Fats & Oils News

900 attend Kuala Lumpur world conference

Leonard Khee Seong, Malaysian Minister of Primary Industries, delivers opening address.

Program committee cochairmen David Tandy (left) and Kurt Berger at meeting with program participants.

Dr. Anuwar Mahmud, director-general of PORIM, speaks at opening ceremonies.

Approximately 770 technical registrants from more than 45 nations at the World Conference on Processing of Palm, Palm Kernel and Coconut Oils were told that producers expect to meet world demand with more downstream products from increasing (palm and palm kernel) or steady (coconut) supplies of crude oil.

The Kuala Lumpur conference attracted approximately 900 participants, including 770 technical registrants, more than 140 exhibitor personnel and three dozen spouses' program registrants. The meeting was held Nov. 11-16, 1984, under sponsorship of the Palm Oil Research Institute of Malaysia (PORIM) and the American Oil Chemists' Society (AOCS). The conference proceedings will be published as the February 1985 issue of the *Journal of the American Oil Chemists' Society* (JAOCS).

Growers, processors, researchers and users seemed pleased with the week-long discussion of technical and economic topics related to the oils. Malaysia's minister of primary industries, Leong Khee Seong, read the opening address for Malaysian Prime Minister Mahathir Bin Mohammad. The address stressed Malaysia's rapid emergence as a force in international fats and oils markets during the past two decades and expressed optimism for further growth. Malaysian palm oil production in 1964 was about 125,000 metric tons; in 1984, it was approximately 3.5 million metric tons; by the year 2000, it could reach more than 10 million metric tons.

The developing nations want to export more processed products than crude commodities. Thus, the Philippines has reduced export of copra in favor of crushing the copra domestically and exporting coconut oil. In Malaysia, virtually all exports are now of refined oil rather than crude oil, which dominated exports only ten years ago.

Malaysia currently derives more income from oil palm product exports than from its rubber exports.

Oil mill capacity exceeds production right now, but the gap is expected to narrow. Meanwhile, in the conference exhibit area, there were many questions on how to increase oil mill efficiency by reducing costs or increasing production. Energy savings were a major topic. Refineries have the same concerns and also are looking to produce more finished products. There are five oleochemical plants in Malaysia with a capacity of about 150,000 tons a year for producing fatty acids, methyl esters and glycerine. There is increasing interest in producing soap noodles—relatively bland, noodle-shaped chunks of soap that can be exported, with each recipient manufacturer creating a distinct product by reforming the noodles into soap bars with whatever additives, coloring or fragrances will create a saleable product. One Japanese firm presently is investigating products derived from oil palm with a view to eventually producing them in Malaysia.

Offsetting the advantages of manufacturing near the source of raw materials is the relatively higher cost of transporting finished products to their market. One speaker, however, urged developing nations to produce those oleochemicals domestically that they otherwise would have to import.

Malaysia's prime minister praised PORIM's role in providing technical expertise in all phases of oil palm production and processing. Kurt Berger, special advisor to PORIM's director and a co-chairman for the conference technical program, said there isn't a great deal of new technology being developed at PORIM, but it is a matter of adapting current technology and educating people in its use. PORIM is working, for example, with East German researchers on

potential palm oil uses. Berger says there are many nations not now importing palm oil that may find it useful in the future. Berger and David Tandy of EMI Corporation, Des Plaines, Illinois, served as co-chairmen of the technical program and headed the committee that organized the meeting. PORIM's director general, Tan Sri Datuk Dr. Anuwar Bin Mahmud, was conference honorary president and spoke at the opening ceremonies.

A recurrent theme of several speakers was an emphasis on quality control. Palm oil is obtained from the fresh fruit bunches of oil palm, which must be processed as quickly as possible after harvest to forestall formation of significant amounts of free fatty acids. One American registrant said he had talked with an oil mill operator who complained of lengthy delays in getting fresh fruit bunches from oil palm groves to the oil mill. Refiners spoke of the need for oil mills to be more concerned with how extraction conditions can affect quality of refined oils.

While the location of the conference tended to focus interest on palm and palm kernel oils, coconut oil was discussed as a source of edible oil and as a feedstock for the oleochemicals industry. Coconut oil production in the Philippines is expected to be sufficient to meet international demand at least through the end of the century. Coconut oil exports from other nations are not expected to be major factors in the international market.

The meeting generally proceeded smoothly, aside from a balky slide projector that developed improved working habits as the week progressed. Six speakers were unable to reach Kuala Lumpur for various reasons, but in all but two cases the prepared papers were read by alternate speakers. Papers on additives and enzymes were withdrawn. Roy J. de Vries of Acidchem (M) Sdn. Bhd., stepped in as co-chairman for the oil processing session when one of the original co-chairmen could not attend.

