Modern technology: Nutritional implications

More than 70 specialists in the biochemistry and the processing of fats and oils gathered in Selvino, Italy, during mid-March to consider the nutritional implications of modern technology.

Although they did not reach any unexpected conclusions, there were some surprises in the 29 presentations by speakers from 10 nations.

For one, G. Hornstra of the University of Limburg in the Netherlands said his studies on the thrombotic effects of dietary fat showed that the relatively saturated palm oil tended to produce less atherosclerosis in rabbits and less thrombosis in rats than did unsaturated oils. There was a general agreement that further research was needed.

For another, Paul McCay of the University of Oklahoma described how use of electron paramagnetic resonance spectrometry and free radical spin trapping techniques showed that α-tocopherol quenches radicals in membranes, then a reductase in the membrane regenerates the tocopherol to quench more radicals.

Among discussion topics at the meeting:

- There should be allowance for the difference between n-3 and n-6 acids in dietary recommendations concerning essential fatty acids (EFA), and such recommendations should say what is intended with regard to specific EFA, avoiding the term polyunsaturated fatty acid (PUFA), which includes essential and nonessential polyunsaturates. The n-3 fatty acids, often espoused as a beneficial component in fish oil, are a "hot topic" in fats and oils nutrition now. Biochemists and technology specialists at the meeting said research is needed on virtually all nutritional aspects of the n-3 fatty acids.
- Concerns about *trans* fatty acid content from linolenic sources, primarily soybean oil, have diminished with the 1985 report from the Federation of American Societies for Experimental Biology and a new report from Unilever presented in Selvino. There was interest in obtaining data on *trans* isomers and other isomers of unsaturated fatty acids present in hydrogenated fish oils.
- Dietary guidelines should reflect needs of different populations and different age groups. A recommendation of a flat 30% of calories from fats and oils may not be suitable for malnourished populations, nor for infants; human milk contains up to 60% fat, attendees were told, which is used in large part in brain development. The elderly also may have a different optimal fat requirement. Concern was expressed that the commonly used 30% figure may mislead the public into thinking that amount is appropriate for all ages and all conditions.
- Much research needs to be focused on the n-3 fatty acids present in fish oils to determine what types and how much would be optimal, and how modern technology can deliver nutritionally beneficial n-3 acids originally produced in anaerobic conditions in a dark environment, and how processes such as hydrogenation might affect n-3 activity.

Reinhard Marcuse of Sweden (left) talks with Vagn Jespersen of Denmark

The event was a NATO research workshop on "Advanced Technologies and Their Nutritional Implications in the Production of Edible Fats." Rodolfo Paoletti of the Universita degli Studi is current president of the Nutrition Foundation of Italy which cosponsored the event. Paoletti explained the NATO workshops are a recent addition to the NATO Scientific Council's better-known research institutes for basic science. Claudio Galli of the Institute of Pharmacology and Phamacognosy at the University in Milan and Enzo Fedeli of the Societa Italiana per lo Studio delle Sostanze Grasse, also in Milan, served as scientific directors for the workshop. The 70 participants came from NATO countries and other European nations.

Proceedings are to be published later this year by Plenum Publishing Corp., which has offices in London and New York. *JAOCS* will publish an announcement on how to purchase a copy when the proceedings become available.

In addition to the formal presentations, there were two round table discussions centering on biochemistry and two such discussions centering on technology, plus two combined round tables.

Ralph Holman of The Hormel Institute observed at the closing workshop that the meeting may "have opened a few windows" between the biochemistry specialists and the technology specialists. Of particular benefit were the discussions on n-3 and n-6 fatty acids, Holman said, noting that the

two major unanswered questions remain "How much?" and "In what proportion?"

In the technology round tables, there was one formal recommendation and a listing of goals. The recommendation was that European regulations be modified to permit consumers to optimize their dietary fat consumption, i.e., that margarines and table spreads of variable fat content be legalized. The goals included providing appropriate fats and oils technologies in lands where there are caloric deficiencies; developing a better knowledge of minor components of fats and oils as well as how processing affects minor components; standardizing and validating modern analytical methods; adopting raw material quality standards keyed to the quality of the end products; and learning more about nutritional qualities of long-chain fatty acids and their stability in consumer products.

In the nutrition round tables, the participants decided it was more productive to talk about fatty acids than specific-source fats and oils. The group noted that while previous dietary recommendations have focused on adult populations, there is sufficient evidence that the period of growth for humans is the period most vulnerable to nutritional distortion. "With the evidence of early vascular changes and the rise in blood cholesterol and pressure in children, there is a clear responsibility for future recommendations to consider the question of maternal and infant nutrition as well as the principles applying during the growth of the child," a round table summary said.

The biochemists also noted that in increasing caloric intake in undernourished populations, care should be taken not to establish dietary patterns that could "introduce the serious health problems now associated with North American and European food structures."

The biochemists, noting a lack of agreement between laboratories on reported composition of organ glyceride fatty acid composition, called for recommendations on methodology for fatty acid analysis that would standardize information.

General aspects of nutrition and technology

Holman opened the first session with his presentation on "Conditions Influencing Essentiality of Polyunsaturated Fatty Acids." While previous nutritional history with respect to polyunsaturated fatty acids (PUFA) may affect onset of essential fatty acid deficiency, recovery seems to require the same time regardless of the duration of deficiency, Holman said. He discussed the metabolic chain of n-6 and n-3 acids and how patterns of serum PUFA are altered by some physiological conditions that apparently impair conversion of linoleic to arachidonic and conversion of linolenic to long chain n-3 acids.

He emphasized that individual unsaturated and polyunsaturated acids are structurally and physiologically unique, and that it is time to recognize the individual fatty acids and not lump them together generically, as they are not biologically equivalent. He suggested that further research may lead to "nutritional means . . . to correct extreme patterns and to meet requirements for those specific fatty acids of the pattern which are subnormal. If this be possible, it will be the task of technology and food science to develop the necessary concentrates."

Workshop co-director Fedeli followed with a talk on the "Impact of Conventional Technologies on the Chemical Composition of Fats." Fedeli discussed how conventional technology may affect components (fatty acids, minor components, contaminants, by-products, etc.) of fats and oils derived from tree crops, oilseeds and animal sources.

Michael Crawford of the Nuffield Laboratory of Comparative Medicine stressed the importance of dietary fat in early brain develop-

ment in a talk on "Dietary Fats During Early Development." Crawford noted that 70% of brain cells divide before birth and that the brain of an infant uses 60% of dietary energy. He noted that deficiencies incurred before the age of 2 cannot be made up by improved nutrition later. Lack of sufficient EFA in early years may set the stage for heart disease later, Crawford said.

He noted that while much has been learned of the composition of human milk, infant formula for non-breast-fed infants does not mirror human milk as closely as it could.

Giorgio Bonaga and Umberto Pallotta of the University of Bologna prepared a presentation on the "Agriculture-Industry Relationship" in Italy. They discussed the various oil crops grown in Italy, including attempts to develop suitable cultivars of soybeans, sunflower and rapeseed. They noted that economic balance for Italy's agricultural producers depends to a large extent on policies of the European Economic Community (EEC). The application of biotechnology and the potential development of nonconventional food sources are expected to play important future roles.

T.L. Mounts of the USDA Northern Regional Research Center spoke on "Hydrogenation of Edible Oils." Mounts described the design of conventional hydrogenation equipment and of the need to hydrogenate polyunsaturated oils to improve physical properties and stability. He discussed selective hydrogenation and the isomerization that occurs in the process. Mounts said NRRC research has shown that monoene isomers are well absorbed, that numerous examples indicate the monoene isomers are preferentially metabolized, that differences in the utilization of positional isomers are dependent on the experimental model and that none of the isomers accumulate in human tissue.

A. Menotti of Italy concluded the first session with a paper on "The Significance of Dietary Fats for Metabolic Diseases and for Atherosclerosis in Particular." Menotti reviewed various studies, concluding that work thus far is in line with recommendations for a diet with levels of about 30% calories from fat, with less than 8% of total calories from saturated fat, and less than 300 mg per day dietary cholesterol. He noted that recent epidemiological work had looked not just at ratios of PUFA to saturated fat, but also at the ratio of monounsaturated fat to saturated fat, with ratios of 2:1 or 3:1 appearing to correlate with reduced incidence of heart disease.

