Fats & Oils News

The Leatherhead Food Research Association, with Special Reference to Current Oils and Fats Research

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About the article—

This is another in a *JAOCS* series on research facilities in the United States and elsewhere. Previous articles have covered the Texas A&M Food Protein and Research Development Center, the POS Pilot Plant facility in Canada, and French Fats and Oils Research Institute (ITERG) facilities in France. *JAOCS* would welcome reports from similar institutions elsewhere. Information should be sent to: JAOCS News, 508 S. Sixth St., Champaign, IL 61820 USA.

Leatherhead Food Research Association facilities in England.

SUMMARY

The Leatherhead Food RA is an industrially funded, but independent, laboratory situated south of London, England. This paper describes the general organization and activities of the laboratory, with special reference to the Oils and Fats Section. Brief descriptions are given of the section's research facilities and of its research funding. The procedures for liaison with members and reporting of results also are outlined.

INTRODUCTION

Mention the word "research" to most people and they immediately conjure up visions of work being carried out on a subject, somewhat divorced from the realities of life but academically fascinating, by a group of backroom boys with no regard for time or money. An industrial research association fitting that picture would not stay in business very long.

The Leatherhead Food RA is a strange laboratory. It is located at Leatherhead in Surrey, just 20 miles south of London, on an independent campus. It is not a food-industry laboratory in the sense that it is not attached to a single food company but, nevertheless, it is geared to serving the needs of industry. It is not a government laboratory, but it has an input of government research funds. It is not a consultant laboratory, yet one-third of its income comes from consultation services. It is not protected from the realities of life; it has to run as a business and it has to be successful. A necessary ingredient of any successful business is the ability to identify a saleable product and to be able to produce it and present it at a competitive price to its customers. The Leatherhead Food RA is in exactly that position. It has been in existence for over 60 years and, during the past 10 years or so, it has expanded in real terms at a rate approaching 10% per annum, so perhaps it is worth examining how the Leatherhead Food RA operates and what it can offer.

INFORMATION RETRIEVAL

The main product of the Leatherhead Food RA is information, and it is, therefore, vital that there is a large and

powerful information section. The Information Group, in fact, comprises a total staff of 35. These are organized in groups covering such topics as Economic and Market Information, Scientific and Technical Information, Library Services, Computer Services and Sales, and Legal Information. These groups vary in size depending on the needs of members. There are, for instance, five scientists geared solely to keeping up to date with food legislation on a worldwide basis and coping with members' queries. Many more queries come to the RA relating to technical and scientific aspects of food manufacturing, and the majority of these inquiries can be dealt with by existing information which either has been generated in-house or is readily available from other sources. In order to cope with the flood of inquiries, it is necessary to access the information quickly. To that end a computer-assisted information retrieval system (CAIRS) was established. The development of this system started in the early 1970s. It was realized that the traditional card-index system, which was in use at that time, would soon become overloaded and in any case would be too slow to cope with the information explosion and/or to provide the rapid response required by modern industry. It was for this reason that CAIRS was developed and installed. The early system was, by present standards, a relatively restricted one but nevertheless represented a significant advance, since it could be operated by a mini-computer and still give specific retrieval of the required information. Since that time the system has become more and more sophisticated. It is now at a stage where authorized members can dial direct into the Food RA computer and do their own searching. Considerable interest has been shown in CAIRS on a worldwide basis, and many systems have been sold, not only to the food industry but to many other organizations such as the Agricultural and Food Research Council, the Manpower Services Commission and several industrial organizations. Occasionally queries come in which cannot be answered from in-house information stocks or from the expertise of the many scientists in the Research Association. Sometimes the information is available in other research laboratories, in which case the Food RA can usually access the information on a reciprocal basis. Sometimes, however, the information simply is not known. In this case it is necessary to decide whether the problem is of sufficient significance to justify mounting a research program.

RESEARCH ACTIVITY

Quantitatively the major activity of the association is, of course, research—not long-range academic research but work geared to solving specific problems which industry already has or which it is anticipated industry will have in the future. Sometimes research projects are of relatively short duration; in other cases they may go on for many years and, in the latter case, the program is examined frequently to see if it is worth proceeding. The easiest way to waste research resources is to do the wrong work, and great care is taken to ensure that this does not happen. The program is developed in consultation with industrial members and, as the work progresses, it is reported frequently to these members so that, if necessary, the direction of the work can be changed to something that is more relevant.

This industrially oriented research is carried out through a system of panels. There are, at present, nine panels: Analytical Methods, Confectionery, Food Engineering, Gels and Thickeners, Meat and Fish Products, Applied Microbiology, Oils and Fats, Process Instrumentation and Fruit and Vegetable Products. Every member is invited to contribute a portion of his subscription to the panel or panels of most interest to his business. The member can then vote in the election of a Panel Committee, which decides the direction of the research work.

The research work undertaken is wide ranging, as would be expected in a laboratory serving a highly diverse food industry. It is carried out in a number of different sections which vary in size depending upon the needs of the industry. Some of these sections correspond exactly with the panels, as in the case of oils and fats, while others, such as microscopy or mycotoxins, carry out work in conjunction with other panels, or on government-funded topics. Some sections are mainly technology oriented, such as the Meat and Fish Products Section, the Fruit and Vegetable Products Section and the Confectionery Section. Some combine technology with quite fundamental scientific investigations, such as the Oils and Fats Section, while other sections are discipline oriented, such as the Analytical, Engineering, Physics and Biochemistry Sections. The technology sections generally are aimed at improving the fundamental understanding of the technology of product manufacture. In many cases the industry knows what to do but does not know why it does it. Given the information on the factors which are involved in, for instance, the binding of fat in a meat product, it is possible to improve dramatically the quality of products by better control of the manufacturing process.

