

will be given to the manufacture of products with increasing chemical homogeneity, *i.e.*, more nearly pure compounds. At any rate it will be necessary to know more about the nature of any impurities present in the materials. This will be essential in order to profitably produce competitive products. This industry should realize that customers will not continue indefinitely to buy a product which is contaminated with an unwanted and undesirable component.

Indications are that the development of diversified markets will tend to lead fatty acid producers and processors into a much greater variety of manufacturing and processing operations. In fact, it seems probable that the industry as a whole will largely assume the characteristics and become a segment of the chemical industry.

Economic Trends in Fats and Oils

ALBERT A. KREIG, Commercial Research Department, Swift and Company, Chicago, Illinois

THE subject of this discussion has been entitled "Economic Trends in Fats and Oils," but I would like to re-phrase it slightly to "Economic Trends and Problems in Fats and Oils." The reason is simple for the economic trends in this or any field lead inevitably to problems which must be solved, and the solution of these problems creates new trends, which lead to still other problems. It is the relationship of economic trends to the problems we face that I would like to stress.



A. A. Kreig

In its most simple form we have here a six-part question:

1. What is the relationship of economic trends to the problems of the research laboratory?
2. What are the basic characteristics of the fats and oils economy?
3. What are the economic developments which have brought us today's situation?
4. What are the future economic developments likely to be?
5. What are the urgent problems which need solution?
6. What are the solutions?

It is the first five of these questions with which we are concerned in this discussion. The sixth I leave to you.

The primary purpose of any review of economic trends is to establish an objective base for judging the future. From an analysis of the historical procession of events we try to project future developments and opportunities and anticipate future problems. These things are of obvious concern to those responsible for long-range planning of production facilities, to the laboratory research man, and to others engaged in market development work. Over the years there have been many shifts in our fats and oils economy

REFERENCES

1. Berthelot, M., *Ann. chim. phys.*, **41**, 216 (1854).
2. Brown, J. B., *Chem. Rev.*, **29**, 333 (1941).
3. Demmerle, R. L., *Ind. Eng. Chem.*, **39**, 126 (1947).
4. Gloyer, S. W., *Ind. Eng. Chem.*, **40**, 228 (1948).
5. Goebel, C. G., *J. Am. Oil Chemists' Soc.*, **24**, 65 (1947).
6. Herb, S. F., and Riemenschneider, R. W., *Anal. Chem.*, **25**, 953 (1953).
7. Jenness, L. G., U. S. Pat. 2,593,458 (1952), to Trendex Company.
8. Kenyon, R. L., Stingley, D. V., and Young, H. P., *Ind. Eng. Chem.*, **42**, 202 (1950).
9. Kistler, R. E., Muckerheide, V. J., and Myers, L. D., *Oil & Soap*, **23**, 146 (1946).
10. Lewkowitsch, J., "Chemical Technology and Analysis of Oils, Fats and Waxes," 3 vols., 6th Ed., 1921-1923, Macmillan and Company Ltd., London, England.
11. Passino, H. J., *Ind. Eng. Chem.*, **41**, 280 (1949).
12. Potts, R. H., *Oil & Soap*, **18**, 199 (1941).
13. Potts, R. H., and McKee, J. E., U. S. Patent 2,054,096 (1936) to Armour and Company.
14. Shreve, O. D., Heether, M. R., Knight, H. B., and Swern, Daniel, *Anal. Chem.*, **22**, 1261 (1950).
15. Swern, Daniel, Scanlan, J. T., and Roe, E. T., *Oil & Soap*, **23**, 128 (1946); Swern, Daniel, and Ault, W. C., U. S. Patent 2,457,611 (1948) to Secretary of Agriculture.

which have developed into industry problems of major magnitude. Research and market development work has played a major role in easing or solving these problems. But research to improve old products, to develop new processes or products, or to develop new outlets is usually a long and costly process. To the individual firm particularly the element of time is important, and the early recognition of the implications of economic change is most desirable.