Dietary fats and the vascular system

Scott H. Goodnight of the Oregon Health Sciences University began the second session with a paper on "Effects of Saturated and Polyunsaturated Fatty Acids on Plasma Lipids, Platelets and the Vascular System." Goodnight's paper focused the workshop's attention on n-3 oils. In his summary, Goodnight noted that "n-3 fatty acids derived from fish oil have been shown to reduce plasma triglycerides and may reduce plasma cholesterol as well. Furthermore, these fatty acids inhibit platelet functions while likely preserving the vascular endothelial production of prostacyclin." Goodnight noted that longterm clinical studies are needed before anyone can make definitive statements about dietary fish oils' role in atherosclerosis or thromboembolisms.

Paoletti's following presentation on "Dietary Fats and Atherosclerosis" reflected the increasing attention to the distinction between n-3 and n-6 fatty acids. He noted that most clinical work on fatty acid essentiality has been done with the n-6 fatty acids from vegetable oils. The mechanism of fish fatty acids' hypolipidemic effect is still largely unknown, he commented.

Ahmad Moustafa, a consultant based in the United States, then discussed margarine production, including the emergence in the U.S. of "spreads" with a fat content above the 40% required for products labeled "diet margarine" and below the 80% for those labeled as "margarine." Moustafa said that the 60% fat products now have a 22% market share in the United States. Hydrogenation and fractionation can produce a virtually unlimited number of oil-based products tailored to optimize dietary benefits, Moustafa said, adding that margarines can be fortified not only with fat-soluble vitamins, but could also be fortified with proteins or specific amino acids.

Specific aspects of nutrition and technology

Fedeli opened the session by describing nonconventional processing technologies. Extraction using supercritical CO_2 is "the most beautiful system I have seen in my life," Fedeli said, noting it provides an oil with far less phospholipids and other residuals found with pressed or solvent-extracted oil. Fedeli described potential benefits of relatively new refining techniques, commenting that study of neutralization via enzymes was at its beginning but offered promise of great specificity.

G. Lercker of the Universita degli Studi in Bologna discussed the autoxidation process, which leads to rancidity in fats and oils. While conclusions concerning digestion and absorption of lipid autoxidation products have not been

Speakers T.L. Mounts of U.S.A. (left) and Michele Rossi of Italy converse

reached, Lercker said there is indirect evidence that dietary peroxide may be absorbed and that peroxide action must be in the intestinal lumen or the intestinal cells, where antioxidants are destroyed, causing nutritional deficiency symptoms. Relatively recent work indicates absorbed secondary oxidation products contribute to worsening the condition of the liver, he said.

A. Nordøy of the University of Tromso in Norway followed with a presentation on "Dietary Fatty Acids and Thrombosis." Nordoy noted that while dietary saturated fat has been correlated with high incidence of thrombosis, no definitive work has been done on monounsaturated dietary fat; that n-6 dietary fatty acid has been correlated to lowering incidence of coronary heart disease; and that knowledge on the n-3 fatty acids is still evolving. It appears that n-6 PUFA should comprise more of the diet than the n-3, he said, but that at least some amount of n-3 provides a protective effect against coronary heart disease.

G. Hornstra of the Netherlands, in his paper on beneficial effects of dietary palm oil on arterial thrombosis (rat) and atherosclerosis (rabbit), provided the previously noted information that palm oil, a relatively saturated dietary fat, seemed to inhibit thrombotic obstruction. Hornstra was studying the effect of type and amount of dietary fat on arterial thrombosis, atherosclerosis and related parameters. Using his "aorta-loop technique," Hornstra found that, generally, the more unsaturated dietary fats inhibited obstruction in a fairly direct ratio to degree of saturation, except for palm oil. Alkali-refined oil seemed to be more beneficial than physically refined palm oil, he said. Palm oil also was associated with the highest production of antithrombotic prostacyclin by pieces of vascular tissue.

Workshop co-director Galli from the University of Milan discussed dietary fatty acids and vascular eicosanoids. Galli noted that work thus far indicates manipulation of dietary lipids should aim to reduce intake of compounds that appear to promote endogenous synthesis of eicosanoids, such as thromboxane and leukotrienes, to favor accumulation in tissues of PUFA that are precursors of less active eicosanoids, such as eicosapentanoic acid, and to preserve the levels of PUFA and natural antioxidants in dietary lipids. Galli noted work remains to be done on processes controlling the formation, transport and incorporation of PUFA into human tissues.

S. Renaud of INSERM reported on "Dietary Fatty Acids and Platelet Composition and Function in Human Studies." Renaud reported that studies of 300 farmers in France and Great Britain showed that high dietary saturated fat did not appear to be associated with a higher level of saturated fatty acids in platelet or plasma phospholipids, but rather with an increase in the level of 20:3(n-9), derived from 18:0 by desaturation and elongation. The 20:3(n-9) fatty acid is a precursor of a proaggregatory 12-OH derivative, he noted. Renaud described how a group of farmers in eastern France agreed to modify their diet to match that of farmers in the south of France, who consumed lower amounts of saturated fat. The study also compared ratios of polyunsaturated to saturated fats in the diet. If the P/S ratio was increased to more than 1.0, there was a significant reduction of serum lipids and of platelet aggregation, but to thrombin only, Renaud said in his abstract. A decrease in all the platelet function tests could be found with a P/S ratio of only 0.6 to 0.8 and an intake of saturated fat equal to 10% of calories.

Fats of special biological interest

Andre Prevot of the Institut des Corps Gras began the next session with a talk on "Residues and Contaminants in Edible Fats and Oils." Prevot noted that fats and oils are some of the most contaminant-free foods with modern processing technology. Contaminants present below current sensitive detection levels are consumed at negligible doses considering the amounts of visible fats and oils in most diets, he said. Prevot reviewed major edible oil contamination problems since the 1930s, identifying the contaminants and their probable sources. The most perplexing case remains the 1981 toxic oil syndrome in Spain, with researchers still trying to determine the exact causative agent and how it was produced in the handling of the oil.

M. Rossi of the Universita degli Studi in Italy spoke on "Nonconventional Hydrogenation of Fat," focusing on use of copper chromite catalysts to provide ultraselective hydrogenation. Such catalysts have been tested for reducing trace amounts of conjugated trienes and dienes in oils of poor quality, he said. The technique has been used on aged, rectified olive oil—under mild conditions of 140 C and atmospheric pressure—to cut down conjugated fatty esters without causing significant change in total acidic composition.

Cesare R. Sirtori of the University of Milan reported on "Olive Oil and Lipoproteins in Hyperlipidemias." Sirtori described how his cross-over study tested the effect of addition of corn oil or olive oil in the diet of patients with a high atherosclerosis risk. Both diets showed favorable effects on plasma lipid lipoproteins, he said, with the high P/S diet significantly lowering cholesterolemia while the olive oil had a negligible effect. The olive oil diet, however, maintained the reduction of cholesterolemia, lowered the apolipoprotein B level and increased apo AI, he said. Sirtori called for additional studies on the optimal fatty acid content in diets to reduce cholesterolemia and possibly to affect platelet reactivity.

M. Lagarde of INSERM concluded from his studies on "Minor Fatty Acids of the n-6 Series and Platelets" that the n-6 family fatty acids would be far less efficient than the n-3 for modifying platelet behavior. The study involved compared 18:3n-6 and 18:3n-3 fed to diabetic and elderly people in prethrombotic states. No modification in platelet functions were observed, he said, but there were changes in fatty acid composition of

plasma lipid and platelet phospholipid subclasses. Previous work with pure 20:5n-3 had shown a significant decrease of platelet functions without detectable modification of the fatty acid profiles of either plasma or platelet lipids, he said.

H. Traitler of Nestec presented a well-received paper on "Complex Natural Phospholipid Blends," describing development of a multidimensional matrix-based descriptive report system. The method provides a single diagram corresponding to the most common analytical procedures now used—TLC, GC, GC-MS and mass spectra. Basically the phospholipid class is measured along one axis, saturated on another and the total number of carbon atoms on the third.

W. Nawar of the University of Massachusetts described the by-products formed in heated fats, with reactions depending on temperature, time, available oxygen, moisture, presence of prooxidants and antioxidants, the surface area and the interaction of components in the food being cooked and the cooking fat or oil.

