Cottonseed and Competing Vegetable Oils

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THIS PAPER proposes to describe, by means of charts and graphs, significant trends over recent years in the total United States factory consumption of cottonseed and competing vegetable oils and trends in consumption by major end-uses, also to discuss some of the factors influencing these trends.

Figure 1 shows that factory consumption of all vegetable oils has increased significantly each year

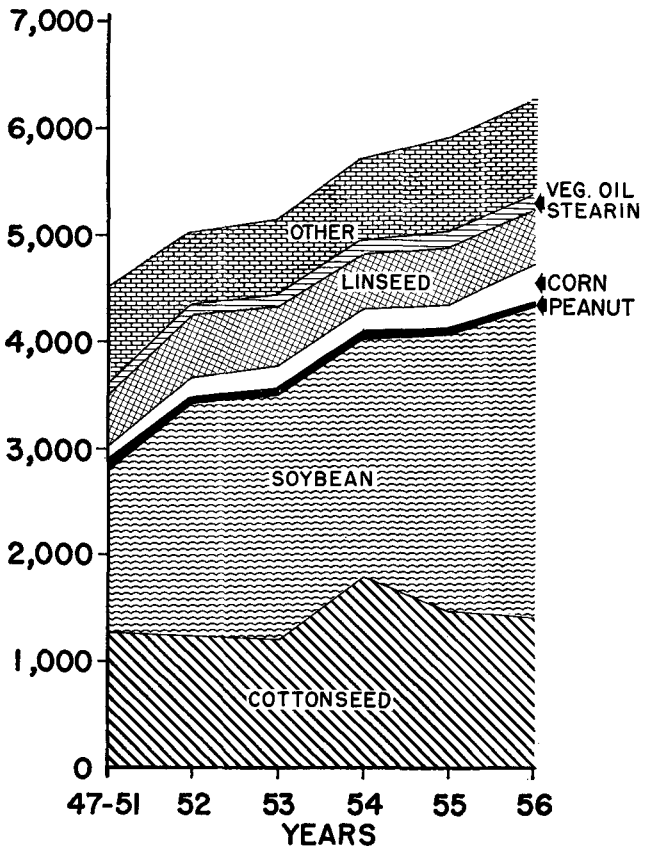

FIG. 1. Estimated U. S. factory consumption of vegetable oils (million pounds).

during the past five years and attained in 1956 the record level of slightly more than 6¼ billion pounds. This is a 5% increase for 1956 over 1955, and an increase by more than one-third over the average for the 1947-to-1951 period.

Soybean oil was used in larger quantities each year than any other vegetable oil. Consumption increased from the 1½ billion-pound average of 1947–51 to a little more than 2 billion pounds in 1952, then to almost three billion pounds last year. Indeed the rise in soybean oil consumption accounted for most of the upward trend in total vegetable oil usage and in some years more than offset the decline in consumption of all other vegetable oils.

Cottonseed oil consumption declined somewhat from the 1.3 billion-pound average of the 1947–51 period until 1954, when it rose sharply to a peak of 1.8 billion pounds. However in 1955 and 1956 consumption declined again to about 1.4 billion pounds. Cottonseed and soybean oils, of course, are highly competitive in quality, in price, and in availability. Since the prices of these two are lower than those of the others, together they account for most of the changes in consumption relationships between the various oils. Both oils are used primarily in edible products, which consumed approximately 75% of the total of all vegetable oils between 1952 and 1956, in shortening, margarine, cooking oils, salad dressing, and other food products.

Linseed oil historically has ranked third in importance among vegetable oils. Consumption of linseed oil has gone slightly downward in this period, from 560 million to 500 million pounds. Linseed oil, consumed principally in inedible products, generally is regarded as not competitive with cottonseed oil.

Consumption of corn oil in 1956 was more than double the 1947–51 average, and 75% higher than 1952 consumption.

FIGURE 2 shows trends in the percentage distributions of vegetable oils over the past five years. Soybean oil has gradually increased its share of the total market at the expense of other oils, principally

