Fats and the Needed Catalyst

THE INDUSTRIES of the fats and oils field have constantly sought improved tools, better knowledge, advanced techniques and more efficient applications, for it is these from which better operations—and hence better profits—result. Their success is unquestionable. In fact, production, processing, handling and marketing of fats and oils have become so very efficient that it is most difficult to improve upon them, except in fractions of a per cent. Indeed, it is to be concluded that rapid advance and significant growth of our industries are not to be had through efforts only to refine that which exists.

What we need today is that new idea or spark—that new catalyst—which will open additional areas of market potential into which our industries can expand.

There are those who insist that no such opportunity exists. Their thoughts follow those of the administrator in the U. S. Patent Office during the 1890's, who advocated closing the service because there was nothing left to invent. It would be tragic if we were so shortsighted as this, for the opportunity—the catalyst—does exist. Once employed effectively, this entirely practical catalyst can expand our industry, improve our technology, and advance our science.

This opportunity is no dark secret. Nor is it restricted by patents. In the relatively few areas where it has been tried, success has resulted. Yet, despite the appealing simplicity and ready adaptability of this idea, it has been put to remarkably little use. It is ours for the asking. We need only apply it.

Before identifying the catalyst and discussing the challenges which will result from its application, let us review the basic reasoning which has brought the entire issue before us. We will first consider those areas where little opportunity for spectacular growth exists, at least for the present.

The edible consumption of fats and oils in this country has, with only slight fluxuations, hovered rather close to 46 lb per person for a number of years. To be sure, there have been changes in the types of fats consumed, and there will likely be more, considering the possible influence of current work on the effect of various fats in the diet. Yet, as people eat more margarine, they eat less butter. As they use more liquid cooking oil, they require less solid shortening. Though total consumption will increase in relation to the expanding population, the prospects for a higher *per capita* consumption seem slim indeed.

The future for domestic industrial usage of fats and oils is hardly more encouraging. To be sure, a great volume of research is in progress, and much is thereby being accomplished. The sad fact remains, however, that we are having difficulty competing price-wise with our petrochemical competitors, who are doing considerably more research and who are getting correspondingly more results. The substitutions of tallow in soap and of linseed oil in interior housepaints are but two of the better-known epitaphs already written. There is no doubt that we are developing new processes and products that will reinforce our position as a supplier to industry. Yet, in the immediate future, there appears to be no sound basis upon which to predict a sudden, explosive growth and demand.

Now, let us look beyond our 50 states where we will see that prospects take on a different cast. Exports are growing at a startling rate. Europe alone imported an estimated 1.4 billion lb of soybean oil in 1962, which doubles their purchases in the preceding year. Likewise, Japan is buying more and more each year. Most of this volume is consumed in edible goods, but there is increasing inquiry into industrial possibilities as well.

The reason for the growth of this new market is simple and basic. People overseas, like those in the United States, will immediately begin to upgrade their diet when they are provided the means of so doing. Much of Europe's economy is flourishing, as is that of Japan. The basic carbohydrate diet is being replaced by the higher protein and fat diet. Other countries less fulfilled economically are feeling the stirrings of their people who want a better life—one that compares favorably with that enjoyed by those of us in the more industrialized nations.

At this point, the shortsighted will say: "Our opportunity is not here, for in this area, we are realizing our potential. Surely the current rapid rate of growth is not to be improved upon." To the contrary, this is where our catalyst is to be applied. Here lies the opportunity for substantial growth and expansion.

Before proposing a theory as to how this could perhaps be accomplished, let me make one point aboslutely clear. My remarks imply no criticism whatever of those who have brought us so far and so fast in so little time. Export of fats and oils from the United States would be in dismal straits were it not for the splendid contribution of private industry, the effective use of PL 480 by the Federal Government, and the tireless efforts of the Soybean Council of America and its overseas offices. Each of these, to the best of my knowledge, has done its job with laudable skill.

Rather than to succumb to the temptation of closing the book on this chapter, assuming that the search is finished and there remains but the pleasant chore of taking ever-increasing orders, let us set aside our current accomplishments in this area and take an objective look at our international relationships.

A share of the "know-how" in using and processing fats and oils has been exported along with our products. But a sizable portion of the use-skills has been developed and perfected by the scientists in the buying countries. In technology, their expertise is good. Yet in another all-important area, they have an overwhelming advantage. That is, they know far better than we the needs, wants, desires, and appetites of their own people and industries. It is to be categorically concluded that if we hope to expand this whole new market opportunity we are seeking, we must become at least aproximately as knowledgeable in that area as those who know it best.