Economic-Research Relationships

The problems arising out of economic change can perhaps be well illustrated by an example from the edible fats and oils field. Many years ago lard and other animal fats were largely unchallenged in the food fat field. Cottonseed had little or no cash value as late as the Civil War and was usually disposed of by burning. But from research new cottonseed products were developed, numbers of crushing mills increased, and cottonseed became of major importance in the southern economy. At first cottonseed oil was blended with animal fats, such as edible tallow or stearine, and marketed as a lard substitute. But, with research leading the way, succeeding years saw improved refining methods and the development of hydrogenation, resulting in an all-vegetable shortening. Advertising and promotional efforts increased, and in time the all-purpose shortening with the special built-in characteristics demanded by consumers was developed. Such shortenings were primarily made from vegetable oils, and although supplies of lard continued to be consumed as produced, the value of lard relative to vegetable oils declined consistently for 30 years prior to World War II (Figure 1). In turn, this situation stimulated vigorous research into lard-quality improvement, and after more than 20 years of intensive study a lard shortening was produced which was equal to or superior in all respects to the finest all-vegetable shortenings. As a result, lard is now extensively used as a raw material for all-purpose shortenings, and the downward trend in the value of lard relative to vegetable oils may have been halted.

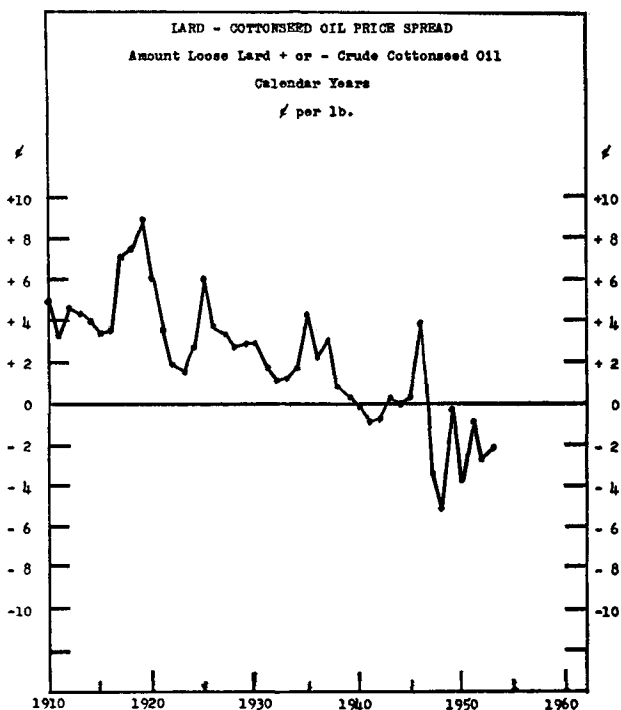


FIG. 1

Data: Daily Market Quotations
Lard in tanks at Chicago
Cottonseed Oil in tanks
Mississippi Valley.

Basic Economic Characteristics

Changes in the fats and oils economy are due to many complex and interlocking factors, and causes may be external or internal. They may, for example, be due to variations in domestic industrial activity or income, to producer decisions regarding crop or livestock production, to the demands of foreign buyers, or to developments resulting from domestic legislation. Before discussing some of the recent economic developments, it is desirable to mention briefly some of the basic economic characteristics of the industry.

First of all, while our primary interest involves fats and oils marketed for industrial uses, we recognize that there is no clear-cut division between food and industrial fats. Soybean oil is primarily processed into edible products but is also used as a drying oil. Inedible tallow does not compete directly with cottonseed oil but has partially replaced coconut oil, which is also used for edible purposes. There are many other examples of this type. As a result of this interchangeability and competition among all fats and oils, it is not desirable to try to compartmentize the fat economy.