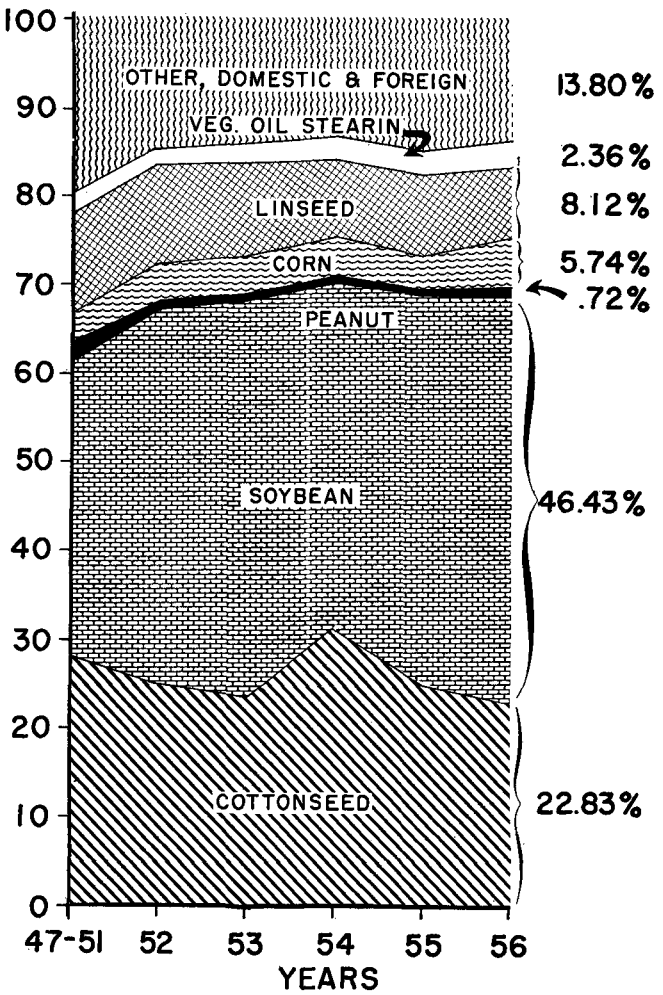

FIG. 2. Estimated U. S. factory consumption of vegetable oils (percentage of total consumption).

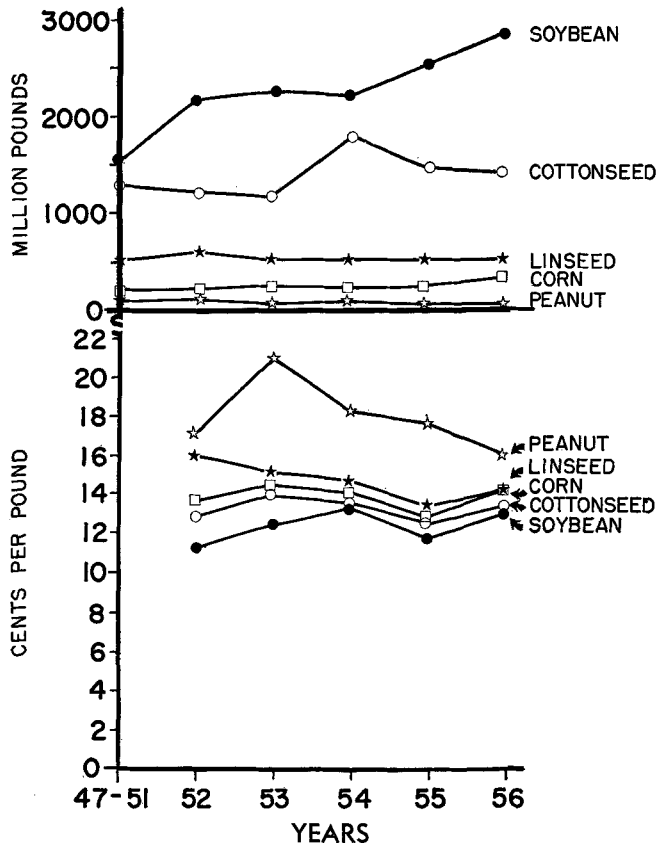

FIG. 3. Estimated U. S. factory consumption of vegetable oils and average prices.

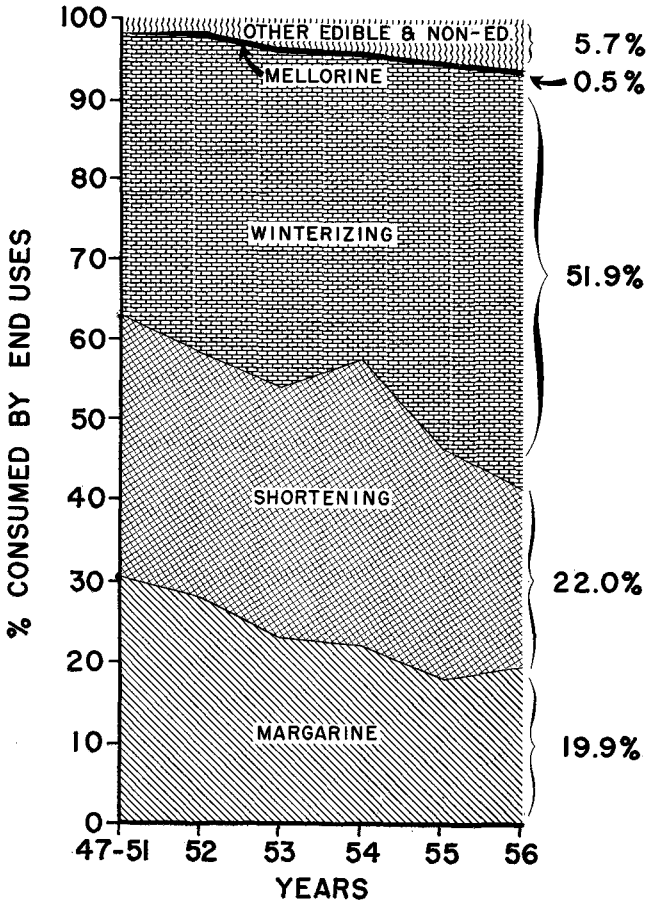

FIG. 4. Approximate distribution of cottonseed oil in the U. S.