To be sure, the Soybean Council has just completed its survey on the potentials of protein foods based on soybean products. The government, and especially the U.S.D.A., has made its inquiries and investigations. Private industry continues to make its own in-person analyses. Is this to be considered adequate attention to the matter? I believe it is only the beginning of a very fruitful activity.

We are continually cognizant of the work of world-renowned fats and oils specialists in foreign lands, who devise, change, invent, and calculate processes in response to the needs of their countries and their people. The importance of these scientists to us is of far greater dimension than is their reputation alone. Their work, their goals, their efforts, all can and will have tremendous impact upon the markets to which we wish to sell. As the work of these people is shaped by demand, so must the product salesman make changes to satisfy this same demand. It is thus of prime importance that we know and appreciate what these scientists are doing if we hope to satisfy their needs. Are we keeping pace with the developments in other lands?

Are we acquainted, for example, with the work in progress at the Experimental Station for the Oil and Fat Industry in Milan? They presently have PL 480 projects on determination of minor constituents in linseed oil, the composition of heat bodied oils, and the effect of metal catalysts in air oxidation of oils to produce useful chemicals. A whole new series of metal salts has been developed. Surprisingly, one of these appears to be an antioxidant

The Needed Catalyst . . . .

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the organization. We have the leadership, the dignity, and the respect. How shall we apply this vast facility to bring about the needed interchange of knowledge? There are several methods which ocur to me as being not only possible but practical.

1. The International Society for Fat Science plans to meet in Hamburg, Germany, in the Fall of 1964. It is possible that the group could be invited to hold one of their future meetings in conjunction with an AOCS Fall meeting. Such a joint meeting would be unprecedented in its magnitude, and would offer an unequalled forum for the exchange of valuable information. Granted, the logistics would require careful planning but the economy of charter plane service from a central city in Europe brings the idea well within the realm of practicality. Such would certainly not be the first successful international meeting to be held in the United States, or in Chicago. When approached, several European members of I.S.F. thought this was entirely feasible, and were optimistic about the possibilities. Were such a joint meeting to become a reality, we would be given the opportunity of meeting the leaders of fat and oil technology from many other countries. We could learn the details of their research and technology, and about the utilization of fats abroad. The AOCS should give serious consideration to entertaining the I.S.F. in the near future.

2. A second suggestion might be to sponsor an International Symposium on lipid metabolism and all its related problems, in conjunction with the 1964 AOCS Fall Meeting in Chicago. The AOCS could assume the rightful role of bringing together ideas and research discussions that could accelerate the whole effort to get at the truth of the many important lipid projects. It might be necessary to enlist the support of such groups as the National Institutes of Health, The Heart Institute, the Department of Agriculture, The Nutrition Foundation, industry, academic institutions, the Committee for Heart Research, The Soybean Council of America, and others. This is a big project, but it could be done, and would be worth every bit of the effort required.

3. Last fall our Canadian colleagues showed us that the AOCS is truly an International Society. We heard more about fat and oil research going on north of the border than has ever been presented at our meetings before. Several scientists from abroad attended, describing some of their work. At our Fiftieth Anniversary in New Orleans we heard of "Fifty Years of Fats and Oils" in several countries. Now, I believe there is an even better way to accomplish another step toward our objective. We could specifically invite workers in fat research laboratories around the world to attend the 1964 Fall Meeting and tell of their own current research. Not generalities, but their specific projects. They are anxious to talk about their research, and have said so many times. This could be accomplished in the form of an International Symposium on fat research. Such would also be well worth the trouble. Similarly, the PL 480 grantees working on fat and oil projects could be invited to present their research results at the AOCS Meeting. This could cement bonds of friendship and understanding that would help keep these markets open long after PL 480 passes into history.

4. A fourth suggestion might be to organize a representative group of members to visit the major research centers in Europe and report back to the 1964 Fall Meeting, detailing work and technology going on abroad. Many such groups from abroad have visited our laboratories and plants since the war and we have sent teams abroad to tell others much that we know. These extensive tours are sponsored and well planned by several different agencies. But there have been few, if any, such U. S. teams abroad for the specific purpose of learning what others are doing since the Technical Intelligence teams were utilized right after World War II. Such a well-organized tour could bring great rewards in better understanding, and some new ideas in fat and oil research or technology. There are several Foundations which might well support such a project, and help extensively with the arrangements. I think the door should be open both ways, enabling U.S. specialists to make these exploratory trips overseas. Here, again, arrangements should insure that people of like interests are brought together. Care should be taken that such a trip not lapse into hollow pleasantries which leave all the participants feeling disappointed and cheated, and wondering why in heaven's name they squandered their money and time. Any such tour should be coordinated with work already underway. There is too much to do, and the potential rewards too great, to permit a needless duplication of effort, and perhaps even conflict.