Some technology problems require input from discipline-based sections. For instance, studies of fat bloom in chocolate rely heavily on electron microscopy. It was in the Microscopy Section that observations of the structure of milled sugar allowed the development of a new form of microcrystalline sugar that has the revolutionary property of not caking. Electron microscopy also provided an understanding of the behavior of fats during the creaming process, which allowed the development of new fats. The Analytical Chemistry Section provides a service to members which allows it to act as a reference laboratory, but it is also concerned with the decomposition of food ingredients, with the development of new analytical methods, and with the detection, identification and quantification of compounds giving rise to taints and off-flavors in foods, especially fatty foods. The Physics and Process Engineering Sections are concerned with factory operations, producing fundamental information on the properties of food material for application by engineers in developing new processes such as mixing. Heat transfer and energy saving are other important investigations. Another section concerned with factory operations is the Process Analysis and Control Section, which has developed not only process control equipment specifically designed to measure difficult in-line process parameters, but also microprocessor and PLC systems capable of utilizing the signals to control processes.

The Physics Section also carried out more fundamental studies. It has, for instance, recently investigated the structure of water in food. This information is leading to a better understanding of the preservation properties of intermediate-moisture foods. Preservation and food spoilage and safety are major concerns of the Applied Microbiology Section, which is quantitatively the largest single research section in the RA. It probably is the most advanced laboratory in the world on rapid techniques for determining the microbiological quality of food and is capable of providing a total count in 30 minutes. Soon it is hoped to modify current techniques to enable the specific determination of individual micro-organisms to be made. Among the facilities offered to members by the Applied Microbiology Section is the Botulinum Laboratory which, although (fortunately) infrequently used by members in an emergency situation, is

absolutely critical, since it is one of the few botulinum laboratories in the United Kingdom not attached to government.

The purpose of the newly formed Biopolymers Section is to provide an understanding of the chemical structures and reactions responsible for the commercially important properties of proteins and polysaccharides. Functional properties of polymers in food and the role of structural glycoproteins in the plant cell wall currently are being examined.

The biochemistry laboratory has, for a long time, been concerned with the formation of nitrosamines in foodstuffs and, again, is in the international class. For many years it has done contract work for the National Institutes of Health, Bethesda, Maryland, USA. Another section concerned with the hazards associated with foods is the Mycotoxin Section, which, while financed predominantly by government contracts, also is able to provide a sophisticated service in determining the presence of a wide range of mycotoxins in many different foods.

OILS AND FATS SECTION

The Oils and Fats Section functions as two sub-groups, the oils and fats laboratory and a routine oil and oilseed analysis laboratory. The latter is the official laboratory of the Federation of Oils, Seeds and Fats Association Ltd (FOSFA International) London, where contractual analyses are carried out on oils and oilseeds being traded throughout the world.

During recent years, under the leadership of Barry Rossell, the Oils and Fats Section has expanded its activities and undertakes a wider service role than previously, analyzing a wide variety of fatty food samples for Food RA members. In addition, research is carried out for the Oils and Fats panel, the (UK) Ministry of Agriculture Fisheries and Foods (MAFF) and FOSFA, and on several confidential projects of fundamental as well as applied nature.

The official FOSFA laboratory service for oil and oilseed analysis was reorganized during 1982. In past years the majority of oil and oilseed samples analyzed had been submitted by FOSFA International on behalf of FOSFA members. This led to both duplication of effort and loss of time. The analytical service therefore was reorganized to enable FOSFA members to send samples and analytical instructions direct to the Food RA; Contractual Analytical Certificates and invoices are in turn sent directly to FOSFA members. This reorganization has enabled savings in time and money, and the RA now is able to offer a better service to clients. There is a greater demand for analyses of a more sophisticated nature, and the number of samples and inquiries highlights the importance of the authenticity project reviewed later.

The Food RA also acts as a scientific consultant to FOSFA and has dealt with a number of technical inquiries from FOSFA members, the work having been channelled through FOSFA on a fee-paying basis. Part of the laboratory reorganization already mentioned relates to these activities also, as FOSFA members now approach the Food RA directly, and are invoiced by the RA for the service, rather than through FOSFA. Dr. Rossell also represents the Research Association and FOSFA on relevant committees (Oils and Fats, and Oilseeds) of the BSI, and was a FOSFA delegate to the last meeting in London of the FAO/WHO Codex Alimentarius Commission Oils and Fats Committee meeting.

The oils and fats laboratory is well-equipped with the latest scientific instruments for such techniques as capillary column gas-liquid chromatography, high-performance liquid chromatography, infra-red and ultraviolet spectrometry, and continuous wave, wide-line NMR. Each of five gas-liquid chromatographs, two of which are on-column capillary instruments, is fitted with its own printer plotter and is linked to a Spectra Physics SP4000 computer for data interpretation and peak identification. The laboratory also has access to flameless atomic absorption and mass spectrophotometers installed in the Analytical Methods Section. Oxidative stabilities of oils and fats are measured by Rancimat and FIRA/Astell apparatus, enabling comparison or choice between the two approaches. The FIRA/Astell stability testing apparatus was in fact devised by M. L. Meara, former head of the Oils and Fats Section, a little over a decade ago.