at the expense of cottonseed oil. With the exception of 1954 this competitive gain was evident each year. Soybean oil accounted for 42% of the market in 1952 and 46% in 1956 while cottonseed dropped slightly, from 25% in 1952 to 23% in 1956. In 1954 cottonseed oil made sharp competitive gains, accounting for 31% of the total, as compared with soybean's 40%. The reason for this is shown in Figure 3, which compares consumption trends with trends in prices for each major domestic vegetable oil. As the chart plainly shows, soybean oil enjoys a price advantage over all other domestic oils. Cottonseed oil prices are close to those of soybean oil while the others are somewhat higher. The trends shown are a consistent reflection of the price spread between the two oils, prior to 1954. As the price differential narrows, cottonseed oil consumption increases at the expense of soybean oil. Conversely as the spread widens, soybean oil gains at the expense of cottonseed. Since 1954 a narrowing in the price spread has not caused as sharp a shift to cottonseed, probably because of competitive gains in quality by soybean oil. Peanut oil was the highest priced vegetable oil, and consumption was lower than that for any other oil.

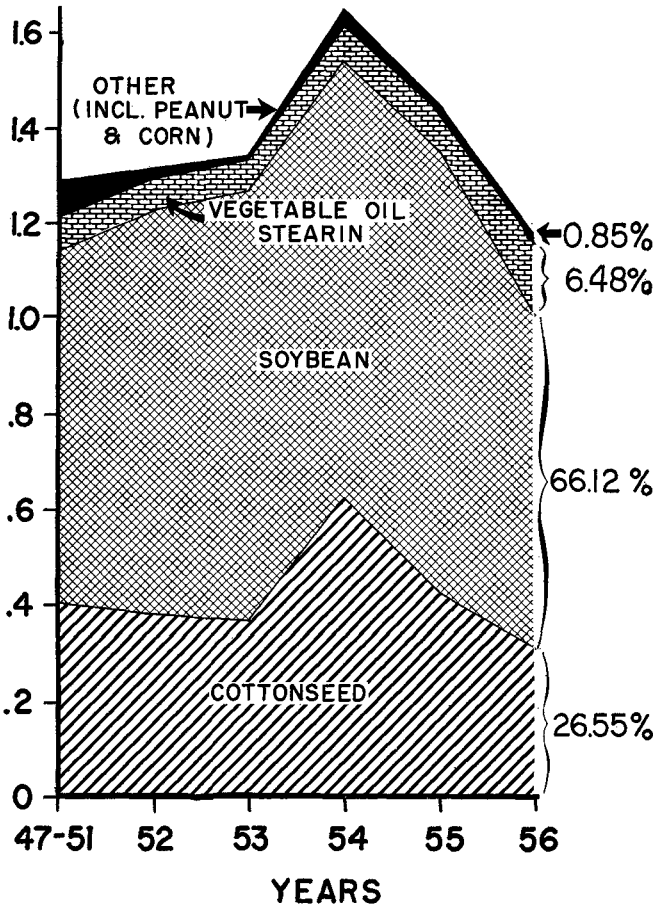

FIG. 5. Estimated U. S. factory consumption of vegetable oils in shortening production (billion pounds).

The approximate distribution of cottonseed oil between its major markets is shown in Figure 4. Margarine was responsible for slightly more than 30% of the cottonseed oil consumption in the 1947–51 period but has gone downard since then to about 20% in 1956. Shortening also declined in importance as a