From the standpoint of supply the important point is that domestic production is not particularly sensitive to changes in demand for the end-product. The reasons for this are readily apparent. First, the total output of agricultural products reflects the individual decisions of thousands of small producers. Secondly, aggregate output does not tend to be very sensitive to price since high sustained volume is the chief method the producer has of maintaining his income. Thirdly, fats and oils are a jointly produced commodity. Meat fats, for example, make up only a small proportion of the total value of livestock marketed, and the availability of such fats is related to the demand for meat and only incidentally to the

demand for fat. The production of cottonseed oil results from decisions concerning cotton. The same situation is reflected in the production of corn and other minor domestic oils. The value of oil is, of course, a primary consideration in soybeans and flaxseed. The fourth factor is an artificial one but nevertheless real, legislation which supports agricultural products at prices higher than true demand levels. Under these conditions price cannot perform its function of facilitating the movement of supplies into marketing channels.

The result of these characteristics is a supply which is fairly inflexible once crops are harvested and producer decisions are made regarding livestock numbers to be raised. While it is true that the packer may render more fat for lard when prices are high relative to fat cuts, this added quantity is not overly significant. Similarly the record shows that price has had little apparent influence upon the total recovery of tallow and grease.

Now turning to the other side of the picture, the demands of domestic consumers for fats and oils also have some special characteristics. For food fats, the controlling factor is the large and growing population of this country, with the quantities consumed being little influenced by price or supply or changing business fortunes. In per capita terms (Figure 2) there is remarkably little change in total except in times of war and rationing. The sharp rise in 1950 primarily reflects inventory accumulation rather than a change in actual consumption. Margarine for the most part complements and offsets any ups and downs in supplies of butter available for the consumer's table although average combined consumption is somewhat lower than before the war. In simi-

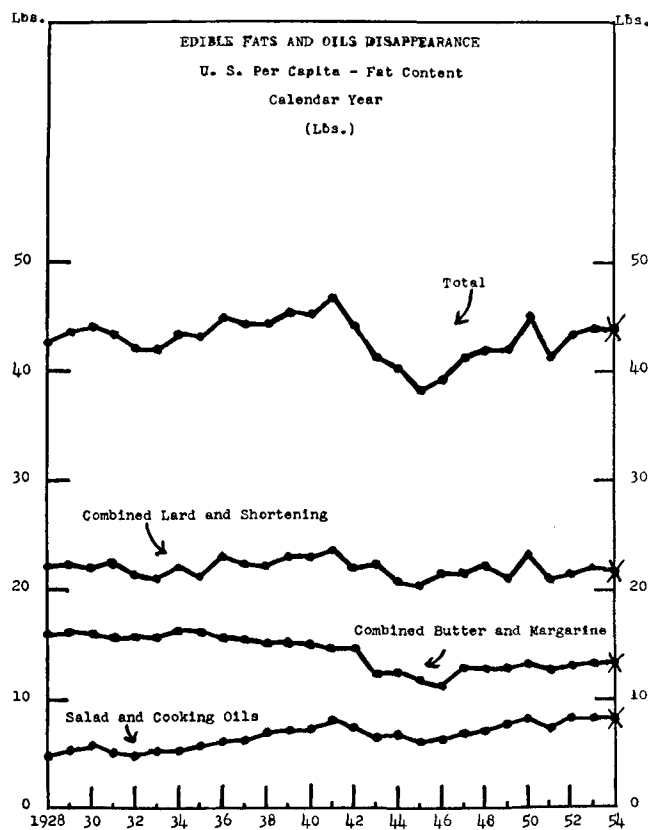


FIG. 2

Data: U. S. Dept of Agriculture
1954 Estimated

TABLE I
Domestic Production of Fats and Oils ^a
Year Ending September 30
Million Pounds

	Tallow and Grease	Lard	Linseed Oil	Cottonseed Oil	Soybean Oil	Corn Oil	All Fats and Oils
1936-40 Ave. ^b	1021	1833	217	1443	346	138	5577
1947	1869	2395	406	1012	1531	250	7953
1948	1982	2324	689	1357	1533	201	8533
1949	2101	2498	751	1735	1807	225	9571
1950	2150	2626	726	1795	1937	242	10040
1951	2343	2811	808	1277	2454	243	10441
1952	2268	2920	554	1726	2444	223	10612
1953	2605	2544	501	1832	2533	258	10792
1954 ^c	2600	2300	625	1950	2250	235	10500

^a Excludes butter and tall oil.
^b Calendar Years.
^c Estimated.
Data: U. S. Department of Commerce
U. S. Department of Agriculture.

lar fashion shortening supplements the changing availability of our lard supply, filling the gap in the consumer's total demand for cooking fats. Only in salad and cooking oils do we see a rising level of use by the individual consumer.