There also are facilities for small-scale frying of, for example, crisps or chips, important in some aspects of oil evaluation, and for kilogram-scale neutralization, bleaching, deodorization and hydrogenation trials.

Recent Oils and Fats Section research topics are described below.

DETERMINATION OF SOLVENT RESIDUES

Industrial hexane is used to extract oils from oilseeds, and although the solvent is recovered from the oil, doubts have been raised about the residual levels. Other solvents, such as ethanol and acetone, also are used as food-processing aids, e.g. for solvent fractionation of hard fats, and it is possible that residues of the solvents may remain in a fatty foodstuff.

The Oils and Fats Section was approached by the Seed Crushers and Oil Processors Association (SCOPA), who wanted a method developed capable of measuring levels of less than 1 mg/kg of residual hexane, and analysis of a number of samples from SCOPA members. The method developed was one of direct on-column injection, which was sensitive down to 0.05 mg/kg hexane in oil. All of the samples submitted by SCOPA members had residual solvent levels below 0.05 mg/kg.

One problem with direct-injection methods of this type is that the chromatographic column may become damaged by the injection of vegetable oil on to the column, and to alleviate this danger a pre-column, or liner, of silanized glass wool was used. This was changed every three injections.

Additional work established that the response is linear at concentrations between 0.05 and 0.5 mg/kg.

In the meantime, reports from Italian laboratories have shown that a closely related method has a linear response of from 5 to 20,000 mg/kg. The combination of RA results with the Italian results indicates that a linear range is likely to be from 0.05 to 20,000 mg/kg for this determination.

This work has now been published (1) and the method written up in standard format and submitted to the BSI and other international standardization bodies. The International Union of Pure and Applied Chemistry decided at its meeting in August 1983 to ring (collaboratively) test this method.

This work is one example of the way in which the Oils and Fats Section is expanding its activities.

STUDIES ON BUTTER OIL

The current confidential (Members Only) work for the Oils and Fats Panel relates to studies of butter-oil processing. The main attraction of butter oil is its flavor, and a considerable effort has therefore been spent on training a flavor-profiling panel. During the training a 'flavor language' for

this profiling work has been established. Winter, spring and summer samples of butter are being converted into butter oil under a variety of conditions, and some samples are being separated into hard and soft fractions in the laboratory. The final objective is to establish the conditions necessary to produce a range of butter oils and butter-oil fractions with flavors and physical properties to suit the needs of manufacturers in a variety of food products.

AUTHENTICITY OF OILS AND FATS

This work is jointly funded by FOSFA, the Food RA, and the (UK) Ministry of Agriculture, Fisheries and Foods, who have overlapping interests. FOSFA had been conscious of the fact that some oils traded as pure oil may in fact be contaminated or adulterated, and wished to develop purity criteria in order to help arbitrators decide on such issues. The Food RA, on the other hand, had an interest in the development of analytical methods and statistical interpretation of results in such areas. The Ministry of Agriculture, Fisheries and Foods also was interested in research work in this area, not only because of its concern about oil purity, but also because it needed better guidelines as to the nutritional and compositional characteristics of the average UK diet. The work started about four years ago and has involved a study of samples of nine major oil types. Table 1 lists the numbers of samples of each oil type studied. Recently, safflowerseed oil also has been included in the list of oils under investigation.

TABLE 1

Number of Samples of Each Oil Type Studied in the Authenticity Project

Oil types studied	Number of samples
Palm oil and fractions	60
Groundnut oil	53
Sunflowerseed oil	34
Soybean oil	32
Rapeseed oil	74
Maize oil	32
Cottonseed oil	27
Palm kernel oil	54
Coconut oil	23
Total	389

The methods of analysis employed in this project are: determination of fatty-acid composition, determination of the composition of the acids at the triglyceride 2-position, determination of triglyceride composition by high-temperature GLC, and determination of tocopherol contents. In a closely related project, solely funded by MAFF, the sterol compositions of a selection from the same set of samples also were determined. Also, a literature review (2) on the influence of processing on the levels and compositions of naturally occurring sterols in edible vegetable oils was compiled as part of this project. One interesting aspect is the analysis of tocopherol and tocotrienol concentrations in vegetable oils by HPLC. This has made it possible to establish ranges for these natural antioxidants, as shown in Table 2.

These values can be important parameters in the identification of adulterants in crude oils. For example, as the table shows, there is a relatively high level of δ-tocopherol in soybean oil in comparison with other liquid vegetable oils such as groundnut and sunflower, where δ-tocopherol is present only in trace amounts.

Another method of distinguishing oils depends on the ratio of the concentration of a fatty acid at the 2-position of the triglyceride molecule to the overall concentration of this acid. This ratio is called the Enrichment Factor (EF), and it can be calculated for a number of constituent acids. It has been established that the ratio is very nearly constant for each oil, as shown in Fig. 1. These plots can be very useful in deciding purity questions with suspect oils, being more useful than the EF ratio itself, as the actual concentrations of the acid in the distinct triglyceride positions also are taken into account. Some of this work already has been published (3), while other aspects are about to be released (4). In addition, two symposia—1) Palm Oil and 2) Quality Liquid Oils (groundnut, sunflower, maize), sponsored jointly by the Leatherhead Food RA and FOSFA International —were held in Leatherhead. The proceedings of the two symposia are available from the RA publications department.