In addition to the technical sessions, registrants were able to participate in a number of industrial site visits, including oil palm plantations, oil mills and refineries. Many participants also toured the PORIM facilities outside Kuala Lumpur. The facility was opened in February 1984 with a staff of approximately 400. Visitors toured tissue culture laboratories, an oleochemical laboratory, effluent and wastewater laboratories, pilot plant facilities and other portions of the site.

On Saturday, Nov. 17, conference registrants also had the opportunity to visit industrial sites in Johore Bahru or to visit the Henkel oleochemicals plant near Kuala Lumpur that opened earlier this year. That facility has been operating above rated capacity since coming onstream, one Henkel official said.

Social events at the conference included an opening reception in the exposition area and a Malaysian night which featured Asian foods and Malaysian craft demonstrations.

While the conference was front page news for The New Strait Times, the daily English language newspaper serving Malaysia, on opening day, it quickly took a back seat later in the week as Malaysia celebrated the coronation of a new king. Conference registrants had a chance to observe the Malaysian royalty staying at the Kuala Lumpur Hilton, headquarters site for the conference.

Summary of Papers Presented at the World Conference on Processing of Palm, Palm Kernel and Coconut Oils

A.R. BALDWIN, 4854 Thomas Ave., Minneapolis, MN 55410

The following summary of plenary papers at the recent world conference sponsored by the Palm Oil Research Institute of Malaysia and the AOCS was prepared by JAOCS *editor A. R. Baldwin. The conference proceedings will be published as the February 1985 issue of* JAOCS. *All regular* JAOCS *subscribers will receive a copy, as will all technical registrants for the conference. Names given in this summary are those of the authors or the presenters.*

Session I

Session I had five papers to start off the conference. The major production of palm oil shifted from Nigeria to Malaysia following the Oil Palm Development Program instituted by the Malaysian government in the 1950s. Mielke described the palm developments since then. They have had a meteoric rise to an estimated 6.6 million tons of palm and palm kernel oils in 1984. This is expected to expand to over 20 million tons by the year 2000. Before that time, Indonesia will join Malaysia as a major producer. Palm and palm kernel oils are expected to become the major export fats and oils by 2000, representing 44% of world exports of fats and oils. There are extensive lands in Malaysia, Indonesia, Brazil and other countries for increased palm plantings. Palm oil is expected to fill the increasing gap between production of other fats and oils and the increasing demand for vegetable oils.

Ignacio provided data on oil production, processing, distribution and consumption. The trend has been toward processing the copra in the countries of production. As a result, West Europe and the USA now import coconut oil and very little copra. Oil milling capacity in the Philippines will continue to exceed demand for several more years. Production of coconut oil is projected to be sufficient to meet specific needs worldwide through 2002. The trend in new production is toward (tall X dwarf) hybrids such as the MAWA hybrid (Malaysian Dwarf X West African Tall), with much higher yields per hectare. The trend in consumption is increasingly toward non-food uses, which now are more than 50% of total consumption.

In a forward looking discussion of biotechnology as applied to oil seed crops, James described the use of enzymes in oil processing, fermentation production of oils and fats and genetic improvements of oil seed crops. The ability to

use specific lipase systems opens a new area in the production of specialized fats. The first major commercial application is the conversion of palm oil mid fraction rich in POP triglycerides to a mixture of POP, POS and SOS which can then be separated by fractionation to recover the POS, the major component of cocoa butter. Although fermentation production of fats and oils is feasible, present cost studies indicate that it is not economically feasible except possibly for some special fats.

Production of palm plants by cloning of high yielding parent plants is in commercial use. This is predicted to increase yields by at least 30% over present palm plantation yields. The oil palm has great variations which would make feasible the selections of plants for cloning, having not only high yields but specific oil compositions. Reproduction of coconut trees by tissue culture and cloning is urgently needed to upgrade yields of coconut plantations. Plantlets have been generated, and successful transfer to soil seems very near.

Padolina could not come, but he would have reviewed the collections of coconut cultivars and the objectives in coconut breeding programs. The "Coconut Breeding Program" has the three basic activities of identification and collection of cultivars; evaluation and selection of cultivars via hybridization and selection of hybrids, and seed production. Embryo and tissue culture are being studied for development of in vitro techniques for propagation and in vitro storage. However, in spite of much progress, regeneration of complete plants by these means has not yet been successful.