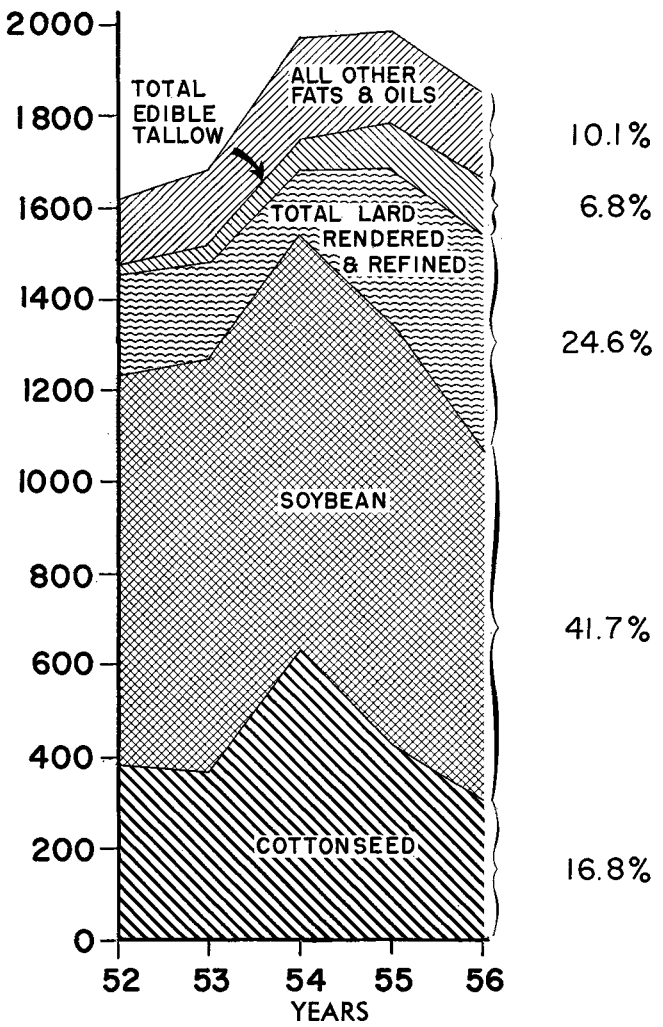

FIG. 6. Estimated U. S. factory consumption of total fats and oils in shortening (million pounds).

market outlet for cottonseed oil, from 32% to 22% over the same period. On the other hand, use of cottonseed oil for winterizing increased from 35% to 52%. There was also a small gain in consumption of cottonseed oil in the classification "other edible and nonedible uses," from 2% to 6%.

Vegetable oil consumption in shortening, Figure 5, was at the rate of about 1.3 billion pounds in 1952–53; it jumped to an all-time high of more than 1.6 billion pounds in 1954, but by 1956 it had declined drastically to a low of less than 1.2 billion pounds. Cottonseed and soybean oils dominate this picture each year, with a combined consumption accounting for almost 93% of total vegetable oil consumption in shortening. Trends in consumption of both soybean and cottonseed oil have been approximately the same, at least since 1953.

Figure 6 shows why vegetable oil consumption in shortening has dropped so sharply since 1954. From 1952 to 1955 consumption of fats and oils actually increased markedly. Although in 1956 shortening production fell somewhat below the 1955 level, the fall was noticeably less than the decline in vegetable oil usage shown in the previous slide. The explanation lies in the gains made by lard and edible tallow, which were made at the expense of soybean and cottonseed oils.

IN 1954 lard and tallow accounted for only 10% of total fats and oils consumed in shortening, but by 1956 they accounted for more than 31%. Comparison of the price relationships of these competing materials with the consumption relationships, as shown in Figure 7, explains what has happened. As the price of lard jumped to almost 16¢ per pound in 1954, consumption dropped to less than 130 million pounds; but when the price declined to 11½¢ in 1955, lard consumption increased to 331 million pounds. A further drop to 11.1¢ a pound in 1956 was reflected by a further increase in consumption to 457 million pounds. In 1952 lard quality was not high enough for lard to displace soybean oil, even at a price advantage of a cent a pound; but in 1955 and 1956 lard and tallow were able to capitalize on their favorable price situation because of important quality improvements.

It is evident from the chart that cottonseed oil has been the biggest loser in the shortening market. Consumption in 1956 was 19% below 1952 levels, and, with the exception of 1954, cottonseed oil consumption was less than half that of soybean. This is the natural result of the fact that cottonseed oil was at a distinct price disadvantage in each of the years shown, except 1954. The quality improvements that have been effected in soybean oil seem to have so far reduced the quality advantage of cottonseed oil that price is in many cases the most important consideration in determining the choice between these two major vegetable oils. The 1956 consumption of lard in shortening moved close to the half billion-pound level, exceeding that of cottonseed oil by 146 million pounds. Usage of tallow climbed from 25 million pounds to 125 million pounds, with sizeable increases