The focus returned to fish oils in the next presentation on "Fats from Marine Animals in Human Nutrition" by J. Dyerberg of Aalborg Hospital in Denmark. Dyerberg was among those urging that dietary guidelines differentiate between n-3 and n-6 fatty acids, rather than lumping them together as "polyunsaturates." According to Dyerberg, the n-3 acids have, compared to n-6, "a more profound hydrolipidemic impact on the bloods, especially on triglycerides and very low density lipoprotein, but also on cholesterol and LDL both in normals and in patients with hyperlipidemia." The n-3 fatty acids, he said, shift the hemostatic balance in an antithrombotic direction by inhibiting thromboxane A_2 and stimulating production of prostacyclin I_3, he said. The challenge to technologists, he said, is to find a way to incorporate n-3 PUFA in soft margarines and other industrialized food items with their nutritional qualities intact.

Peter C. Weber of Germany, currently working at the Harvard Medical School, discussed "EPA and the Eicosanoid System," describing the "desirably different" biological activity resulting from eicosanoids derived from 20:5n-3 compared to those from arachidonic acid 20:4n-6. Still to be determined, he said, is the relationship of biochemical and functional changes observed after dietary n-3 PUFA, such as reduction of triglyceride concentration, VLDL formation, intimal proliferation, increases in fibrinolytic activity and changes in n-3 and n-6 fatty acid composition of cell membranes and in plasma.

J.P. Helme of the Institut des Corps Gras spoke on "New Sources and Utilization of the Long-Chain Polyunsaturated Fatty Acids." Helme discussed γ-linolenic acid, dihomogammalinolenic acid and arachidonic acids from the n-6 family, and eicosapentaenoic acid and docohexaenoic acid of the n-3 family. Helme said attention should be given not only to the fatty acid profile of foods formulated for infants, but that the elderly also may need to consider the types of long chain polyunsaturates in their diets. Other potential applications would include hospital health care, some metabolic diseases, dermatology and numerous pathological situations, Helme said.

John Salmon's presentation on "EPA and PMN (Polymorphonuclear) Leukocytes" postulated that supplementing diets with EPA could, by reducing the synthesis of prostaglandins and leukotrienes derived from arachidonic acid, be beneficial in prevention and/or treatment of inflammatory diseases.

G. Robbelen of the University of Gottingen in West Germany spoke on "Experiences in the Development of New Oil Crops." Robbelen noted that most of the world's edible vegetable oil supply comes from about 10 sources. He discussed development of new varieties and cloning work on palm, coconut and olive varieties, as well as the potential for using biotechnology to produce improved crops.

J. Graille of IRHO in France discussed "Fats of Tropical Origin," mainly palm, palm kernel, peanut and coconut oils. Those crops account for about 20% of world fats and oils production, he noted. Researchers are investigating a new oil palm variety to provide more essential fatty acid, he said. Tropical oils rate well as frying fats without hydrogenation, he noted.

Minor components

Two talks were presented during a brief session on minor components. Paul McCay presented his previously mentioned paper on the mechanism by which alpha-tocopherol functions as an antioxidant. McCay said his experiments demonstrated that vitamin E quenches free radicals generated in biological membranes by enzymatic processes or by environmental factors. The resulting relatively stable toxcopheroxyradicals are then immediately reduced back to tocopherol by a heat-labile membrane-bound factor that uses glutathione (GSH) as a source of reducing equivalents, he said. "The most fundamental finding supporting the existence of this 'free radical reductase' function was the observation that highly reactive trichloromethyl radicals produced during the metabolism of carbon tetrachloride by the hepatic endoplasmic reticulum are quenched by this system," McCay said, "thereby preventing the initiation of extensive peroxidation of membrane lipids that would otherwise occur. This quenching capacity of the heat-labile 'free radical reductase' system was shown to be dependent on the presence of both tocopherol and GSH. Neither alone is effective."

J.L. Zevenbergen of Unilever summarized his work on determining the "Biological Effects of *trans* Fatty Acids." While it has been generally accepted that *trans* fatty acids do not have adverse specific effects if sufficient linolenic acid is present in the diet, Zevenbergen's lab performed two rat feeding studies to define the minimum amount of linolenic acid required to prevent undesirable effects of *trans*. With a high *trans* level (50% of fat) and a 5% linolenic content, no harmful results were found. As the Western diet usually provides more than 5% linolenic acid and less than 10% *trans*, "it is evident that *trans* fatty acids, apparently, do not form a nutritional problem," he concluded. Zevenbergen noted the recent FASEB report came to a similar conclusion.

Antioxidants' safety examined

The latest research findings on antioxidants commonly used in foods were discussed at an international symposium, "Food Antioxidants: International Perspectives," held April 21-23, 1986, in Washington, DC.

More than 135 people attended the conference sponsored by the International Life Science-Nutrition Foundation's Antioxidant Technical Committee. According to Julia C. Howell of the Coca-Cola Co., chairman of the Antioxidant Technical Committee, the aim of the symposium was to assess the risks and provide an open discussion on the food use of major antioxidants in the U.S. and abroad.

Antioxidants under scrutiny included propyl gallate (PG), butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT), tertiary-butylhydroquinone (TBHQ) and α-tocopherol.

Discussing the technological necessity for antioxidants in the food industry, John W. Finley of Nabisco Brands said a basic question to ask is what would happen if antioxidants were not used. Citing consumers' demand for "natural" products, Finley asked, "Is 'natural' necessarily better when it is rancid? I'm not sure that it is."

Finley said lipid oxidation affects nutritional quality, causing losses in essential fatty acids, essential amino acids and vitamins. It also can adversely change flavor, texture and color and cause toxicity. Triggering oxidation can be such factors as light, heat and catalysts. Foods benefiting from the addition of antioxidants include vegetable oils, animal fats, flavorings, confections, nut products including nut oils and butters, potato chips, bakery and cereal products, and sea foods.

Renate Kahl of the West German Federal Health Office spoke on methodology for studying antioxidant activity in foods and the mechanism of antioxidant action in the body. Kahl noted that hydroperoxides are primary oxidation products, leading to deteriorating taste and flavor and perhaps even causing adverse health effects. In vegetable oils, Kahl said, PG is a more active antioxidant than BHA.

Kahl suggested more study is needed in such areas as the toxicology of lipid peroxide products as well as products formed during antioxidant action in foods, the interchangeability of antioxidants in food products, mechanisms of antioxidant synergism, the prooxidant action of antioxidants and the conflicting evidence of anticarcinogenic and antimutagenic properties of antioxidants on one hand and tumor promotion on the other.

Charles Warner of the Food and Drug Administration's (FDA) Food Additives Branch reported on work to determine the extent of antioxidant decomposition in foods and the extent to which decomposition products are retained in food. Warner's research included simulated deep-fat frying experiments using lard. Warner reported findings showing intermittent frying leads to more rapid deterioration than continuous frying. Steam, he said, seems to have an antioxidant effect. In a second test using lard and potato chips to simulate typical commercial deep-fat frying operations, Warner noted a significant level of peroxide throughout the frying. He said the control product without an antioxidant had only an eight-day shelf life, the BHA product had a nine-day shelf life, the BHT product a 10-day shelf life, and the TBHQ extended shelf life to 25 days.

TBHQ, developed by Eastman Chemicals and approved by FDA as a food antioxidant in 1972, is used in vegetable oils in the U.S. European and Canadian representatives said it is not allowed in foods in their countries as there has been insufficient information presented to make a ruling on its safety. The National Toxicology Program in the U.S. has listed TBHQ as a substance for testing; it is expected to complete bioassay testing on TBHQ in the next three to five years.

Paul B. Addis of the University of Minnesota addressed the health implications of lipid oxidation products, including a possible link to coronary heart disease and atherosclerosis, particularly for cholesterol oxidation products. Noting there are significant levels of cholesterol oxidation products in some foods commonly consumed in the U.S., Addis said an examination of french fries in continuously cooked tallow showed evidence of up to 10% cholesterol oxides. "Evidence shows human food supplies contain lipid oxidation products. Most have been demonstrated to show some toxicity to humans, such as atherosclerosis," he said. However, with current antioxidants, packaging and special processing, "there is less excuse for heavily oxidized foods today," he said.