I have mentioned only four possible projects, any one or all of which could be coordinated with a coming AOCS Meeting. These are meant only to stimulate thought, and certainly not to restrict it. There are many other ways to accomplish these objectives.

At this point, if you agree that the objectives discussed are worthy of attaining, I have accomplished my primary purpose in this discussion. If, in addition, it is agreed that the proposed projects have merit, then we have our catalyst, and need only to apply it.

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"The Fat and Oils Situation"

From figures released at the end of March by the Economic Research Service, U.S.D.A., it is expected that supplies of food fats and oils will be slightly higher than last year, while exports and domestic use will probably continue high and may set new records for the entire 1962–63 marketing year. Carryover stocks next October 1 should be virtually the same as last year, as reduced stocks of soybeans will probably offset the anticipated increase in those of edible vegetable oils and lard.

Current prices of edible vegetable oils and lard are expected to remain relatively stable through September, with cottonseed prices expected to average at least as high as in the first half of the marketing year (October–March 1962–63), but slightly below the April–September 1962 average. It is probable that soybean prices will average slightly higher in the second half of this marketing year than the first half, and somewhat above that of the April–September 1962 average.

Exports of food fats (including the oil equivalent of soybeans) dropped somewhat in the first half of the marketing year, due to the dock strike, but the demand for U. S. soybeans from dollar exporting areas is expected to be stronger this year than last, for the movement of cottonseed and soybean oils under the Food for Peace Program will increase sharply. In fact, for the entire 1962–63 marketing year, exports of all food fats and oils may set a new record of around 4.7 billion lb compared with 4.1 billion last year. More soybeans, soybean oil, and butter are expected to move out; about the same volume or more cottonseed oil; but less lard.

Total U. S. supplies of soybeans available the rest of this marketing year will be nearly as large as during the corresponding period of 1962, but requirements will be greater this year. Thus the supply may tend to tighten before new crops are available—usually around mid-September, and carryover stocks of old crop beans this October will be sharply below the same date last year. Soybean prices to farmers increased from a monthly average of $2.23 per bushel last October to $2.50 in February 1963. During this period CCC holdings of 40 million bushels were virtually liquidated. Prices are expected to continue strong this spring and summer, averaging above the $2.33 per bushel received during April–September 1962.

Early indications point to about the same level of food fats and oils supplies in 1963–64 as in our current marketing year, and the strong demand is expected to continue well into 1963–64.

rather than an oxidation catalyst. This work could be very useful in the future.

In Spain, the Institute for Fat Research has several very interesting projects. One in particular, sponsored by PL 480, deals with the effects of trace metals in soybean oil on the stability of the oil. Removal of these by ion exchange treatment is being studied as a practical means of improving the flavor stability of soybean oil. Of course in addition there is considerable work on recovery, processing and utilization of olive oil, the indigenous oilseed crop in Spain.

In France, the National Scientific Research Laboratory of Lipochemistry has active projects on the mechanism of autoxidation, preparation of peroxy acids, ketones, cyclic compounds and differential thermal analysis of fatty acids.

In Belgium, the National Institute of the Fermentation Industries has done a great deal of interesting work on the processing—especially bleaching—of palm oils. Some of the results are certainly of value in other oilseed areas.

At the German Institute for Fat Research in Munster, there have been and are projects on virtually every phase of fat and oil technology—basic analytical techniques, oil processing into edible products, preparation of fatty chemical derivatives, and soaps and detergents. Those who visit the Institute will note a plaque which explains that Marshall Plan funds from the United States helped to get this laboratory started again after the war.

Other newer developments from German industrial fat and oil chemists included a non-saponifiable drying oil vehicle prepared from linseed oil, a new process for isomerizing polyunsaturated fatty acids which can then be used as starting materials for several new industrial outlets for oils in automobile manufacture, construction industries, packaging materials, and protective coatings. A recently announced biodegradable detergent made from castor oil and sucrose could be a big new area of interest to fats and oils chemists. A new law in Germany requires that all detergents be biodegradable by the fall of 1964. Concern over contamination of our water resources in this country is mounting rapidly and similar proposed requirements are being considered by several of our state legislatures. Therefore, a fat-derived detergent to replace the tetrapropylene benzene sulfonates now used could be of great interest to our industry.