The work on the authenticity project is continuing with the analysis of additional samples of the oils so far studied, and with the analysis of safflowerseed oil samples. More sophisticated methods of analysis (e.g. capillary column gas-liquid chromatographic analyses of 4α-methyl sterols and triterpene alcohols in oils) are being developed to supplement those already employed. Any readers who are able to

TABLE 2

Tocol Contents (mg/kg) of Vegetable Oils

	Ranges					Mean values	
	Cotton	Sunflower	Groundnut	Soya	Palm	Maize	Low erucic acid rape
αT	130-540	400-850	50-30	10-350	5-185	280	200
βT	0-30	10-45	0-40	0-35		50	65
γT	160-600	0-35	100-400	410-2400	3-35	1000	490
δT	0-20	ND-7	3-22	155-930		55	10
αT_3					40-700	50	
βT_3					0-150	10	
γT_3						150	
δT_3						5	
Mean Ratio $\frac{\alpha T}{\gamma T}$	0.88	219	0.82	0.09	4.4	0.3	0.4

T = Tocopherol; T_3 = Tocotrienol, and ND = Not Detected.

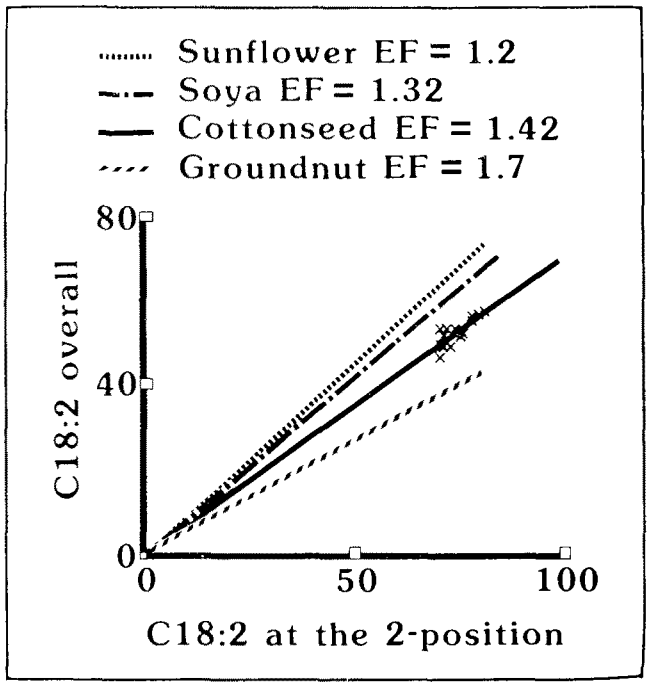

FIG. 1. Linoleic enrichment factor plot for cottonseed.

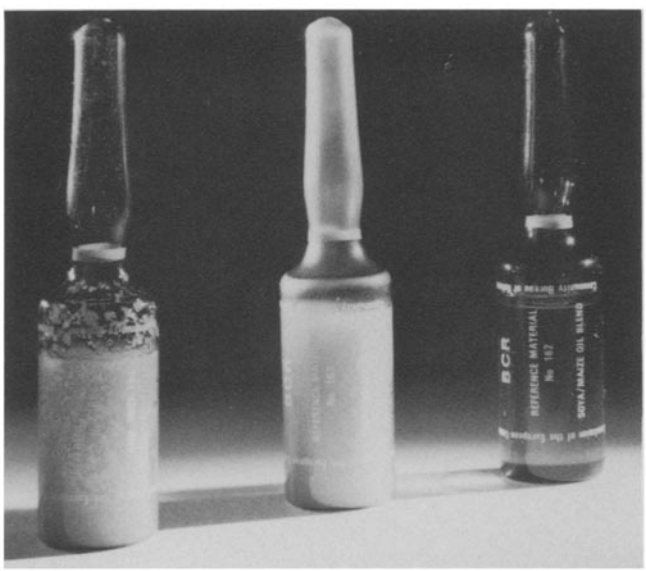

FIG. 2. Ampules of anhydrous milk fat, a beef/pig fat blend (50:50) and a soya/maize oil blend (50:50) prepared for the BCR.

provide samples of oilseeds for this work are invited to contact J. B. Rossell at the Leatherhead Food RA with information about the oilseed samples they have at their disposal.

REFERENCE MATERIALS FOR THE CBR (SUPPORTED BY THE EEC)

The objective of this work for the Community Bureau of Reference (CBR) is to prepare a number of edible-oil reference materials which eventually will be certified for a range of analytical properties. Four thousand brown glass printed ampules, (5-ml size) of each of three fat materials (Fig. 2) were filled under N_2 at the Leatherhead Food RA using an automated filling and sealing machine. Measurements of peroxide value, induction period at 100 C, FFA, etc., were used to select the best batch of each fat type. To ensure good stability on storage, TBHQ (250 mg/kg fat) was added to each material prior to filling. BHT and BHA (each 100 mg/kg fat) and vanillin, β-sitosterol and stigmasterol also were added to the anhydrous milk fat in accordance with EEC Regulation No. 262/79. Fatty acid compositions of the parent oils and their 50:50 blends were determined by GLC.

The refractive index was determined on 40 evenly spaced and 40 randomly selected ampules (plus a few corresponding to temporary stoppage of the filling machine) from each of the three batches. The specific extinction values (conjugated dienes at 232 nm and trienes at 268 nm) on half of these samples also were determined. These results were used to confirm homogeneity of the batches of ampuled materials.