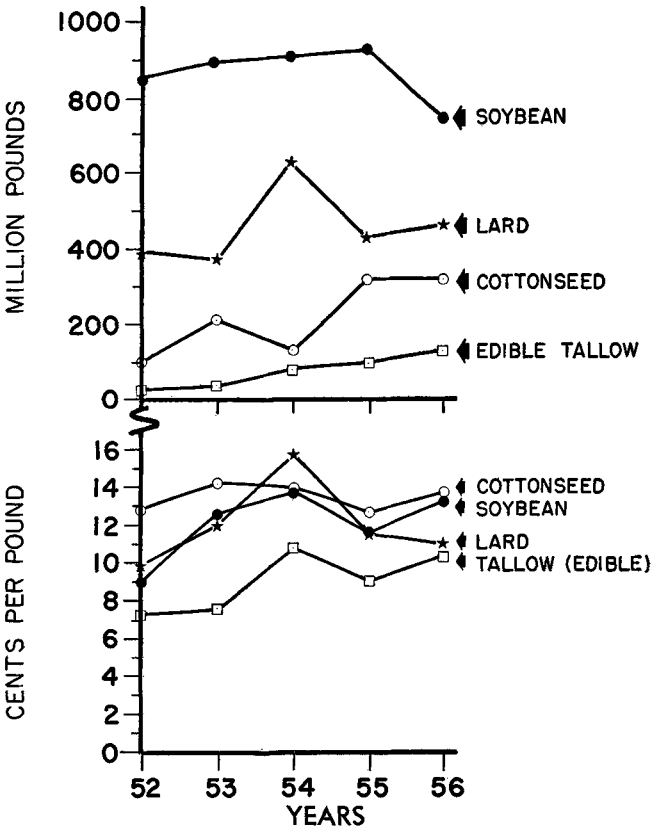

FIG. 7. Estimated U. S. factory consumption of fats and oils in shortening and average prices.

being achieved each year of the period. Lard and tallow together equalled three-fourths of the 775 million-pound, soybean-oil consumption.

The second largest outlet for vegetable oils is in margarine, Figure 8. The growth of this market in

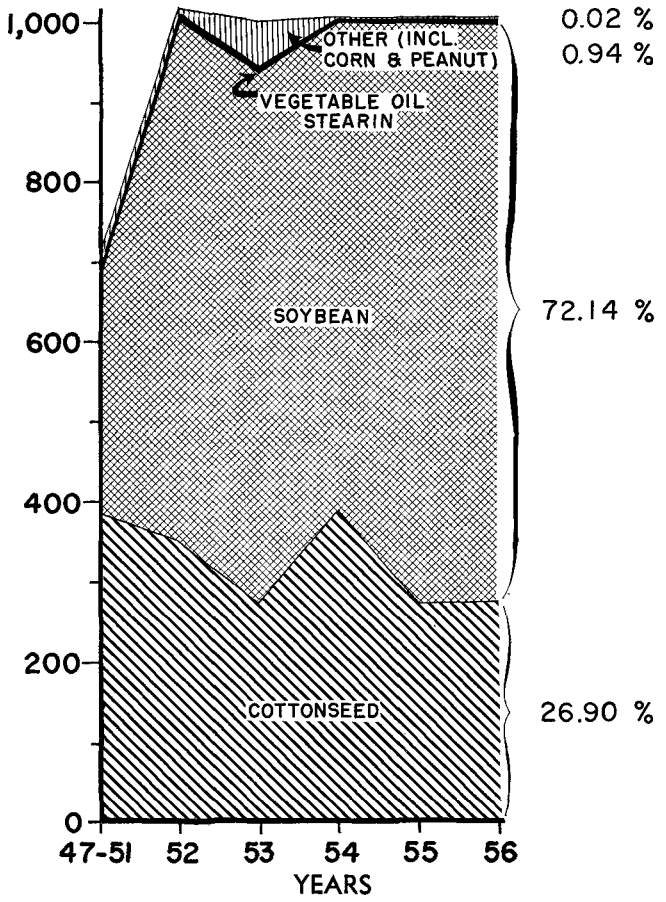

FIG. 8. Estimated U. S. factory consumption of vegetable oils in margarine production (million pounds).

a relatively short period of time has been spectacular. Although margarine quality has risen steadily, this gain is most likely a reflection of factors relating more to politics than to the quality improvements effected in the product. Most of the expansion in margarine occurred during the 1947–52 period. Since that time consumption seems to have leveled off at about the billion-pound figure. Further increases in the margarine market will result from population increases. To some extent additional gains will depend on future quality-improvements and competitive prices, but probably the biggest opportunity for market expansion lies in adequate promotion of margarine as a quality food-product at economical prices. (Figure 8 is misleading in showing a dip in soybean oil consumption in 1953. This was caused by Census Bureau classification procedure, which included soybean oil in "other oils" that year to avoid disclosure of the production of individual establishments. A truer representation of actual consumption would show the combined consumption of cottonseed and soybean oils as a straight line slightly above the one billion-pound level.)

The cottonseed and soybean oils together comprise roughly 99% of total vegetable oil consumed in margarine each year. The 751 million pounds of soybean oil consumed in 1956 represented 72% of the total vegetable oil usage, compared with soybean's 64% in 1952. On the other hand, cottonseed's share in the market declined from 35% in 1952 to about 27% in 1956. The only exception was 1954 when the price differential between these two oils was only 3¢ per pound in favor of soybean oil.