Ronald Haigh of the Commission of the European Communities, Brussels, Belgium, spoke on the EEC approach to antioxidants. Although antioxidants have been permitted in foods in the EEC since 1970, Haigh said, there are no regulations specifying conditions of use. Use and regulation of antioxidants has varied from country to country within the EEC, he said, adding that the EEC's Scientific Committee for Food would like to see adoption of uniform regulations so products could be traded freely among the countries. Foods in the EEC needing antioxidant protection include fats and oils for frying, fats and oils for use in processed foods and margarine containing animal fat.

Haigh said there was little EEC concern over the safety of antioxidants until Nobuyuki Ito of Nagoya City University Medical School, Japan, in 1982 reported findings

showing BHA to be carcinogenic in F344 rats. Threats by Japan to ban products containing BHA as a result of Ito's research led to the formation of an international committee representing Japan, the United States, Canada and Europe, to look into BHA's safety for human consumption. This committee subsequently determined there was no short-term threat to humans of using BHA.

Harry Conacher of the Food Research Division of Health & Welfare, Canada, reported that BHA, BHT and propyl gallate can be used alone or in combination in foods in Canada. Maximum use levels, alone or in combination, are 0.02% in fats and oils, lard and shortening, and 0.01% of the fat content in margarine. Levels of BHA permitted in foods, in milligrams per gram, are 0.1 in peanut butter, 0.2 in cooking oil and shortening, and 0.07 in salad dressings.

Assuming the maximum allowed levels are used, Conacher said, overall mean dietary intake of BHA in Canada ranges from 5–12 mg per person per day. He added that based on permitted levels, antioxidant use is unlikely to exceed 1 mg per kilogram of body weight per day, and is more likely to be 0.1 mg.

Meanwhile, Robert Rehwoldt of the National Research Council in the U.S. reported on data on nine antioxidants compiled from volunteer studies of the American food industry conducted in 1982. The data showed BHT used in 23 food categories, BHA in 22 food categories, TBHQ in two categories and PG in 16 categories. All four were reported used in fats and oils products. According to Rehwoldt, only TBHQ showed a slight growth in use.

Reports presented on a number of feeding studies using rodents linked antioxidants, particularly BHA, to possible tumor growth or promotion at high dosage levels. These results create what one participant termed a "Dr. Jekyll-Mr. Hyde" picture for antioxidants: the possible inhibition of carcinogenicity at some dosages on one hand, along with other indications that BHA and other antioxidants may promote tumor growth or carcinogenic reactions in rodents at high dosage levels. While researchers expressed concern over such findings, they tempered their comments by questioning whether these can be correlated to effects on human health. Also, they seemed to agree that studies show BHA to be nongenotoxic, as it seemingly does not attack DNA.

Additional studies reported at the symposium included feeding experiments with rabbits, hamsters, monkeys, pigs and beagles. One aim of such studies was to see if the proliferative effects seen in the forestomach of rats fed diets containing BHA would be observed in the liver, stomach, esophagus or duodenum of other animals. Results seemed to indicate no adverse effects, researchers concluded. "Dog and monkey studies lend a lot of assurance of BHA's safety for humans," Paul Newberne, professor at Boston University Medical School, said.

Panel discussions at the conclusion of the symposium showed general agreement that despite findings indicating antioxidants such as BHA may cause or promote tumors in specific organs in rats, specifically the forestomach of F344 rats, they appear still to be safe for human use at the current levels. General recommendations included doing further risk assessment of these materials to make sure accepted daily intake levels approved in the U.S. and other countries truly allow a sufficient safety margin.

Suggestions also included additional research to study the mechanism of BHA on the esophagus and other organs of nonrodents, to determine the problem of tumorigenesis of BHA, BHT and other antioxidants, to answer whether these compounds are genotoxic and to determine what the no-effect level would be in man. Panelists seemed to agree that there is no need to stop using these antioxidants.

"Studies showing carcinogenesis in the forestomach of the rat do not indicate what will happen in other strains of rodents, let alone other an-

imals. We need better bridges to span the differences between such studies and the application to humans," Harold Grice of CanTox Inc., Nepean, Ontario, Canada, said, summing up one of the basic questions still needing to be answered—namely, the relevance of the rat findings to human risk assessment.

Meanwhile, Gaston Vettorazzi of the World Health Organization, Switzerland, said the Joint FAO/WHO Expert Committee on Food Additives (JECFA), as a result of the findings presented at the symposium, might consider separating the antioxidants BHA, BHT and TBHQ into different categories, rather than grouping them together for use alone or in combination. "We may weigh them on their own merits," he said. Robert Scheuplein of FDA agreed that comparative studies on all of the major antioxidants might be warranted.

Proceedings of the symposium will be published by the International Life Sciences Institute (ILSI) later this year in *Food and Chemical Toxicology*. For more information, contact ILSI, 1126 16th St. NW, Suite 111, Washington, DC 20036.

The margarine market in the EEC

The American Soybean Association (ASA) in 1984 commissioned J.P. Helme, director of Bio-Extraction, Paris, France, to make a survey of the margarine market in the European Economic Community (EEC). The following article, prepared by Roger Leysen, market manager of ASA's Brussels office, in cooperation with Helme and I. Hodac, secretary general of the International Federation of Margarine Associations (IFMA/IMACE), Brussels, summarizes and updates the findings of this survey.

Margarine is a European invention, invented by Mège Mouriès in 1869, but its development worldwide really was possible only after hydrogenation of oils was discovered by Normann.

World production of margarine is now over 8 million metric tons (MT). Since 1979, it has increased nearly 16% (Table 1). However, a similar increase has not occurred in the EEC. Instead, production has fluctuated around 1,700,000 MT since 1979.

Production, consumption and trade

During the period 1979 to 1984, margarine production in the current EEC member-countries increased from 1,671,900 MT in 1979 to 1,696,600 MT in 1984, an increase of approximately 2% (Table 2). However, production increased between 1979 and 1982 from 1,671,900 to 1,790,300 MT, then started to decline to reach the 1984 level.

In comparison, butter production in the same period increased from 1.90 million MT in 1979 to 2.11 million MT in 1984, setting a record of 2.26 million MT in 1983 (Table 3).

Concerning the respective member-states, margarine production increased during the period in the United Kingdom (6%), Belgium (11%), Denmark (11%) and the Netherlands (12%). It decreased principally in Germany and France. Again, the production in most EEC countries reached a peak in 1982. The most significant decrease in the period 1979-1984 can be seen in Germany (approximately 15%).

EEC margarine consumption increased from 1,650,700 MT in 1979 to 1,721,900 MT in 1984 (Table 2). It also peaked in 1982, at 1,753,900 MT.

In absolute figures, the highest margarine consumption in the EEC has been in Germany (486,000 MT in 1984), followed by the United Kingdom (421,000 MT) and France (208,000 MT). Denmark has the highest per capita consumption, at 18.3 kg/year in 1982, followed by Belgium (12.6 kg/year in 1982) and the Netherlands (12 kg/year in 1982). Margarine consumption is significantly higher in northern EEC countries than in the southern ones. The average margarine consumption in the 12 countries was approximately 6.3 kg/year in 1984. This is approximately equal to the average consumption of butter (Table 3 and Fig. 1).

Margarine is not a product that would be regarded as highly tradeable. In 1984, the margarine trade covered approximately 8% of the total production of the 12 countries. The principal exporting countries during 1979 to 1984 were the Netherlands (approximately 40,000-70,000 MT/year), followed by Belgium (approximately 30,000-40,000 MT) and Denmark (approximately 10,000-20,000 MT). The list of importing countries is headed by France (approximately 30,000-50,000 MT/year, representing 26% of its total consumption in 1984), followed by the United Kingdom (20,000-40,000 MT a year) and Italy (approximately 8,000 MT). In the other countries, especially those of the Iberian Peninsula, the consumption and production of margarines in the period studied were practically equal; there was no trade in margarines in these countries. Also, it should be stressed that most of the trade in margarines involves intra-EEC trade, while only a very small quantity is traded with non-EEC countries. Finally, it

TABLE 1

World Production of Margarine

Year	Production (000 metric tons)
1979	7,010.5
1980	7,262.5
1981	7,922.2
1982	8,066.5
1983	8,013.6
1984	8,129.9

Source: *Oil World*, West Germany.