The industrial fat picture is quite another matter, for here we are tied closely, as we shall see later, to the more variable ebb and flow of business activity.

Another demand area, of little significance in the long run but productive of vexing problems, should be mentioned. It is the changing nature of what we might call inventory demand, the need or the desire to own greater or lesser amounts of raw material or finished product. Erratic in timing and degree, it involves producers, processors, and consumers. It is a special problem for products such as these, produced and traded worldwide and with wide seasonal swings in production.

Lastly, we have the so-called export demand, reflecting the changing availability of world supplies of competitive fats, the attractiveness of our domestic market prices, and in the past 13 years the political-economic considerations of hot and cold war.

Economic Developments

What have been some of the chief economic developments of the past 15 years and what are the problems they produce?

High on the list is the sharp increase in domestic production (Table I), with total output now nearly double the pre-war average. This increased production reflects first of all the situation growing out of World War II. With imports cut off from both our allies and ourselves by dislocations in supply lines and in foreign producing areas, every effort was made to boost domestic production. The output of the entire agricultural economy was accelerated and near maximum land use was achieved and has been continued. Bumper crops have resulted from favorable weather conditions, improved crop varieties, and increased use of fertilizer. Resultant feed supplies have maintained livestock numbers at high levels. In 1953 cattle slaughter was up 60% and hog slaughter was up 50% from pre-war averages.

A large part of the production increase is due to soybean oil for in less than 20 years soybeans have risen from a position of little commercial importance to that of chief oilseed crop. As corn yields increased some 30% with the development of hybrid corn and increased use of fertilizers, land no longer required for corn was switched to soybeans. Soybeans are

now a bulwark in the economy of the Midwest cash grain farm.

Significant production increases also occurred in other domestic fats. Tallow and grease, lard, and cottonseed oil are up some 150, 25, and 35%, respectively, over 1936-40 averages. Part of the increase in animal fats can be attributed to higher livestock slaughter. But particularly for tallow and grease, the 60% increase in total meat production falls far short of a full explanation.

A factor which has been of great importance in increasing domestic production is greater efficiency of the industry in recovering fats. These "yield" figures are shown in Table II. The industry now

TABLE II
Fats and Oils Production
Measures of Recovery Rates for Specified Fats and Oils
Yearly

Measure	Tallow and Grease	Lard	Soybean Oil	Cottonseed Oil
	Ratio to total meat production	Yield per 100 lb. hog slaughter	Yield per bushel crushed	Yield per ton crushed
	%	lbs.	lbs.	lbs.
1936-40 Average	6.0	12.3	9.1	311
1947	8.6	13.8	8.9	315
1948	9.1	13.6	9.5	312
1949	9.7	14.5	9.8	320
1950	10.3	14.5	9.9	323
1951	10.4	14.5	9.7	318
1952	10.0	14.8	10.0	319
1953	11.4	14.3	10.8	328

Data: Based on reports from:
U. S. Department of Agriculture
U. S. Department of Commerce.

produces almost twice as much tallow and grease per unit as compared to pre-war. This increase is due to greater coverage by the rendering industry, plus gains in efficiency at both meat packing and rendering plants. Trends in recent years suggest a leveling-off in recovery rates for both lard and tallow.