THE BASIC FACTORS that have favored increasing use of soybean oil in both shortening and margarine have been: a) soybean oil has maintained a price advantage; b) quality improvements in soybean oil have so far reduced the quality advantage of cottonseed oil that price has become the deciding factor in the choice of oil; and c) there are indications of a trend toward locating production plants in the heart of the soybean-growing area. These plants also are close to concentrated population areas so that producers of shortening and margarine make dual savings in selling and manufacturing costs. They save freight charges on transporting raw materials from growing areas to the production plant; they save on freight charges for transporting the finished product from factory to market area.

Figure 9 compares the consumption of margarine and butter, the upper half of the chart showing total production, the lower showing per capita consumption of these two products. Total production of margarine and butter climbed from 2.4 billion pounds in 1947 to almost 3 billion pounds in 1956. Butter production declined slightly during this period as margarine production increased rather sharply from the 746 mil-

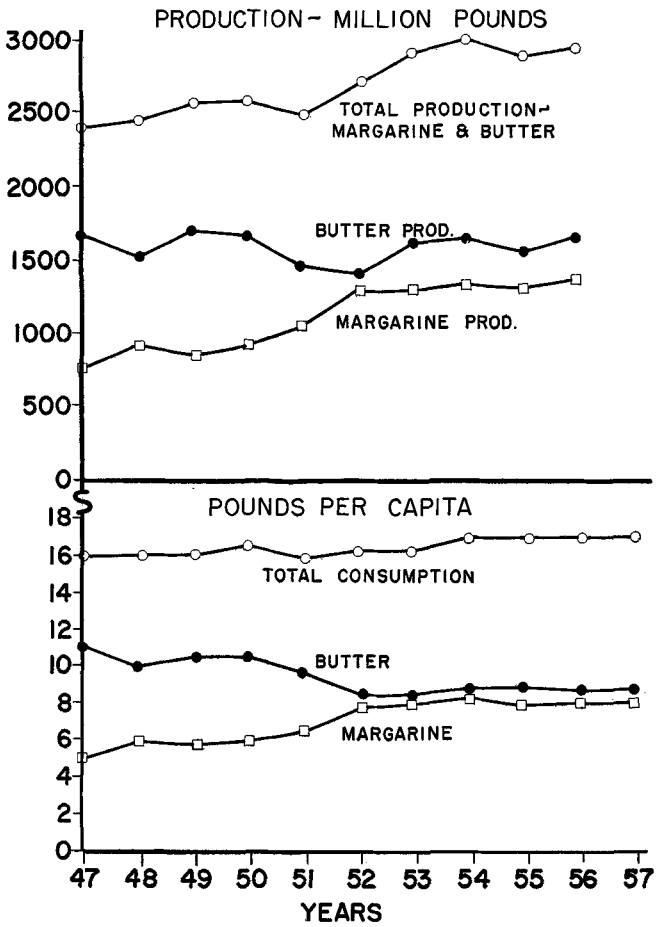

FIG. 9. Production and per capita consumption of margarine and butter.

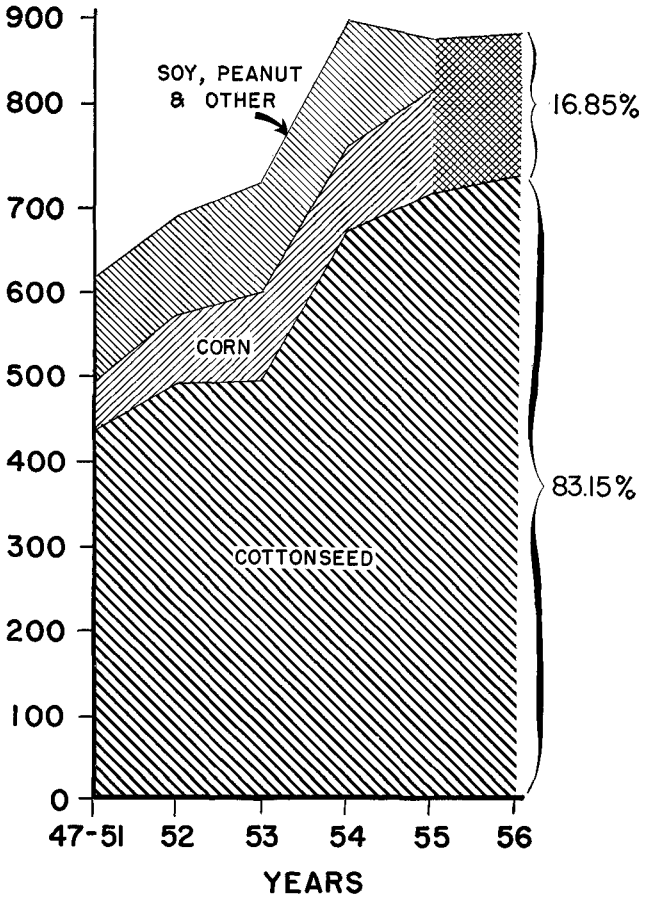

FIG. 10. Estimated U. S. factory consumption of vegetable oils in winterizing (million pounds).

lion-pound level in 1947 to 1.3 billion pounds in 1952, then continued to climb more slowly to the present 1.4 billion-pound level. Margarine's share of the table-spread market has risen from 31% of the 1947 total to 46% in 1956.