Statistical analyses showed there was no significant difference in the contents of each set of ampules. All the data were found to fall within the 99% confidence limits. The storage stability testing of the ampuled materials is underway.

A number of European laboratories, including the Food RA, participated in a collaborative test to determine the certified properties. The analyses carried out were therefore: iodine value; unsaponifiable matter; *cis,cis* polyunsaturated fatty acids; vanillin; butyric acid; fatty acid composition; triglyceride carbon number composition; composition of the fatty acids at the glycerol 2-position, and the sterol composition. Statistical analyses of the results obtained in this study are being conducted by the EEC. The BCR has a plan to prepare, in the near future, reference ampuled materials of virgin olive oil, a blend of coconut oil and cocoa butter, a blend of low erucic acid rapeseed oil and groundnut oil, and a blend of rapeseed oil and hydrogenated fish oils. In addition, preparation of oil standards containing trace elements such as copper, iron, nickel, zinc, manganese, arsenic and lead is being considered.

ADDITIONAL WORK FUNDED BY FOSFA

Research Projects

Food RA staff frequently are invited to be "in attendance" at FOSFA meetings such as those of the "Standard Method Working Group." This liaison, and participation in the FOSFA technical matters, led to the realization that the research facilities available at the Leatherhead Food RA could be brought to bear upon several of the problems which confront FOSFA from time to time. Some time ago, for instance, a short research project was undertaken to examine the analysis of rapeseed for the undesirable weedseed "Sinapis Arvensis." This short research project reached no definite conclusion and was suspended about four years ago. However, interest has been revived and a student now is working in this area at the Liverpool Polytechnic, partly funded by FOSFA, and under the joint supervision of the Leatherhead Food RA and Liverpool Polytechnic.

In addition to the above, and the authenticity work partly supported by FOSFA, research on a number of small projects is carried out. One project investigated alterations to the British Standard method for the determination of soap in oils (BS 684: Section 2.5: 1977), which is not applicable to acid or other darkly colored oils as the oil color masks the visually determined titration end point. Potentiometric titration was found to be the most suitable alternative method; it is being recommended to the FOSFA International Standard Methods Working Group and through

them to VSI and ISO.

Other research topics include comparison of methods of extracting oil from oilseeds; analysis of sunflowerseeds for oil content, and instrumental methods of oilseed analysis.

Occasionally, experimental work is conducted on behalf of FOSFA International, in connection with appeals and arbitrations. One recent example was hydrogenation of a suspect oil in the oils and fats laboratory using the Parr reactor.

Collaborative Tests on Analytical Methods

As mentioned earlier, the Food RA acts as scientific consultant to FOSFA, and in this capacity organizes FOSFA's collaborative tests. These are designed both to monitor the standard of analytical work being carried out by their approved laboratories throughout the world and, occasionally, to study new analytical methods.

During the year tests on the determination of fatty acid composition of oils by GLC were carried out with laboratories whose technique previously had been found to be suspect, and with a new member analyst. A test on determination of peroxide value was extended to include a trial on behalf of ISO of a new draft method for determination of Anisidine Value.

A collaborative test on the measurement of color by AOCS, FOSFA and BS methods also has been organized.

Detailed discussions have been held on the statistical background to the ring-test program and on ways to obtain the most benefit from the program. It was appreciated that the FOSFA ring-test program differs considerably from many collaborative studies in that the objective is mainly to test the analysts rather than the analytical methods, although the latter aspect sometimes is included, as outlined above.

OTHER TOPICS

In addition to work on confidential projects, sponsored by either an individual member company or a group of Food RA members, research on suitable topics sometimes is carried out by students and visiting scientists from abroad. A few years ago, an Iraqi student registered at Reading University investigated steam (physical) refining of soybean oil. This work now is being published externally (5,6,7).

Currently, an Egyptian student from Alexandria University, A. A. Abdel-Nabey, is studying the compositional characteristics of several varieties of Egyptian cottonseed in comparison with other cottonseed types available at the Food RA. This study also includes measurement of the mycotoxin levels of the seeds, and the gossypol contents of the oils. A further objective of the project is to investigate changes in various characteristics when cottonseed oil is processed, taking particular note of the fate of the cyclopropenoid acids.

A couple of years ago, T. Matsui, a visiting scientist on sabbatical leave from the University of Meiji, Japan, carried out work (8) on the nutritional quality of some fatty acids and the *trans* contents of some oils, margarines and other food fats. Nutritionalists throughout the world have taken an interest in his survey of food fat compositions.

The current oils and fats research projects are supported by the Food RA from members' subscriptions, the Oils and Fats Panel, MAFF, FOSFA International, private confiden-

tial contracts and the EEC. Research results on these topics are regularly reported to the appropriate committees and members. Wherever possible, an effort is made to publish the results of non-confidential projects externally, or the papers are presented at relevant international conferences and/or meetings.

In summary, the Oils and Fats Section at the Leatherhead Food RA is a specialist research and analysis facility capable of carrying out a wide range of tasks from the measurement of the free fatty acid content, or peroxide value, of a member's sample, to a detailed sophisticated research program. Its strengths lie in its independence, which ensures utmost confidentiality when working on specific contracted research topics, the experience and skill of its staff, and its access to the skills of other sections. In fact, the last aspect is perhaps its main strength. Food RA members in the oils and fats industry often have skilled staff and laboratory facilities equalling those at Leatherhead. However, the Oils and Fats Section has an advantage over industries' own laboratories because of its access to the extensive library and information service, and also due to the cooperation available from other Food RA sections, such as Sensory Evaluation, or Food Engineering. This often enables implementation of multi-disciplinary research not possible within a member's own resources.