TABLE 2

Margarine Production, Consumption in EEC Countries, 1979–84[a]

	1979			1982			1984		
		Consumption			Consumption			Consumption	
Country	Production[b]	Total[b]	Per capita[c]	Production[b]	Total[b]	Per capita[c]	Production[b]	Total[b]	Per capita[c]
Belgium	150.00	117.20	11.90	158.60	124.00	12.60	169.30	134.00	13.60
Denmark	94.00[d]	85.10	16.60	108.70[d]	93.70	18.30	105.90[d]	85.70	16.80
France	159.50[d]	189.40	3.40	165.40[d]	208.00	3.80	155.60[d]	208.70	3.80
Germany	507.90	515.00	8.40	512.50	517.00	8.40	430.60	486.70	7.90
Greece	23.00	21.20[d]	2.10	23.60	23.60[d]	2.40	23.00[d]	25.90[d]	2.60
Ireland	15.00	13.00	3.70	17.70	13.00	3.70	16.00[d]	13.00	3.70
Italy	68.20[d]	74.10	1.30	71.30[d]	79.10	1.30	63.60[d]	71.50	1.20
Luxembourg	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Netherlands	210.00[d]	177.00	12.30	236.00[d]	174.00	12.00	247.00[d]	171.00	11.80
Portugal	45.00	45.00	4.50	52.10	52.10	5.20	57.20	57.20	5.70
Spain	40.20	40.20	1.10	45.30	45.10	1.10	46.20	46.60	1.20
United Kingdom	359.10	373.30	6.60	399.10	424.30	7.50	382.20	421.60	7.40
Totals	1671.90	1650.50	5.90[e]	1790.30	1753.90	6.30[e]	1696.60	1721.90	6.30[e]

Source: IMACE, Association of the Margarine Industry of the European Community Countries.
[a]Includes Spain and Portugal.
[b]In 000 metric tons.
[c]In kg/year.
[d]Estimate.
[e]Average.

TABLE 3

Butter Production Consumption in EEC Countries, 1979–84[a] (000 Metric Tons)

	1979		1982		1984	
Country	Production	Consumption	Production	Consumption	Production	Consumption
Belgium	85.00	84.60	79.80	91.70	81.00	93.00
Denmark	131.00	42.90	121.40	51.20	105.00	59.00
France	533.00	515.50	570.00	491.70	643.00	508.00
Germany	567.00	429.80	543.00	434.60	572.00	427.00
Greece	7.00		7.00	9.60	7.00	8.00
Ireland	121.00	35.80	132.00	40.50	165.00	39.00
Italy	79.00	121.40	75.00	128.60	82.00	129.00
Netherlands	202.40	49.00	218.00	51.20	242.00	56.00
Portugal	3.20	3.00[b]	2.60	3.00[b]	2.70	3.00[b]
Spain	16.50	20.00[b]	18.00	20.00[b]	13.60	20.00[b]
United Kingdom	161.00	387.00	217.00	316.70	205.00	306.00
Totals	1906.10	1689.00	1983.80	1638.80	2118.30	1648.00

Source: European Communities statistics.
[a]Includes Spain and Portugal.
[b]Estimate.

should be mentioned that the trade in margarines during 1979–1984 increased by approximately 50,000 MT, or from 5% to 8% of the total production.

EEC margarine legislation

Despite several attempts during the last 15 years, the national regulations concerning margarines are not harmonized at the EEC level. It is extremely difficult to say when, or if, such harmonization may occur. Consequently, the margarine legislation varies, to a lesser or greater extent, among the EEC member states. Detailed information concerning margarine legislation in the EEC and other countries can be obtained from IFMA/IMACE Secretariat, rue de la Loi 74, 1040 Brussels, Belgium.

With the exception of France and Ireland, the minimum required fat content of margarine is between 80 and 84%. In France and Ireland, no requirements concerning minimum fat content exist. Concerning the milk fat content, requirements vary from Belgium and Italy, where no milk fat may be added, to the United Kingdom, France and Ireland, where milk fat can constitute up to 10% of the fat phase of margarine. Also, no vitamins may be added to margarines in France and Italy except in dietetic products, while they are obligatory in Denmark and the United Kingdom. There are also different requirements in the various EEC member-states concerning the use of additives in margarines.

On the packaging side, requirements concerning the shape of margarines are liberal in all the EEC countries, and margarine packages can take practically any form. On the other hand, margarine still is discriminated against in the areas of advertising and pricing regulations compared to competing products in a number of EEC countries. For instance, television advertising is not allowed in France while there are restrictions on TV and radio advertising in Belgium, and the TV and radio advertising in Ireland is regulated by broadcasting authorities. In a number of EEC member-countries, no health claims are permitted in margarine advertising. Also, there are different value-added tax (VAT) rates for margarine and butter in Belgium (17% and 6%, respectively), France (18.6% and 5.5%, respectively) and Greece. In some countries such as Belgium and France, margarines must be clearly separated in displays; in other countries, such as Italy and Greece, there is a limitation as to the distribution channels.

It can be concluded that national regulations concerning margarines in a number of EEC countries still discriminate in part vis-à-vis butter. Also, despite recent changes in the national regulations in a number of EEC countries (such as Belgium, France, West Germany and Denmark), these laws still may constitute obstacles, though not major ones, to intra-EEC trade in margarines.

Comparison with the U.S.

The total production of margarine in the U.S. certainly did not increase from 1979 to 1984 (see Table 5). In examining the quantity of fats and oils used to produce this margarine, it can be observed that this decreased from 79.3% in 1979 to 74.3% in 1984, indicating the growing importance of low-fat margarines.

The U.S. market also is characterized by the availability of a large variety of different type margarines (different fat and salt contents, whipped or not, wrapped or in tubs, possible presence of dairy products and different polyunsaturated fatty acid [PUFA] levels), while in the

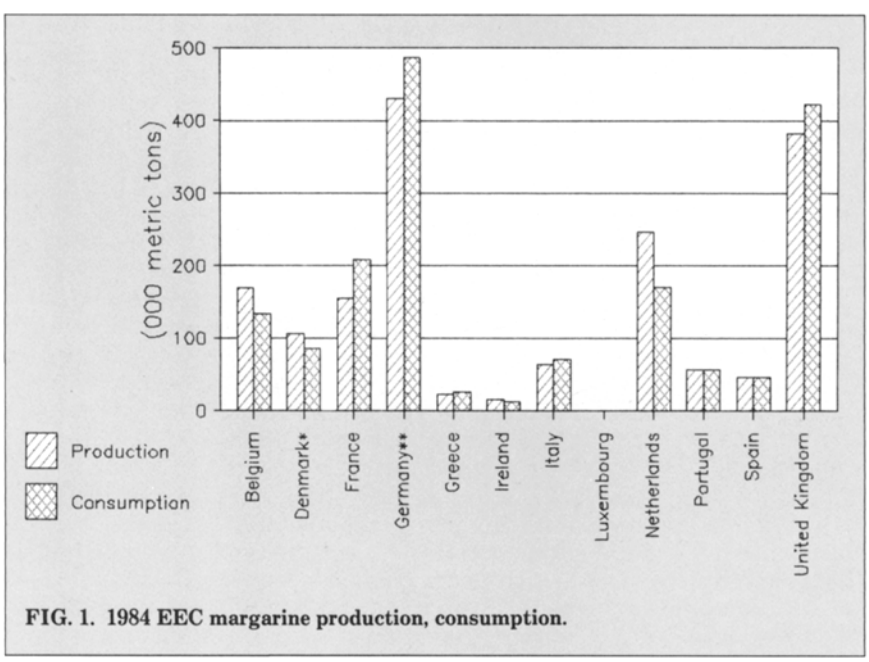

FIG. 1. 1984 EEC margarine production, consumption.

TABLE 4

Margarine Production and Use in the U.S.