Padolina also described the etiology of *cadang-cadang*, the blight disease that has killed vast areas of coconuts. The viroid ccRNA appears to be the cause of the disease, and various studies are in progress to determine the vector and to develop rapid diagnostic techniques.

Kheiri provided an extensive analysis of the Malaysian palm and palm kernel oil processing industry. The current processing capacity is sufficient to handle the increased production to at least 1990. The palm oil products exported now are the primary downstream products. The emphasis is on further processing to higher technology, higher priced products, such as specialty fats for the food industry, finished shortenings, margarines, cocoa butter substitutes and oleochemicals.

Session II

On Monday afternoon there were four papers on "Properties of Oils." Rossell described results to date of a research program funded by the U.K. Ministry of Agriculture, Fisheries and Foods, The Federation of Oils, Fats and Seeds Association Ltd. (FOSFA International), and The Leatherhead Food RA. This work was to study purity characteristics of the major edible vegetable oils, including palm, palm kernel and coconut oils. Forty-seven samples of crude palm oil, 5 of palm olein, 8 of palm stearin, 54 of palm kernel oil and 23 of coconut oil were analyzed for fatty acid, triglyceride, sterol and tocopherol compositions. The melting properties also were determined and, in the case of palm, all the compositions of the acids at the triglyceride 2-positions were measured. An initial statistical analysis of the results shows that a combination of values from the carbon number analysis differentiates palm kernel and palm oils and can be used to decide the portion of each in a blend. In the case of palm oil suspected of being contaminated with palm fractions, it was found useful to plot melting points against iodine values and to compute the product of the C48 triglyceride content and the palmitic acid enrichment factor.

Tan reviewed glyceride and fatty acid compositions of *E. oleifera*, *E. Guineensis* and hybrids between the two. Prospects are described for modification of palm oil composition through selective breeding, tissue culture propagation and enzyme catalyzed transesterification. The target is to develop hybrid oils with iodine values above 72 and less than 25% palmitic acid. The best opportunity is to select for higher oleic acid, because there is little variability for linoleic acid. More unsaturated oils are desired in order to increase their consumption as salad and cooking oils.

Goh discussed the types and amounts of minor constituents in palm oils. Crude palm oil contains approximately 1% of minor constituents, including carotenoids, tocopherols, sterols, triterpenes, phospholipids, glycolipids and other trace impurities. Carotenes which give the red color to palm oil, together with tocopherols, are claimed to contribute to the stability and nutritional value of the oil. To a great extent, the minor constituents determine important quality characteristics of palm oil. Most of them are destroyed or removed during refining, bleaching and deodorization. If carotene could be recovered undamaged, its commercial value would nearly equal that of the oil itself. The authors also discussed effects of the minor constituents on the oil and methods for their removal.

Timms presented an excellent review and comparison of physical properties of palm, palm kernel and coconut oils. The properties of mixtures of the oils also present interesting properties of emtectic mixtures. The basic physical properties considered were density, specific heats, heats of fusion and viscosities. Melting points and solid fat contents were discussed, and their empirical natures were emphasized. Detailed information on Wiley and slip melting points and solid fat contents by NMR and SFI by dilatometry was presented. Phase behavior and polymorphism of the three oils were reviewed. Special attention was given to post-hardening phenomenon in palm oil and the effects of diglycerides and storage times on phase behaviors. There is a wealth of data in this paper for those interested.

Session III

Tuesday morning started off with seven papers on "Processing of Fruit." Southworth described events leading to introduction of the pollinating weevil *Elaedobins kamerunicus* into Malaysian plantations. The benefits so far are increased kernels and reduced estate pollination costs. Changes in bunch composition have caused some processing problems in sterilization and nut processing, which currently are being corrected by the industry. There have been no recent significant changes in basic processing procedures. However, recent process improvements include use of decanters, better steam utilization, numerous quality improvements and computerization. Most palm oil mills now conform to government standards for effluent treatment using mostly biological digestion processes and land application of wastes. Current research and development projects include tissue culture and cloning of premium oil palms, utilization of by-products, mechanization of harvesting and improvement in processing methods.

Tang compared the three processes for recovering oil from palm kernels. Capital costs, operating costs, oil recoveries and oil qualities must be considered in choosing among screw pressing, solvent extraction and prepress/solvent extraction. Palm kernel production has increased to 800,000 to 900,000 tons/year. Most of the kernels are now processed in Malaysia. The oil, similar to coconut oil in composition, is all exported. The defatted meal is mostly exported for animal feed.