For further information on the Association and its services, readers should contact the Sales and Training Manager, R. A. Swift, at the address at the head of this article.

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Leatherhead symposium

A symposium on production, use and economics of soybean and rapeseed oils will be held Thursday, Nov. 29, 1984, at the Leatherhead Food Research Association in Leatherhead, England.

The symposium is sponsored by the association and FOSFA International, with cooperation of the Canadian High Commission and the American Soybean Association. Topics will include oil production, characteristics, composition and uses, world trade, consumer acceptance and future prospects.

Details are available from Anne Nash at the Leatherhead Food R.A., Randalls Road, Leatherhead, England.

U. S. crush off 20%

The U.S. soybean crush declined during the second quarter of 1984, according to figures from the National Soybean Processors Association.

The total crush during April, May and June of 1984 was approximately 224 million bushels, compared to 271 million bushels during the first quarter. Whereas NSPA members operated at 68% of capacity during the first quarter, the second quarter figure was 60%.

Oil yield was up slightly at 11.31 pounds from each bushel compared to 11.23 pounds the first quarter. Meal yield also rose, to 47.18 pounds, compared to 47.15 pounds the previous quarter.

The relatively small 1983 U.S. soybean crop limited the amount of soybeans available for processing. Third quarter figures may show another decline, as the 1984 soybean crop will not be available for processing until the fourth quarter of 1984.

U.S. Soybean Crush—Second Quarter 1984

	April	May	June	Totals
Capacity (1,000 bushels)	121,701	125,757	121,701	
Crush (1,000 bushels)	74,561	79,248	70,263	224,072
Per cent of capacity	61.3	63.0	58.5	60.7
Oil produced (1,000 lbs)	838,855	898,093	795,679	2,532,627
Oil yield (lbs per bushel)	11.25	11.33	11.32	11.31
Meal produced (1,000 tons)	1,759	1,869	1,658	5,286
Meal yield	47.19	47.17	47.19	47.18

Spicola heads Cargill

James R. Spicola has been elected president of Cargill to succeed M. D. McVay, who is retiring after seven years as president and 44 years with Cargill. Spicola, an executive vice president for Cargill since 1981, had been responsible for the company's milling, oilseed processing and industrial operations. Also, Cargill has elected three new members to its Board of Directors. They are John P. Cole, group vice president for trading; James A. Howard, group vice president for commodity marketing, and Gerald M. Mitchell, group vice president for milling.

ASA opposes protection

Domestic trade protectionism was a major target of the American Soybean Association's 1984 annual meeting held during mid-summer in Tulsa, Oklahoma, with approximately 2,100 persons attending.

ASA staff members and speakers warned that efforts to erect U.S. barriers to European goods could lead to restrictions on U.S. soybean exports to Europe, a major customer for U.S. farmers.

Speakers said a proposed limitation on European wine imports would have hurt U.S. soy exports had it been enacted. One ASA target this year is a proposal to limit steel imports from Europe. Joe Zak, a marketing specialist with

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ASA formerly stationed in Belgium, told a breakfast meeting of Illinois growers that Belgium is one of the major European steel exporters, and also imports soybeans equivalent to 10% to 15% of the Illinois soybean crop each year. That Belgian market could be cut if the U.S. limits steel imports, Zak said.

ASA traditionally has supported free trade policies.

There was relatively little said during formal sessions about a Common Market tax on fats and oils products. Zak said in an interview that while that issue had moved from the front burner to the back burner a few months ago, it could again be considered somewhere in between. The tax has been proposed to help the Common Market finance agricultural programs. It could surface again next March, Zak said, as a bargaining item between governments favoring the tax and those who oppose it but who also seek reductions in their shares of Common Market expenses.

At the Tulsa meeting, U.S. soybean growers were facing prospects of a larger crop than a year ago and, therefore, lower prices. When they met in 1983, growers were watching prices rise daily as the effects of a summer drought were reflected in the commodity markets. This year's larger crop, estimated from 1.98 billion bushels to 2.07 billion bushels by private forecasters, and at 2.04 billion bushels by the U.S. Department of Agriculture August crop report, is one factor depressing prices. Another major factor is the strength of the U.S. dollar overseas, which limits demand. Zak noted that when he was stationed in Brussels about five years ago, the U.S. price for soybeans was about $7 a bushel, which was equivalent to about 210 Belgian francs. In 1984, he said, soybeans again were priced about $7 a bushel in the United States, but the exchange rate had shifted and a Belgian soybean processor would need 420 Belgian francs to buy a bushel of U.S. soybeans.

Worldwide economic stagnation has reduced consumer demand for meat, leading livestock producers to cut back on herd size, thus reducing the demand for soybean meal. Livestock feeders also have opted for less expensive feedstuffs.

During a session on Latin American potential soy production, farmers were told there is lots of land available for expanded plantings in Brazil and Argentina. Both countries foster soybean and soybean product exports to curb trade imbalances. One speaker said Argentina may increase soybean production 10% to 15% annually. Important factors in both countries are inflation rates, government aid to farmers and tax incentives on exports.