Trends in per capita consumption have been similar. The combined per capita consumption of butter and margarine increased almost 6% between 1947 and 1956. Per capita consumption of margarine increased sharply until 1952 with consumption of butter in an almost opposite trend. Since 1952 per capita consumption of these two spreads has been relatively stable at about 8.8 pounds for butter and 8.1 pounds for margarine. The forecast for 1957 indicates that per capita consumption will be the same as in 1956.

Consumption of vegetable oils winterized for use in salad oils, cooking oils, and related products, where clarity, or lack of cloudiness is an essential quality, is shown in Figure 10. Consumption increased from 688 million pounds in 1952 to 880 million pounds last year. This has been the third largest outlet for vegetable oils in each year of the latest five-year period. Of total oils winterized in 1956, cottonseed comprised 83%, for a total of 732 million pounds. This is a substantial gain from the 492 million pounds of cottonseed oil consumed in 1952, which comprised only 72% of the 1952 consumption of winterized oils. This is apparently the one major use in which the quality advantages of cottonseed oil are sufficiently important to more than offset the price differential enjoyed by soybeans.

In addition to the winterized oils, significant quantities of vegetable oil are consumed in commercial production of salad dressings, mayonnaise, sandwich spreads, and French dressings without being winterized. According to a survey by the Department of Commerce, vegetable oil consumption in this "semi-solid" product group amounted to 438 million pounds in 1955. This consisted of 295 million pounds of soybean oil, 114 million pounds of cottonseed oil, and 29 million pounds of corn oil. These figures are not included in Figure 10. In these prepared spreads where unwinterized oils are normally used, soybean oil is used in much larger quantities than cottonseed, partly because of its price advantage and partly because the quality differential is much less important here. The formulation of these products, involving the use of various flavorings and the blending of several components, tends to diminish any quality differences.

THE MELLORINE MARKET, Figure 11, is not a large consumer of vegetable oil, but it is an outlet which has only recently assumed sizeable proportions and one for which the potential may be very considerable indeed. The consumption curve follows closely the action in various states which legalized the manufacture and sale of this competitor of ice cream. Four states had legalized production and sale of mellorine prior to 1953; six legalized it in 1953, and one more in 1955. This would seem to be the strongest factor influencing the total consumption of vegetable oils in mellorine.

Consumption of oils in mellorine last year was estimated at 15 million pounds, with cottonseed oil and soybean oil consumption, 90% of the total, increasing at approximately the same rate. The distribution between vegetable oils in 1956 was soybean oil 45%,

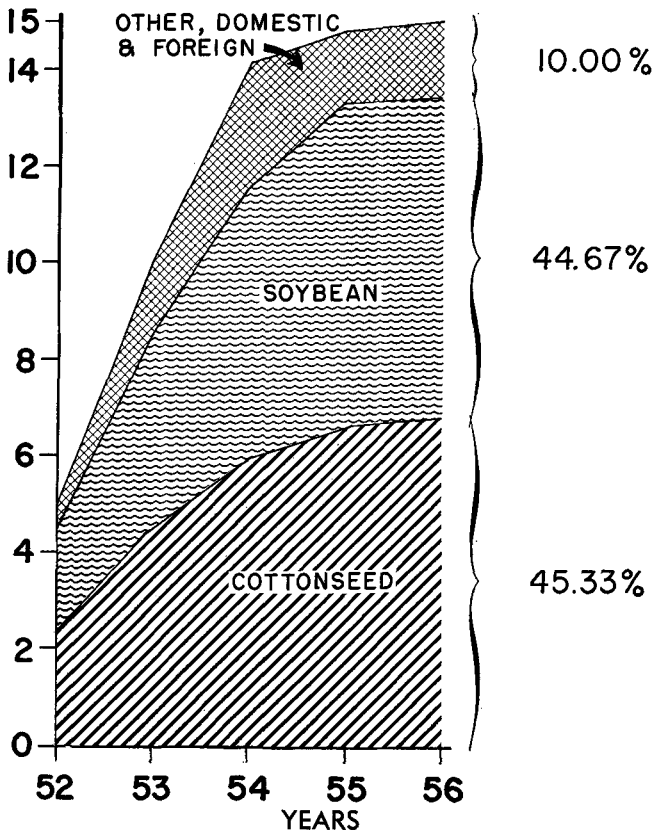

FIG. 11. Estimated U. S. factory consumption of vegetable oils in mellorine production (million pounds).

cottonseed oil 45%, and "other vegetable oil," mostly coconut oil, 10%. Future trends in this market depend not only on quality improvement and promotion effort but on further legislative recognition of mellorine's rightful place in the market as a wholesome, nutritious food-product.