Shifts to solvent-extraction plants plus higher oil content in the case of soybeans are the chief reasons for higher yields of edible oils, and further increases are likely. Solvent-extraction yields about 20% more oil per bushel of soybeans crushed than does the screw-press method, and about 80% of the soybean crushing industry has already converted. If the remainder of the industry had been converted to the solvent process in 1952 and 1953, an additional 100 million pounds of oil per year would have been produced. A greater potential exists in the cottonseed industry, where only about 20% of the mills are of the solvent type. Based on recent crush levels, if only half of the hydraulic and screw-press mills switch

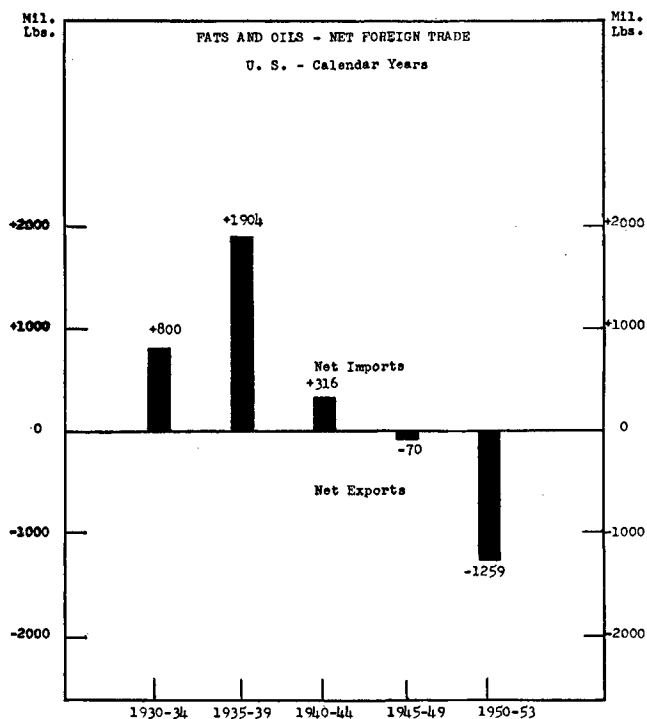


FIG. 3

Data: U. S. Department of Commerce.

to solvent-extraction, an additional 100-150 million pounds of cottonseed oil will be produced.

The second major development has been in the field of world trade (Figure 3). Before the war U. S. net imports totaled about 2 billion pounds per year, with large quantities of coconut oil, fish oil, palm oil, and flaxseed flowing into this country. At the same time low lard production, plus the loss of the German export market in the mid-'30's, sharply reduced our exports.

During and since the war world-wide dislocations in production and trade reversed this situation, and we are now on a net export basis. Shipments of lard abroad have been higher, tallow and grease exports have risen from negligible levels to over one billion pounds per year, large quantities of vegetable oils and oilseeds have been shipped out and, notably in the case of soybeans, are still continuing. At the same time high domestic production has cut U. S. need for foreign oils. Tallow and grease have almost entirely replaced palm and fish oils for use in soap. Edible use of palm oil has been largely eliminated, and edible use of coconut oil substantially reduced. Heavy domestic flaxseed production has replaced linseed oil and flaxseed from Argentina.

The third major area of development concerns the use and consumption of fats and oils. Population in this country has grown at an unprecedented rate over the past decade, and consumer demand for edible fats has kept pace. With 2½ to 3 million more people every year, it takes more than 100 million pounds of added edible fat each year just to maintain rates of per capita consumption. This constitutes a substantial but still only partial offset to the great increases in production.

In looking at the use of industrial fats, it is clear that there is a close relationship between such use and general business activity, as we illustrate in Figure 4. It is a logical relationship since fats and oils

are consumed either as an integral part of a product or in the manufacturing process in almost every type of industry. The market is still large, totalling over three and one-half billion pounds in 1953, but there have been declines in recent years, beginning around 1947. In 1950 and 1951 there was a temporary upsurge in fat usage, reflecting an inventory build-up after our entry into the Korean conflict, but the trend seems definitely downward. The extent of the market loss is emphasized by the increasing divergence in recent years between industrial fat usage and industrial activity, indicative of markets lost to synthetic detergents and other non-fat materials.

The industrial market may be roughly classified into three groups: soap and synthetic detergents, drying products, and other industrial uses (Table III). Although a few fats and oils are predominantly consumed in only one of these usage groups, many are potential raw materials for almost any type of industrial use.