	1979	1980	1981	1982	1983	1984
Total production (MT)	1,158,131	1,174,280	1,168,655	1,177,546	1,111,864	1,129,419
Fats and oil used (MT)	918,313	923,031	909,967	906,429	840,113	838,888
Soybean oil	81.1 %	81.2 %	84.2 %	86.0 %	83.7 %	83.9 %
Corn oil	11.0 %	11.0 %	10.7 %	11.0 %	11.4 %	10.7 %
Cottonseed oil	1.3 %	1.2 %	1.3 %	1.1 %	1.8 %	1.4 %
Lard & edible tallow	4.2 %	5.1 %	3.4 %	1.4 %	2.3 %	2.6 %
All other	2.4 %	1.5 %	0.4 %	0.5 %	0.8 %	1.4 %
Per capita consumption (kg)	5.1	5.1	5.1	5.0	4.8	4.7

Source: Natural Association of Margarine Manufacturers, U.S.A.

EEC, there basically are packet margarines and soft, spreadable margarines, with the low-fat spreads all relatively new. Of course, in the tub margarines, a further differentiation can be made between vegetable and dietetic (high PUFA content) margarines. In Belgium, dietetic margarines are even promoted on the basis of a polyunsaturated/saturated ratio of 66:15.

The most striking difference between the U.S. and EEC markets for margarines, however, is the different fats and oils used in the composition. In the U.S., soybean oil clearly dominates, leaving only some 16% to all other oils and fats. In the EEC, soybean oil usage was estimated at less than 23% in 1982.

This difference can be explained, first of all, because the use of animal fats, from both land and marine animals, is much lower in the U.S. Marine oils do not have GRAS (generally recognized as safe) status in the U.S. Other reasons include the following:

- Soybean oil, as a liquid oil, has to compete in the EEC with domestically produced rapeseed oil.
- Hydrogenated soybean oil has to compete with palm oil. In addition, the polymorphic behavior of hydrogenated soybean oil is not ideal and some additional precautions, such as interesterifying, adding special additives, avoiding fluctuation of storage temperature or using a three-component fat mixture, are required.
- Political interventions do not facilitate developing the overall margarine market further; this is a consequence of several schemes artificially encouraging the use of butter.
- The image of soybean oil, considered to be neutral, certainly commands no premium as does sunflowerseed oil.
- Because of the long shelf-life requested (sometimes up to a year) and often the lack of a complete refrigerated channel to EEC consumers, the linolenic acid present in soybean oil (and even more so in rapeseed oil) could cause off-flavor problems if the soybean oil is not properly refined.

Statistics for individual countries in the EEC for the utilization of different oils and fats are not readily available. The only country publishing official statistics is the United Kingdom, through its Ministry of Agriculture, Food and Fisheries. This data shows that soybean oil is not very popular and that animal fats are used considerably. This may change, however, after publication of the report by the United Kingdom's Committee on Medical Aspects of Food Policy (COMA), which recommends cutting saturated fatty acid intakes and increasing the ratio of polyunsaturated to saturated fatty acids consumed.

Copra export duty is reduced

The government of the Philippines lifted the ban on copra exports in mid-March, and at the same time reduced the export duty on copra from 15% to 10%. In order to dispel fears that the the lifting of the 3.5-year ban may be temporary, the government said the lift will be a permanent part of the government's agricultural development program.

In addition, the Philippine Coconut Authority (PCA) has been placed under the Ministry of Agriculture and Food and will be directed by Oscar F. Santos, deputy minister for coconut industries. The PCA was formerly under the Office of the President.

Pakistan ends price control

Pakistan in April announced it would remove government control on edible oil prices and imports, effective July 7, 1986. According to the April 11 issue of *Oil World*, Pakistan will permit edible oil imports in bulk, while prices for such secondary products as vegetable ghee and cooking oils will be decontrolled.

Oil World reported the existing excise duty and import surcharge on edible oil products will be replaced by a specific regulatory import duty, which will be reviewed weekly by the Economic Coordination Committee. Pakistan said this committee will sanction the expansion and modernization of domestic vegetable ghee and cooking oil industries.

The import duty planned by Pakistan is meant to keep domestic prices for edible oils and oilseeds high to encourage sufficient domestic oilseed production, according to *Oil World*. However, the new policy is expected to increase edible oil imports in the longer run.

Canola industry eyes U.S. markets

The Canola Council of Canada's message during its 19th annual convention, held in San Francisco in March, was that it is looking to the U.S. and other markets for places to expand exports of canola products.

Canola, Canada's low erucic acid and low glucosinolate rapeseed, provides 56% of that nation's total edible vegetable oil supplies, and canola meal makes up 30% of the animal feed protein used in Canada. But for the canola crushing industry to grow, exports must increase, according to Robert J. Broeska, executive director of the Canola Crushers of Western Canada. Otherwise, canola oil consumption probably will increase at a rate comparable to Canada's population growth of 2% per year, he said.

Now, 45% of seed production and 50% of all canola products are exported to the U.S., India, Japan and other markets; expansion beyond that, in Broeska's opinion, will depend in large part on trade-policy formulation. Quoting Baldur Stefansson, a leading Canadian canola breeder, Broeska said, "Scientists had accomplished much of the basis for the canola industry as it is known in Canada today and they would be expected to maintain a high level of contribution in the future in order to support a viable industry. However, it will be the effort and expertise brought to bear in trade policy-making and negotiations which will determine continued success of the industry."

Broeska said, "The Canadian canola industry will be looking to bilateral trade talks between Canada and the U.S. with a view to improving the terms of trade for the canola industry." The canola crushing industry supports complete removal of tariffs on U.S. imports of canola oil and meal, he said, adding the industry must convince Canada's negotiators to get an exemption from the provisions of the U.S. countervail law.

In addition, Broeska said the Japanese import tariff on vegetable oil probably would become a high priority issue for the canola industry soon. Under the present tariff system, Japan, a major importer of canola seed, has a significant purchasing power advantage over Canadian canola crushers, Broeska said.

While the Canadian canola industry has enjoyed many benefits as a result of negotiations under the General Agreement of Tariffs and Trade (GATT), Broeska said, in the next round of GATT negotiations Canadian representatives need to focus on controlling the export battles among the major nations involved in trading agricultural commodities. "The frustration of the canola industry with the GATT has been the inability of that body to deal with elements of the agricultural trade war such as the export subsidy in its varied and perverse forms," Broeska said.

Broeska was particularly concerned with the European Economic Community (EEC) subsidization of agriculture and Malaysia's practice of imposing differential export taxes on crude and processed oils.

Like Broeska, Charles Mayer, minister of state for the Canadian Wheat Board, expressed concern over the EEC continuing to subsidize growers without setting production limits. Mayer said that EEC producers are so well protected that they will not go out of business because of low international grain prices. He also added that while the U.S. farm bill has the potential to reduce production in the U.S., it may not happen in the EEC. Instead, it will be the Canadian, Argentine and Australian producers who feel the price decline.

While Canada understands the U.S. farm bill may help draw the European Community to the negotiating table, Mayer added, "Nobody can win a flat-out subsidy war. I'm afraid some of those who have not joined in, such as Canada, will be caught in the crossfire."

Canada and the United States must agree on long-term objectives for world agricultural commodity markets before there can be any change toward more stable world markets, Mayer said. In soybean and canola trade between the U.S. and Canada, the trade advantage fell to the United States, he said. In 1985, Canada imported $208.4 million in soybean products from the U.S., while the U.S. imported $37.3 million in canola products from Canada. A particular hindrance to trade, Mayer said, was that canola seed, meal and oil are subject to tariffs entering the United States, but when soybeans, soybean oil and soybean meal move into Canada, only oil is subject to a tariff.

Mayer was quick to point out that even if Canada could export its total canola production—152 million bushels of canola in 1985 compared to 2.1 billion bushels of U.S. soybeans—it "wouldn't make much of a dent on the U.S. oilseed market."

Mayer's opinion was shared by Gerry W. McClintock, vice-president and manager of the Canadian region of North American Grain Division, Continental Grain Company. After his talk on marketing canola, McClintock said, "There's no doubt that we're concerned about protectionism, but the amount of canola oil we're talking about is not an amount the American oil industry or farmers should be concerned about. If it should reach a half a million metric tons, then worry." In 1985, Canada exported 19,100 metric tons (MT) of canola oil to the United States. Total production was 245,200 MT.