The remaining consumption of vegetable oils in foods, shown in Figure 12, is classified as "other edible products." This group includes consumption in bakeries, prepared flours, canned soups, candy, and so on. Figures are not available for individual products in this group.

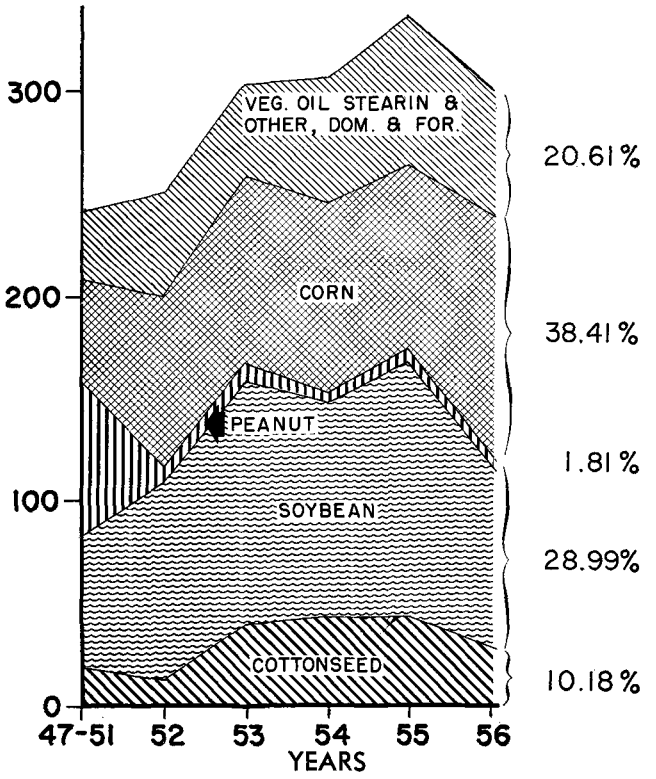

FIG. 12. Estimated U. S. factory consumption of vegetable oils in the production of other edible products (million pounds).

The total consumption of vegetable oil in "other edible products" amounted to 304 million pounds last year. As is apparent in the chart, the total consumption rose from 251 million pounds in 1952 to a high of 339 million pounds in 1955, then declined to 304 million pounds in 1956. This decline reflects again increased competition from lard and edible tallow, as occurred in shortening in the same two years. Corn oil, for the first time, is the principal oil used, accounting for 38% or 117 million pounds in 1956. Soybean oil, at 29%, was the second largest supplier while cottonseed accounted for 10%.

Inedible products represent only a fourth of vegetable oil consumption, in such products as paints and varnishes, soaps, printing inks, linoleum, oil cloth, lubricants, and greases. Linseed is the principal oil consumed in inedible products, along with domestic and foreign oils other than those represented as principal factors in the edible products field. Since cottonseed oil is a relatively small factor in inedible products, only a few brief comments will be offered. Coconut oil is about the only vegetable oil now used in the soap market. The largest natural competitor is and has been inedible tallow and grease. Consumption of vegetable oils in soap in 1956 was almost exactly half the average of the 1947–51 period. Use of tallow and grease is off however by more than 40%. Increased use of synthetic detergents is the obvious explanation; these now account for two-thirds of the total consumption of soaps and detergents.

In paints and varnishes, and for that matter in all uses of drying oils, no significant shift is observable in the total use of fats and oils. The most interesting factor in paints and varnishes is a shift away from linseed oil toward soybean oil. Paint formula changes, utilizing more alkyd resins, which adapt semi-drying oils to drying oil uses, are responsible for this shift.

Total production of vegetable fats and oils has increased steadily from 1951, with the increase in cottonseed and soybean together on the order of about 40%. Domestic use, like production, has also increased for these commodities, but it has not increased to anything like the same extent. For cottonseed and soybean together the increase amounted to only 10%. Although domestic stocks increased slightly, the amount of additional oil in the stocks is negligible as compared with either production or use. The only reason that there has not been a disastrous accumulation of food fats and oils has been the sharp increase in exports resulting principally from government programs. Exports of cottonseed and soybean oils together, for example, more than tripled in the period from 1951 to 1955. The outlook for 1957 is for continuing exports of these two oils at about the same level as last year, approximately two billion pounds.

Acknowledgment

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Note: The statistics on which this paper is based are published annually under the same title by the National Cotton Council. Copies may be obtained without charge, on request.

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Drying Oils

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THIS PAPER will discuss some economic factors which suggest the present large value of drying oils as chemical intermediates. Then it will consider two chemical reactions of current importance in making more useful industrial products out of fats and oils.

In any historical approach to drying oils (2) it is easy to overstress the early importance of such