Soap. The much-heralded rise of synthetic detergents has now shrunk the domestic market for fats in soap by well over a billion pounds. Since 1947 soap production has declined from 3½ to 2 billion pounds while synthetic detergent output has increased from less than 500 million to over 2 billion pounds. Only significant increases in the production of industrial and toilet bar soap have kept soap production from falling more drastically. The chief impact of this market loss has, of course, been on tallow and grease, which since the war have composed about 75% of all fats used in soap. Other fats severely affected have been vegetable oil foots and both animal and vegetable fatty acids. The consumption of foots in soap is now down 60% from 1947-48 and fatty acid usage in soap is down about 35%.

The divergent trends of higher fat production and lower fat usage in soap have left huge quantities of tallow and grease available for other outlets. Con-

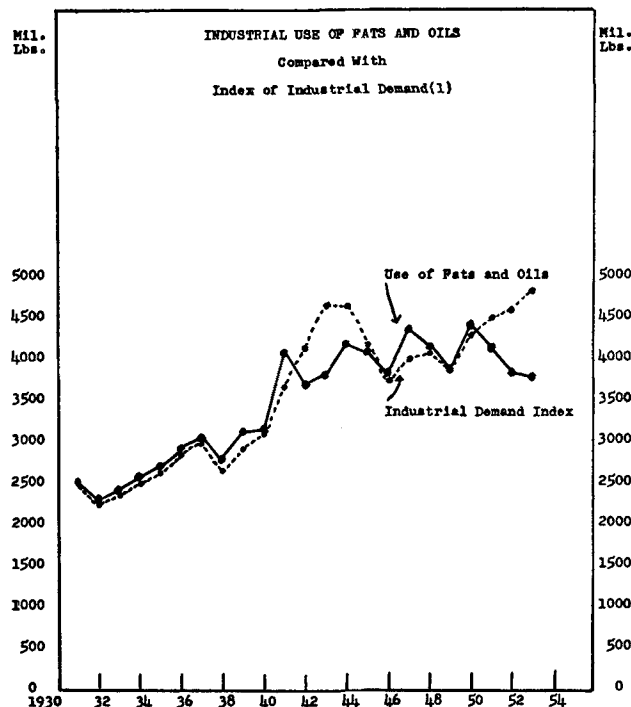


FIG. 4

(1) Based on FRB Index of Industrial Production.
Data: U. S. Department of Commerce.

TABLE III
Industrial Uses of Fats and Oils
by Type of Use — Calendar Years
Million Pounds

	Soap	Drying			Other Industrial	Total ^a
		Paints and Varnish	Linoleum	Misc.		
1936-40 Average	1740	650	100	40	495	3025
1947	2362	706	142	169	994	4373
1948	2140	765	167	149	948	4169
1949	1847	656	148	170	1057	3878
1950	1886	776	153	262	1348	4425
1951	1617	743	134	274	1371	4139
1952	1455	690	125	216	1334	3820
1953	1372	707	113	191	1373	3756

^a Includes tall oil.

Data: U. S. Department of Agriculture
U. S. Department of Commerce.

sumption of all fats in synthetic detergents has risen to 125-150 million pounds, with tallow accounting for about half of the total. Use in fat-splitting and other processing has been rising. But the combined increase of all non-soap uses has been small compared to the surplus available, and the bulk of the surplus has been exported. In 1953 the export rate was well over a billion pounds and exceeded the domestic use in soap.

Drying Products. The paint and varnish industry is second only to soap as a market for industrial fats and oils. Direct use of oils in paint and varnish is now about 700 million pounds per year and has remained fairly steady for the past seven years. This lack of growth is in contrast to a 35% rise in total industrial activity and a more than 50% rise in new construction from 1947 to 1953. Part of the explanation lies in the use of oils in resins which may eventually go into paint, and part in the increasing use of non-oil and low-oil content paints.

Use of fats and oils in linoleum and oilcloth has tended to decline from the immediate postwar peak for growing competition from competitive floor covering materials has cut the market 30% in the past five years. The 200 million pounds consumed in other drying oil products go into resins and a wide variety of other products, such as printing inks, insulation, core oils, and miscellaneous protective coatings.