McClintock did express concern about the amount of Malaysian palm oil on the market, which he described as a "glut." He said U.S. companies were sharply increasing palm oil imports, and the market is being tested to see just how much low-cost palm oil can replace soybean oil. He estimated that the replacement of soybean oil by palm oil in the U.S. may exceed 8% this year compared to an average of under 4% for the past five years. He added afterward that the entry of more Malaysian oil into Canada's domestic market is causing con-

cern. He said the price Canadian crushers were paying for canola seed was greater than the price for Malaysian refined palm oil.

McClintock told canola producers and processors that regardless of how good they think the quality of canola is, the price must be competitive, especially in the face of competition from EEC, China (expected in about a decade), the United States and Australia. He estimated that the U.S. might produce 50,000 MT of rapeseed this year, with much of the seed being exported to Japan. In the not-too-distant future, the United States and Australia could produce as much as 300,000-400,000 MT per year, he said.

After their talks, Broeska and McClintock said the canola industry was looking to move into the U.S. market as it moved into the Canadian market—slowly and steadily. Although Broeska was cautious about projecting how much canola oil might be exported to the United States, he said the canola industry was pleased by the amount of oil imported into the U.S. in 1985. Last year, he said, 20,000 MT of canola oil was shipped to the United States, including 7,000 MT for industrial use and 13,000 MT for edible use, compared to a 1984 import total of 2,000 MT, all for edible use. Broeska said that increase is due to the fact that canola recently received generally recognized as safe (GRAS) status from the U.S. Food and Drug Administration (FDA).

Edible canola oil entering the United States now mainly is being sold for testing purposes by U.S. companies exploring possible uses. Anna Reager of Anderson Clayton Foods said she was attending the meeting primarily to learn more about canola. She said canola was competing with cottonseed products from Anderson Clayton in the Pacific Northwest. Another attendee, Edward Campbell, technical director and marketing manager for Archer Daniels Midland Co., said there is no strong interest yet on the part of ADM to use canola on a large scale. "We would only have a use for it if it were an economic replacement for soybeans," Campbell said. Campbell added that he doesn't believe canola will be used extensively in the United States until more American farmers start to grow it.

Dick Auld, associate professor of plant breeding and genetics at the University of Idaho, said it probably will take until 1990 before the U.S. canola crop will be large enough to support a canola processing plant. In the Pacific Northwest 28,000 acres will be harvested this fall, and Auld estimates it will take at least 200,000 acres to make a processing plant economically viable.

Promoting Canadian canola, especially canola oil, would be easier in the United States if the industry could use the name *canola*, Allan Earl, president of the Canola Council of Canada said. Under present labeling requirements, canola oil must be listed as "low erucic acid rapeseed oil" in the U.S. "Who would want to eat something called low erucic acid rapeseed oil? The name has negative connotations," Earl said. The Canadian government is requesting the FDA allow the use of the word *canola* as a synonym for low erucic acid rapeseed oil in the U.S., according to Earl.

Stanley Smith, vice-president of quality control and product development for Colfax Inc., said for rapeseed oil to be used in any great quantity in the United States, the term *canola* probably would have to be adopted. Colfax presently imports canola oil and refines it for export sales, but Smith said his company does not see great potential for it in the U.S. He added that Colfax has no long-term plans to develop the oil.

The short-term opportunities for canola may not be great in the United States, but the long-term potential is better, said Dave Sommerville, vice-president and general manager of Edible Oils Division of Canada Packers. He listed two prerequisites for successful marketing of canola in the U.S.: FDA approval to use the term *canola*, and an economic incentive to try canola. He added that canola has one advantage in that it has proven itself to many multinational companies that do business in Canada and have divisions in the United States. "This venture isn't just some crazy Canadians looking at an unknown oil," Sommerville said. "The largest of the large companies are involved in studying and marketing the oil in Canada."

Report from New Zealand

An Oils and Fats Group of the New Zealand Institute of Chemistry has been established.

The group's first seminar was held March 4 at Waipuna Travel Lodge, Auckland. Topics included the growing of low erucic acid rapeseed (LEAR) and oil production from this crop, currently New Zealand's only oilseed industry.

It was reported at the seminar that a new facility is being established to recover wax and kauri gum from peatlands by solvent extraction. Kauri gum, a fossil product used in varnishes and linoleums, was a big export item 80 years ago; however, production declined when the crude methods of digging it up no longer produced an economic return.

The Oils and Fats Group plans to hold another international conference in 1989.

Officers of the Oils and Fats Group are Stanley G. Brooker, patron; Laurence Eyres, chairman; Sharon Hannan, secretary; and Gordon Winward, treasurer. Brooker is with the Chemistry Department at the University of Auckland. Eyres, who has resigned as technical services manager for Abels Industries, has set up a consultant specialty manufacturing service, Eyres Chemical Group, PO Box 18098, Glen Innes, Auckland. Hannan is with the Department of Medicine, Auckland Hospital, Private Bag, Auckland. Winward, meanwhile, recently has started Food Group

Consultants, 1/329 Pakuranga Rd., Auckland.

The effect of different feeding programs on animal depot fats is being investigated in two New Zealand laboratories. At Victoria University of Wellington, Brian Shorland is looking at the feeding of polyunsaturated fats to steers. At the Department of Scientific and Industrial Research, Palmerston North, lambs are being fed stock meal and their fats compared with those of animals which are pasture-fed, as is usual in New Zealand.

Copies of the proceedings of the international conference held in 1983 are available from Duromark Industries, PO Box 56-244, Dominion Rd., Auckland, for $35 US, which includes postage. The proceedings include papers by well-known chemists from many different countries.

According to Brooker, the group will be pleased to welcome any AOCS members who visit New Zealand. Anyone contemplating doing so is encouraged to give advance notice to Brooker, at the Chemistry Department, University of Auckland, Private Bag, Auckland, New Zealand, telephone (09) 737-999, Extension 8287, or home telephone (09) 503-727, or to contact Eyres.

Biochemical food markets

The market for biochemicals used in foods in the U.S. will rise to a value of $4.5 billion in 1989, from $3.9 billion in 1985, according to a market study by Frost & Sullivan.

According to the report, "U.S. Biochemical Food Markets," corn sweeteners will be the largest category during this period, with protein ingredients constituting the second largest category. In the latter category, the study rated soybean derivatives as the most important, with soy preparations used in meat, bakery, cereal and some dairy products.

The study noted, "The applications for soy proteins range in these various foods from fat and water absorption to cost savings." One appeal of protein ingredients, the study said, is price, with a blend of ground beef and textured vegetable protein costing about 20% less than 100% ground beef. Frost & Sullivan predicts this segment of the market will rise from $596.6 million in 1985 to $647.3 million in 1989.

For more information, contact Frost & Sullivan Inc., 106 Fulton St., New York, NY 10038.

Consumer survey

Consumers usually don't know what type of vegetable oil they're buying when they purchase a particular cooking oil or margarine, market research conducted by the National Sunflower Association (NSA) has shown.

NSA, through Miller Research Services of Minneapolis, conducted a nationwide telephone survey of 500 consumers last fall to better understand consumer awareness and usage of vegetable oils. The results show many shoppers do not know what vegetable oil is the main ingredient in many of the most popular brands of liquid cooking oils or margarines.

The survey found Crisco (a soybean oil product) and Wesson (soybean and/or corn and/or sunflowerseed oil) to be the most popular liquid vegetable oils, followed by Mazola (corn oil), Puritan (soybean and/or sunflowerseed oil) and Sunlite (sunflowerseed oil). Brand loyalty seemed to be a factor in making a purchase, with 21% of those surveyed saying they buy a certain brand primarily because it is the one they or their mothers have always used.

Other key considerations in selecting vegetable oil were price, taste, amount of cholesterol and lightness or consistency. Less important considerations seemed to be the color of the oil, oil stability and the smoke point.

Asked to compare specific advantages of various vegetable oils, consumers cited corn oil for low cholesterol and good flavor, and sunflowerseed oil for low cholesterol, lightness and nutritional value. Many consumers apparently are unaware that no vegetable oils contain cholesterol, NSA said.

Most consumers polled indicated they do not care what vegetable oil is used in margarines they buy. Those who did have a preference, however, chose corn and sunflowerseed oils most frequently. A common reason cited was low cholesterol; sunflowerseed oil also was picked for its lightness and nutritional value, NSA said.

NIOP officers

The National Institute of Oilseed Products (NIOP) re-elected Albert F. Mogerley to a second one-year term as president at its 52nd annual meeting held in March in Tucson, Arizona.