How much practical knowledge do we have of these and the many similar activities in Europe? Of those facts available to us, how valid will they be 12 months from now? And what of the activities in India, Pakistan, Turkey, Israel, Japan, Brazil, and the other countries where end-use research is being conducted on a major scale? What do we know of these?

How much information is generally available about the end-use of fats and oils shipped abroad under PL 480? How well do we know the people who receive this material? What do they do with it? What would they prefer to do with it, or are they satisfied with what they now receive? If we designed fats and oils specifically to their needs, would there be the possibility of dollar sales in addition to those for their own currencies? And to continue with this reverse-type Point 4 program, how much technology has been developed overseas that could be of value to us in this country? What new products or processes or ideas are being developed? Since World War II, we have become so accustomed to exporting science and technology that it is easy for us not to realize the importance of work that may be going on in other countries. It would be sheer folly to ignore this vast amount of experimentation.

There is a great increase in use of soybean oil in Spain. How many of us know specifically why the Spanish—traditional consumers of oilve oil—are broadening their diet? Do they have information on uses or processing that could be of help to us, or do they have problems in using soybean oil that we could help solve? Are there other oils they might find to be desirable alternates?

The questions can go on and on. Each represents, to some degree, information that we should have—that we must have—if we are to continue the supply and processing role for which we are so well qualified.

The economic importance of these overseas industrial and scientific leaders is obvious. These specialists represent channels to increased knowledge and sales, all of which leads to a broader base for profits. There is little need to belabor this point.

But there are yet other benefits worth considering. For example, the people to whom our fats and oils are shipped will enjoy improved nutrition and better diets, and at a low cost made possible by our highly efficient production complex. New or broadened markets would create need for additional farm-grown oilseeds. Thus, values to our agricultural and business economies and to the balance of payments situation becomes apparent.

To summarize, one might enumerate as follows:

1. There is a need to increase the utilization of fats and oils.

2. The greatest opportunities seem to lie in increased sales overseas and in new industrial applications here at home.

3. In order to take advantage of these opportunities, we need to know more about our customers and the uses to which they put our products.

4. The scientists and technologists abroad have considerable know-how that we should make a greater effort to acquire in order to put it to use here and to improve our understanding of the possible markets they represent.

Now, we reach the ultimate question. How are we to gain this knowledge? As mentioned before, there is considerably more that can be done to this end.

It is obvious that we are discussing a project that no one can accomplish alone. Each of us has day-to-day tasks to perform. Hours for outside projects are precious and limited. The full-time devotion of one or two men to a project of such magnitude would end in hopeless frustration. There would be much to praise in such courage, but little to commend it in judgment. At the same time, if we are not to join the ranks of the shortsighted, we must certainly think bigger than we normally do. The challenge for free enterprise to move forward to new markets is very great. We must accept this challenge in order to keep our type of free western society strong—and to further strengthen it at every opportunity.

You will recall that the title of these remarks is "Fats and the Needed Catalyst." Let me issue a challenge which is interchangeable with this title.

The actual doing of such a program of information gathering and dissemination would of necessity be a big undertaking. The specialties of many persons would be required—chemists and public relations men, management and government administrators, college professors and the office mimeograph department, plus a multitude more.

The project would be long in accomplishment. An increased exchange of information on needs, products, goals and activities between nations cannot be achieved quickly, nor should it be. There will be need for questioning and analysis, examination of fine points, proposals and counterproposals. To attempt any meaningful action in a week or a month would be folly of the highest order. What this project requires is a floodlight, not a flashbulb.

Here is the heart of our challenge:

The American Oil Chemists' Society and its Journal are well known around the world. There are members and Journal subscribers in every major fat producing or consuming country and in most of the major laboratories that are concerned with lipid products. It is altogether logical that our Society should play a much more aggressive role in this increased interchange of information. We are looked to as leaders, so let us examine some ways in which we can render greater service to our associates, our industry and our country's economy.

I believe we of the American Oil Chemists' Society can become the catalyst to spur more activity toward the goal of gathering additional information for our industry. Furthermore, I believe we must accept the responsibility to take an aggressive lead. We have the manpower, the ability, and the imagination. We have the facilities and

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