Linseed oil still dominates the drying oil field for it accounts for more than half of all oil so used, but even so it is decidedly less important than 10 years ago. The rising challengers are soybean oil with 20% of the market, four times as important as a decade ago, and tall oil with 10% of the market. Trailing behind are tung, fish, and castor oils, and a variety of fatty acids.

Other Industrial Uses. The apparent disappearance of fats and oils in industrial uses other than soap or drying is over one and a quarter billion pounds per year. These uses total almost three times the pre-war average and have been maintained at a high level in recent years. It is difficult to "pin-point" specific

TABLE IV
Miscellaneous Industrial Uses of Fats and Oils
by Type of Use, 1952

	Million Pounds	% Change from 1949
Synthetic Detergents	147	+125
Chemicals	140	+ 48
Lubricants and Grease	116	+ 17
Rubber	51	+ 24
Textiles	48	+ 5
Tin and Terne Plate	31	- 6
Toilet Articles	26	+ 24

Data: U. S. Department of Agriculture
U. S. Department of Commerce.

markets since only about 50% are reported to the Bureau of Census. In 1952, the last year of complete data, the chief reported consumption areas were in synthetic detergents, a catch-all chemical classification, and lubricants and greases, plus three or four less important classifications (Table IV).

Although the growth rate varies greatly from product to product, on a total basis the average increase of about 8% per year from 1949 to 1953 has been nearly identical with that for all manufacturing industries and for the chemical industry in particular.

In summary, trends in the fats and oils economy over the past 10 to 15 years can be summarized in three main points:

1. great increases in domestic production;
2. gradually rising edible fat consumption as population grows, and lowered industrial use as synthetics cut into soap consumption and threaten to invade other fields; and
3. sharp change from a net import to a net export position, with large surpluses available for export.

Outlook

So far as we can tell, the future to a degree can be summed up in a phrase, more of the same. Live-stock numbers and slaughter, and meat fat production, all are pointed higher and, indeed in the long run, must constantly reach higher levels as the population grows and the consumers' desire for meat expands. The expansion in soybeans, which have become the primary source of domestic vegetable oil, has apparently been only temporarily interrupted during the past year, and the increase in oil output ahead will be only partially offset by less cottonseed oil. Stimulated by high prices, protected by support programs, and multiplied by the farmer's ingenuity and efficiency, the output of oils and fats in this country shows every sign of further increase.

Against this rise in output, we must balance the continued growth of the country, in people, in their productive capacity, in their ever-increasing consumption demands. This is particularly true for the edible fats because more people eat more food, and to a degree it will be true of the demand for industrial fats. But in the latter field there is an offset in the expansion of substitute materials, an expansion which shows little signs of slackening. It is notably present in the growth of synthetic detergents with its tremendous replacement of fat usage in soap, but it can be seen also in the development of rubber-based *versus* oil-based paints, in synthetic glycerines, and in a multiplicity of uses in the chemical field. The net seems likely, without much question, to be a continuation of production well in excess of domestic needs. In times past this surplus has been exported.

But this export market, at first a stimulus to and later a convenient outlet for high domestic production, shows signs of diminishing. In recent years it has been maintained in large measure by a series of government-sponsored programs aimed at economic or military assistance to our allies in Europe, and it has been encouraged by dislocations growing out of the war in Korea. Even so, recovery in world production and trade has resulted in substantial cuts in prices, cuts which have been necessary to attract the export buyer. The differentials between our domestic prices and world markets have tended to narrow, and the possibilities of further increases in world supplies, from current sources and perhaps from China, may

mean even smaller differentials in the future. Barring droughts or war, the problems of surplus disposal which we have increasingly faced in these past few years seem likely to continue unabated.

Industry Problems

The developments of the past and the prospects for the future emphasize the urgent need for solution of many problems in fats and oils. One in particular has attracted much attention in the past few years, and that is new uses for tallow and grease.

