices reached low levels throughout 1940. However in 1941, and particularly in recent months, substantial gains have been recorded in the prices of most fats and oils. The principal factors in this rise are the growing strength in domestic demand resulting from increases in industrial activities and consumers' incomes; a lower rate of output for lard and greases; higher shipping costs for imports of oilseeds and oils and a lower volume of imports, partly because of the shipping situation; and Government lard purchases under the recently announced program for support and stabilization of hog prices. Our domestic consumption of all fats and oils this year will almost certainly establish a new record of over 10 billion pounds to supply a widening industrial and consumer demand.

While fats and oils prices are higher than last year's extremely low levels and are on a rising trend, the fundamental supply position does not justify any unwarranted speculative price spiralling. One of the National Defense measures has been the establishment of the Office of Price Administration and Civilian Supply. They are well aware of the sensitive tendency of prices of fats and oils to respond to events and rumors of events which of themselves have actually no relation to the intrinsic supply and demand situation.

A conference of manufacturers, distributors and government officials was called on May 2 by the Secretary of Commerce, because of the public interest in the business world with respect to the supply and demand of certain consumer goods, price movements, industrial capacities and supplies of raw materials. There were four round-tables, one of which was devoted to a discussion of the problems related to the distribution of food. Among the topics reviewed at the food round-table was the current fats and oils situation and the outlook as it affected supplies and prices from the producer to the ultimate consumer.

We all remember the aftermath of the 1914-1918 war when 35 cent lard dropped to 11 cents in two years, and 27 cent cottonseed oil became an 8 cent product in the same short period. The Office of Price Administration and Civilian Supply will be particularly concerned about any abnormal price fluctuations during the present emergency period that may not be justified by actual market conditions.

Our agriculture and our livestock industry produce a surplus of edible fats that are capable of considerable expansion for our own use and for export, but the increasing shortage of certain imported oils really represents a challenge to chemists in this industry to further exercise their talents in utilizing in the industrial field, wherever possible, domestic products to replace raw materials that we are unable to bring into this country in sufficient quantities for our needs.

If the chemists' laboratories can further their remarkable work in this direction, this will be an outstanding contribution to supplying our needs for National Defense.

Report of the Referee Board

FOR the year 1940-41 the Referee Board received 33 applications and issued 32 referee certificates. The program of collaborative tests included 5 samples of crude cottonseed oil and 10 samples of cottonseed, the same as in other recent years. Reports on the seed samples were again tabulated by Mr. R. T. Doughtie of the Bureau of Agricultural Economics. Tentative arrangements have been made with Dr. K. S. Markley to have the reports on the cottonseed oil samples tabulated next year at the Southern Regional Research Laboratory.

A single sample of crude peanut oil was distributed and reports were received from 47 collaborators. The agreement on this sample was good notwithstanding selection of a peanut oil showing relatively high loss. It seems likely that the difficulty of obtaining uniform samples was responsible for the experience which had caused us to feel that a peanut oil of this type would give discordant results by refining tests.

Five samples of crude soybean oil were also distributed during the past year to collaborators requesting same, this being the principal new activity of the Referee Board during the year. These samples, including all shipping expense, were generously contributed by The Procter & Gamble Company, A. E. Staley Manufacturing Company, Central Soya Company, Inc., Lever Brothers Company, and Archer-Daniels-Midland Company. Dr. R. T. Milner and Dr. T. L. Wheeler of the Regional Soybean Laboratory took care of the tabulation of the results. It still remains to work out a complete plan for adequate attention to soybean oil in our system of referee certificates.

We welcome this opportunity to express publicly our gratitude for all the assistance which has been mentioned in this report.

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G. W. AGEE
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