The potential of genetic engineering and biotechnology for improving soybeans was the topic of another session. Speakers described how scientists seek to implant genes for desirable traits in cells, then produce whole plants from those cells. Thus far it has not been possible to regenerate soybeans from the undifferentiated cells, speakers said, but work is continuing. Regeneration has been accomplished with some plants with smaller seeds, speakers said, including some small seed legumes, and there have been successes with corn.

New president of the ASA is Roger Asendorf of St. James, Minnesota. George Fluegel of LeRoy, Illinois, was elected first vice president and is scheduled to become president in 1985.

Recent ASA staff changes include the reassignment of Gil Harrison from ASA's Mexico City office to the ASA headquarters office in St. Louis, Missouri. Harrison was a key organizer for the 1980 World Conference on Soya Processing and Utilization held in Acapulco, Mexico. Steve Drake, formerly public affairs chief at ASA, has been named executive director, succeeding Jeff Gain who has become chief administrator for the national corn growers' association. Ken Bader continued as ASA's chief executive officer.

Martinez honored

AOCS member Wilda Martinez received the American Soybean Association's Meritorious Service Award for Utilization Research during the association's annual meeting this summer.

Martinez is a national research program leader with the USDA Agricultural Research Service in Beltsville, Maryland. She has served as a liaison between ARS and the soybean growers' organization. In announcing the award, ASA noted Martinez has been described as having "demonstrated her ability to focus on research and to apply the results of that research to practical problems, with a ready recognition of the needs and problems of the oilseed industry." She has published more than 30 scientific papers and presented numerous invited papers.

Argentine crop should fall

Argentina's 1985 soybean crop probably will not be as large as the 1984 harvest since it is unlikely the record yields of 1984 can be duplicated.

In 1984, Argentina produced about 6 million metric tons (MT) of soybeans on 2.6 million acres, for a yield of approximately 2.3 tons per hectare. For 1985, the initial forecast is for total acreage of 2.8 million hectares producing 5.5 million MT, or about 2 tons per hectare. Virtually ideal growing conditions spurred the 1984 record yield. Such conditions are not expected to reoccur for the 1985 crop.

Sunflower production is expected to rise in 1985 to 2.5 million MT from 2.2 million metric tons in 1984. The increase reflects more acreage and improved yields. Heavy rains at the wrong time hurt the 1984 sunflower crop.

Four of five crushing plants under construction are expected to become operational by the end of 1984. Argentina's crushing capacity presently has been estimated at 7.1 million MT annually. The five new plants represent an addi-

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tional potential of 1.83 million MT annually, but considering start-up time and other factors, for 1984 the increase in Argentinian crush capacity should be about one million MT, according to a USDA report.

Argentina's total domestic crush for 1983 was about 5.7 million MT, for 1984 it is estimated at 6.5 million MT and the forecast for 1985 is for a total crush of about 7.2 million MT. Total oilseed production—including flaxseed, peanut and cottonseed—is estimated at 9.5 million MT for 1984 and forecast at 9.3 million MT for 1985.

French favor sunflower

Sunflower may surpass rapeseed as the largest oilseed crop in France during the 1984/85 period, according to a report from the USDA agricultural counselor in Paris.

Sunflowerseed production is likely to exceed one million metric tons (MT), while rapeseed production is forecast at 937,000 MT. Sunflowerseed production has doubled in the 1980s because of European Common Market prices and continued consumer preference for sunflower oil. For 1982/83, harvested sunflower acreage was 281,000 hectares yielding 649,000 MT of seed; by 1984/85, harvested acreage is expected to be 475,000 hectares producing 1.08 million MT of seed.

Rapeseed acreage has declined since the 1980-82 period. About 476,000 hectares were harvested in 1982/83, producing 1.14 million MT of rapeseed, but low yields due to adverse weather and disease have prompted a forecast of 430,000 harvested hectares for 1984/85 producing 937,600 MT. Earlier harvest reports indicate the crop could reach one million MT. Rapeseed in France is grown primarily as a winter crop. Farmers report higher yields with the low-erucic than with varieties low in erucic acid and low in glucosinolate.

In the French crushing industry, the major development during the past year was the restructuring of CNTA, the leading French oilseed crushing firm that went bankrupt about a year ago. A holding company representing producers, cooperatives, traders, vegetable oil refiners and financial institutions, with Bunge, will acquire four of CNTA's six plants with a total crushing capacity of about 820,000 MT. About 500,000 MT of capacity is for rapeseed and sunflowerseed, slightly more than a third of France's crushing capacity for those crops. Bunge will have 35% of the assets and lease the plants for at least five years and manage crushing operations.

France's crushing industry expects to benefit from new Common Market regulations on crushing subsidies. The net effect of changes for 1984/85 should be to diminish the competitive advantage that German and Dutch crushers have had over French crushers.

China cuts oilseed acreage

China is shifting acreage from oilseed crops to grains, which will mean increased Chinese vegetable oil imports during the coming season and declining exports, according to Oil World, the German weekly fats and oils trade publication.

Most dramatically affected is rapeseed. Acreage in 1982-83 was 4.1 million hectares, but for 1984/85 it is expected to be about 3.5 million hectares. Production of major vegetable oils in 1982/83 was 3.64 million metric tons (MT), but it is expected to be 3.51 million MT in 1984/85. With an expanding population requiring increasing amounts of edible oils, this means China probably will import about 200,000 MT of oil in 1984/85, Oil World said. For 1982/83, imports were about 66,000 MT. Chinese oil exports meanwhile are expected to be 24,000 MT in 1984/85, compared to 89,000 MT in 1982/83.