The struggle by the industry to find a solution to the "tallow problem" is, I believe, another good illustration of the relationship of economics and research and market development. It is a relationship which is stimulated and functions when prices are left to reflect true supply and demand conditions. With the accelerated loss of the soap market, tallow prices declined, and these lower and more attractive prices caused tallow to flow in increasing amounts into world trade. At a price all tallow produced in the past five years has found a market, though not a market which can be considered very satisfactory. But adjustments were made, which is in sharp contrast to developments in butter, cottonseed oil, and linseed oil. In these products high support prices have priced the products out of a large part of their market, increased government held stocks to mammoth proportions, and provided little incentive to the development of new uses and new markets.

But in tallow and grease, economic adjustments stimulated new and more vigorous research, and as a result tallow seems to be making a comeback. The problem is not solved, but there has been notable progress, and the most important from the standpoint of volume is the use of fats in feed. In little more than a year interest in and use of fats in feed have grown tremendously. The basic requirements were present in the known high caloric value of fats, and the need for correctives to the excessively dry and dusty condition of many feedstuffs, a condition incidentally, intensified by higher oil extraction from oilseeds through solvent processes, dictated in large measure by economic considerations. But the growth of fats in feed waited upon three principal factors: a) a price for fat that would make it competitive in cost with other feed ingredients; b) the development of stabilizers which would reduce or prevent rancidity in fat; and c) field tests to prove the favorable performance and economic worth of feed with added fat.

Coincident with the expansion of interest in the use of fats in feed, the prices of tallow and grease made a very appreciable recovery, and there was hope and fear, depending on one's point of view, that prices would go progressively higher as use in feed continued to grow. But there are two factors that work against this trend. First, of course, is the fact that the price of fats can soon reach a point where their continued use is uneconomic in relation to the cost of other feed ingredients. Secondly, and this illustrates the magnitude of the problem, to the extent that the domestic price structure strengthens, there is an almost inevitable opposing and moderating force in lessened export interest, an interest which could decline to zero as the domestic price approaches or surpasses world market prices for the same or competitive fats. When we consider that exports of tallow and grease alone amounted to nearly 1,200 million pounds in 1953, we have some measure of the magnitude of the tallow and grease surplus problem. Nevertheless the developing use of fats in feed is a very great step forward.

Other problems involve finding additional outlets for the expected continuing surplus of vegetable oils and vegetable oil foots. As the combined output of cottonseed and soybean oil continues to outstrip edible requirements, even more soybean oil will be available for industrial purposes. At the same time linseed oil will likely meet increasing difficulties as markets are lost to other oils and synthetic materials. The net price of vegetable oil foots has at times been below freight costs, in part a reflection of low tallow and grease values but more directly a result of high supplies and the loss of a large part of the soap market. The chief outlet for foots is in splitting, and further progress in the utilization of vegetable and of all fatty acids is a challenge for the future.

In thinking of the problems resulting from the invasion by synthetic materials into traditional fat and oil markets, we are faced with the fact that in the current chemical age this problem may become even more acute in the future. But tremendous technological gains have been made in fat processing in recent years, and more highly purified products with special capabilities have been and are being developed. As a result, the fats and oils industry is gradually getting in a position to wage a more vigorous competitive battle. The success of the battle will depend in large measure on how well we can meet and solve these present and future problems.

Vegetable Oils. Raw Materials for, and Recovery of, Inedible Fats and Fatty Acids¹

DONALD H. WHEELER, General Mills Inc., Minneapolis, Minnesota

THE order of magnitude of the more important fats and oils in the United States is given in Table I. Those marked with an asterisk are the vegetable oils which are the subject matter of this paper while the others are given for comparison. The figures are for factory production, excepting palm, tung, babassu, and oiticica, which are for consump-

tion since these oils are extensively imported. For the other oils the factory consumption is of the same order of magnitude as the production.

It is evident that soy, cottonseed, and linseed oils are the "big three" as to volume. However soy and cottonseed oils are used to a very great extent as edible oils and shortenings so their relative importance