Mogerley, an AOCS member, is president and chief executive officer of Hudson Tank Terminals based in Port Newark, New Jersey.

Other officers elected were first vice-president Susan Tan Luo, Shearson-Lehman Brothers, San Francisco, California; second vice-president R.L. Fleming, Capital City Products Co., Columbus, Ohio; and secretary-treasurer Grove E. Bryant, Petromark Inc., Richmond, Georgia.

Others elected as directors were Milton F. Barr Jr., Ranchers Cotton Oil, Fresno, California; C. Burton-Smith, Zone Devices Inc., San Rafael, California; George L. Congleton, Baker Commodities Inc., Los Angeles, California; Millard M. Evak, Durkee Foods, Chicago, Illinois; Arthur K. House, Lou Ana Foods Inc., Opelousas, Louisiana; Raymond R. Long, Stolt-Nielsen Inc., Greenwich, Connecticut; Douglas Lu Ym, Lu Do & Lu Ym Corp., Cebu City, the Philippines; William W. Stanley, Stanley Brokerage Co. Inc., San Francisco, California; Robert E. Thomaier, Best Foods U.S., Englewood Cliffs, New Jersey; Harold S. Wann, Hunt-Wesson Foods Inc., Fullerton, California; Rik J. Wijsenbeek, Forum Import & Export Corp., Stamford, Connecticut; William Winecki, Palmco Inc., Portland, Oregon.

Cacao De Zaan marks 75 years

Cacao De Zaan of Holland is celebrating its 75th anniversary this year. According to company officials, Cacao De Zaan has become the largest cocoa factory in the world, with sales offices in the United States and West Germany, since its founding as a chocolate and confectionery factory April 3, 1911, in the region of Zaanstreek located on the River Zaan.

The first small factory established in 1911 confronted many difficulties. As a result, the company decided to concentrate production less on consumer goods and more on cocoa butter and cocoa powder for industrial processing.

By its 25th anniversary in 1936, the company had grown into one of the larger Dutch cocoa factories. Meanwhile, the name was changed to N.V. Cacaofabriek De Zaan. After World War II, the company went through a period of growth and expansion, and consumer goods were put on the market again.

By 1961, Cacao De Zaan had become the largest cocoa factory in Holland and its products were used throughout the world in chocolate and foods. In 1964, the company became wholly owned by W.R. Grace & Co. of the United States.

Color officers

Allan B.J. Rodrigues of DuPont begins his term as president of the Inter-Society Color Council with the society's annual meeting, slated for June 15 in Toronto. Chosen as president-elect is Joy Turner Luke of Studio 231, Sperryville, Virginia.

Other officers are Therese R. Commerford of the U.S. Army Natick, Massachusetts, R&D Center, secretary, and Edward T. Connor of Pacific Scientific Co., treasurer. Elected as directors are Paula J. Alessi of Eastman Kodak, Mary Ellen Zuyus of Hunter Associates Laboratory and Roland L. Connerly Sr. of Burlington Industries.

Nordic liaison

AOCS member Lars Appelqvist of the Swedish University of Agricultural Sciences, Uppsala, Sweden, has been named liaison representative for the Nordic countries to the Association of Official Analytical Chemists (AOAC). Appelqvist was instrumental in developing the Nordic Committee on Food Analysis cooperative agreement with AOAC. He also chairs the National Committee for Food and Feed Standards within the Standard Institute of Sweden.

Erdman honored

AOCS member John W. Erdman Jr., professor of nutrition at the University of Illinois, has been awarded the 1986 Paul A. Funk Recognition Award. The award is given annually to University of Illinois faculty for outstanding professional achievements and major contributions to agriculture through research, teaching, extension and public service.

Erdman, a U of I faculty member since 1975, is nationally recognized for his work in nutritional science. His major research has focused on the effects of processing upon the bioavailability of food nutrients, as well as the role of vitamin A and other retinoids in mammalian metabolism.

Münster appointment

Kurt Aitzetmüller has been appointed head of the Institute for Chemistry and Physics of the Federal Center for Lipid Research in Münster), West Germany.

A native of Austria, he studied chemistry at the University of Vienna, spent two years as a postdoctoral fellow at Argonne National Laboratory in Argonne, Illinois, and later worked for many years at the Unilever Research Laboratories in Hamburg, West Germany. He is known for his studies in the field of lipids and other natural products.

The Münster institute deals primarily with developing analytical methods and standardizing techniques for characterizing edible fats and related products.

Holman, Briggs named Fellows

AOCS members Ralph T. Holman and George M. Briggs were among 10 senior scientists designated as Fellows of the American Institute of Nutrition at the Institute's 1986 meeting held during April in St. Louis, Missouri.

Holman, formerly executive director of the Hormel Institute, University of Minnesota, is co-editor of *Lipids*, published by AOCS. His career spanning four decades has included extensive research with polyunsaturated fatty acids.

Briggs, meanwhile, is professor emeritus and nutrition consultant for the Department of Nutritional Sciences, University of California at Berkeley. He has been involved in work with carbohydrates and fats for 48 years.

News briefs

Robert L. Opila Sr., an AOCS member, has been named manager of Austin Company's newly organized food group based in Chicago. He has 35 years of experience in the food, pharmaceutical and specialty chemicals industries.

Saul Rogols has joined Grain Processing Corp. Inc. of Muscatine, Iowa, as a food technologist in its technical services department.

Dr. Ing. Heinz Hiller, a member of the executive board of Lurgi GmbH, Frankfurt, West Germany, for the past 19 years, retired at the end of March after reaching his 65th birthday. Hiller had worked for Lurgi for 36 years.

Novo Laboratories Inc. of Wilton, Connecticut, has promoted James S. Crawford to director of marketing; Donald A. Krull, Bernard Yemc Jr. and Robert J. Petrowski to marketing managers; John Burr to director of sales; and Lois P. Watts to advertising coordinator. Novo also has established the Novo Information Center at 110 E. 59th St., New York, NY 10022, telephone 212-593-6355, to answer queries about its business and services.

AOCS member **Antoni Rutkowski** has been given the honorary title of Doctor Honoris Causa by the Agricultural-Technical University of Olsztyn, Poland. Rutkowski, professor of food and oil technology at the Agricultural University of Warsaw, also has been elected as a foreign member of the Allunion Academy of Agricultural Sciences of Russia.

Rodolfo Paoletti, president of the Nutrition Foundation of Italy and a faculty member at the University of Milan, will present the Kaufmann Memorial Lecture during the joint DGF-ISF meeting Sept. 7-11, 1986, in Münster, West Germany. At that same meeting, **Janos Hollo**, director of the Central Research Institute/Chemistry of the Hungarian Academy of Sciences, will receive the DGF's Normann Medal.

A pilot fermentation plant has been established by **Efamol Ltd.** of Guildford, England, and Dundee University, Dundee, Scotland, at the university. The 500-l fermenter will be used to develop γ-linolenic acid production through biotechnology.

According to the National Cottonseed Products Association, **cottonseed products** exported by the U.S. during calendar year 1985 totaled $141.5 million, up 10% from the 1984 figure of $128.1 million. Included were crude, once-refined and hydrogenated cottonseed oils, as well as cottonseed cake and meal and cotton linters.

Fritzsche Dodge & Olcott has promoted **William J. Downey** to vice-president of new business development within its flavor division. Downey this year was elected president of the Flavor and Extract Manufacturers' Association.

AOCS member **Frank C. Naughton** of CasChem Inc. has been elected vice-president of the International Castor Oil Association based in New York City.

Central Soya Co. Inc. has sold J.H. Filbert Inc., a manufacturer and marketer of margarines and salad products in Baltimore, Maryland, to **Shedd's Food Products Inc.** of Smithfield, Michigan.

Dart & Kraft Inc.'s **Kraft Inc.** unit in April announced intentions to buy the food service business of S.S. Pierce Co. of Dundee, New York.

The **POS Pilot Plant Corp.**, Saskatoon, Saskatchewan, Canada, has approved a bylaw change allowing non-Canadian corporations to be members. Membership in POS allows member companies a discount on POS services, including research and access to in-house research. Meanwhile, AOCS member **Janos Mikle** has been named director of development at POS.