China's ministry of agriculture has released statistics on 1983 production showing soybean production at 9.76 million MT, cottonseed at 9.27 million MT, rapeseed at 4.29 million MT and peanuts at 3.9 million MT. Forecasts for those same crops for 1984 are 9.5 million MT, 8.95 million MT, 4.6 million MT and 3.96 million MT, respectively.

A USDA report from China reports a Chinese newspaper claimed China has become the world's leading exporter of soy sauce with 1983 sales of 27,500 MT valued at $10.5 million shipped to more than 50 nations.

New soy crushing facility

Indonesia's first soybean crushing facility is expected to be operational in late 1985 or early 1986, reducing that nation's dependence on imported soybean meal for its poultry industry and increasing the volume of soybean imports.

The plant capacity is estimated at 300,000 metric tons

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(MT) annually, which should produce about 240,000 MT of meal. That is about the volume of soybean meal imported from the U.S. during 1984. Domestically produced soybeans are used almost exclusively for human foods such as tempeh and tofu.

Oil palm and coconut are the major sources of vegetable oil in Indonesia, with palm, palm kernel and coconut oils accounting for 99% of Indonesia's 1.8 million MT production. Palm oil production is about 1.1 million MT annually, with a goal of 2.8 million MT annually by 1989.

Hansen promoted

William A. Hansen has been appointed vice president of edible oils manufacturing for the Industrial Products Group, Stokely-Van Camp Inc. In his new position, Hansen, who served as plant manager at the company's Kearny plant, assumes responsibility for manufacturing and quality control of edible oils at the Columbus and Kearny facilities.

Simon-Rosedowns change

Simon-Rosedowns Ltd., designer and manufacturer of a complete range of plants and machinery for the extraction and processing of edible oils, recently appointed Mike Wilson, formerly works manager, as production director, and Len Naylor, the former technical manager, as technical director. Simon-Rosedowns Ltd. of Hull, England, has opened a regional office in Singapore to promote its range of oil milling machinery and complete processing plants for handling coconut, palm kernel and palm oil in Southeast Asia.

Chemap moves

Chemap AG, producers of Funda-filter, has moved its headquarters in Switzerland to Volketswil from Maennedorf. The new location is closer to Kloten airport, outside Zurich. The firm's new address is: Chemap AG, Holzliwisenstrasse 5, CH-8604 Volketswil, Switzerland.

Beauregard in Spain

The American Soybean Association has named Lawrence Beauregard its director of Middle East, Africa and Iberian Peninsula programs. A biochemist specializing in fats and oils, Beauregard most recently served as associate director of ASA's soy oil programs. He will work out of Madrid, Spain, in his new position.

NSA appointment

The National Sunflower Association has appointed Julie Henderson director of consumer affairs. Henderson formerly was a foods editor for *Better Homes and Gardens* publications.

Research grant

Pfizer, Inc. has awarded $500,000 to support biomedical research conducted by Dr. John A. Oates Jr., professor of medicine and pharmacology at Vanderbilt University, Nashville, Tennessee. Dr. Oates, chairman of the department of medicine and director of the division of clinical pharmacology, has been cited for his work "elucidating the biochemical pathways" which has included the pharmacological effects and clinical roles of prostaglandins, thromboxanes and leukotrienes.

USDA biotech center

USDA's Agricultural Research Center, in cooperation with the California Agricultural Experiment Station and the University of California, Berkeley campus, is setting up a biotechnology research center for crop engineering. The Plant Gene Expression Center will be based at the USDA agency's Western Research Center in Albany, California.

Hunt-Wesson

Hunt-Wesson Foods, renamed Swift/Hunt-Wesson after acquisition by Esmark Inc., now is officially Hunt-Wesson Foods again after Esmark was acquired by Beatrice Foods Co.

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Obituaries

DAN L. HENRY

AOCS has been informed of the death this past spring of Dan L. Henry, an emeritus member of AOCS and former director for Law & Company, the analytical laboratory firm in Atlanta, Georgia.

Mr. Henry received his bachelor's degree in chemical engineering from the Georgia School of Technology in 1934. He worked seven years for Swift & Company at the firm's Los Angeles, California refinery, before serving in the armed forces from 1941 to 1945. He joined Law & Company as a chemist after World War II.

Mr. Henry retired in 1976 from the partnership of Law & Company. He had suffered a heart attack and stroke in the year before his death. Mr. Henry had been quite active in AOCS, serving on administrative and several technical committees. For a number of years in the 1960s and 1970s he served as chairman of the Uniform Methods Committee and also was an ex-officio member of the Governing Board.

He served as general chairman for the 1963 spring national meeting in Atlanta.

Survivors include his wife, Sarah Booker Henry, a son and two daughters.

JAMES E. HEALEY

AOCS has been informed of the death of James A. Healey, vice president of Wilsey Foods in Los Angeles, California. Mr. Healey was a graduate of Creighton University where he received his chemistry degree in 1941. He joined AOCS in 1951.

ROBERT L. DRYER

AOCS member Robert Dryer, a professor of biochemistry at the University of Iowa College of Medicine, died unexpectedly July 19, 1984, in St. Louis, Missouri. Dr. Dryer had been an AOCS member since 1966. He received his doctorate in 1949 at the University of Iowa.