Augistine described the by-products of coconut processing—coconut water as a carbohydrate beverage or a fermentable raw material, the husk as a source of fibers, charcoal and chemicals, and the shell primarily as a source of carbon. Details were given for processes to make activated carbon, which is an effective adsorbent in many industrial and environmental applications.

As the oil palm industry has expanded, so has the problem of handling the tremendous amount of waste material to prevent pollution of the land and waters. About 2.5 M^3 of palm oil effluent (POME) is generated per ton of fresh fruit bunches (FFB). Reducing the biological oxygen demand (BOD) for these products has become mandatory. Ma described three processes for treating the POME. The ponding system is used in more than 85% of the mills and can reduce the BOD by more than 99%. The tank digester system reduces the BOD by 90% and at the same time produces a burnable biogas. The decanter-dryer and ponding system really is a pollution prevention approach.

Sivasothy described many examples of automation in palm oil operation. In general, automation is justifiable to improve process efficiency, to reduce production costs, to improve product quality and to meet safety requirements. Examples of sequence control included automatic sequence control of individual sterilizers, control of self-cleaning type oil purifiers and automation of periodic discharge of settled solids from clarification tanks. Examples of continuous process control included automatic control of oil loss and nut breakage in presses, automatic control of drying nuts and kernels, control of digester levels, controlling intermittent boiler blowdown and control of levels in crude oil buffer tanks and vacuum driers. Process data management applications include pressure and temperature indicators and recorders, belt weighers, nut weighers, measurement of sludge output to quantify oil losses, orifice plate steam flow meters, and automation of sample collection. There are many uses for computers in business data processing. Many future applications were projected. An example of a practical approach to automation is the automatic control of crude oil dilution.

As the production of palm oil in Malaysia continues to increase, a good reputation for reliable supply and consistent quality becomes ever more important in maintaining and expanding the markets. Teoh provided an extensive review of the steps necessary to good quality control programs throughout the palm oil milling process, from harvest of FFB to shipment of oil and kernels. To obtain high quality palm products at minimum cost, emphasis must be placed on maintaining quality at the field and mill level. Long-range quality development effort should include the commitment of top management; a decision on the quality level expected and how to achieve it; a quality responsibility structure to use quality improvement efforts and quality control circles; training of all personnel in quality control procedures; incentives linked to reduced losses, reduced downtime, etc.; public recognition of quality improvements and suggestions, and a well-organized system to disseminate information on how to improve quality throughout the organization.

The value of empty oil palm bunches generally has been neglected because of assumed low residual oil, high water and difficulty of handling. Krishnan described how Jenerata separates, dewaters and burns the empty bunches for extra steam production. This provides an increase of 51% available steam. If the steam can be used, it is worth $10.67 per ton of empty bunches. This equals about 0.35% of the value of the FFB.

Session IV

Five papers on Tuesday afternoon discussed all aspects of oil processing. Both alkali and steam refining processes were reviewed by Swoboda, who also discussed the chemistry involved. Refining is a purification process applied to crude oils whose qualities depend to a large extent on the processes of cooking, pressing and seed clarification at the oil mill. The quality of the crude affects the efficiency of refining and thus the quality of the fully processed products. Fractionation tends to concentrate impurities in the stearin fraction, making it more difficult to refine. Alkali refining without earth bleaching followed by deodorization —in which thermal bleaching takes place—was described. The main objectives in refining are removal of fatty acids and color. A prerequisite for the study of the refining process in the laboratory is a procedure that simulates the industrial process and yields comparable results. Many bleachability tests have been proposed, but a test now widely used is the SCOPA palm bleachability test which was described by Swoboda. Different methods of removing impurities, such as washing, use of local kaolin clays for bleaching and liquid-liquid extractions, are being studied. In this industry, new developments will be used if they are cost effective.

Good refining processes by either physical or chemical processes depend on the use of good bleaching materials. Acid activated montmorillonite clays have been widely accepted for this function. Shaw described how acid activation changes the physical and chemical properties of the clay by dissolving out impurities such as calcite, replacing exchangeable Ca^{++} ions with H^+ ions and dissolving some of the Al^{+++}, Fe^{++}, Fe^{+++} and Mg^{++} ions from the tetrahedral and octahedral layers of the clay crystals. This changes the pore size and structure with greatly increased surface area. The particle size of bleaching earths is controlled by the milling process to reach a compromise between filterability and color reduction. By varying the acid treatment and milling procedures, clays can be altered to give materials with specific performance characteristics.

Most palm oil today is refined by physical refining processes. These were described with comparisons of operating parameters and qualities of products produced. Stage also described a new process developed at ATT Verfahrenstechnik GmbH based on countercurrent film deodorization with very low pressures and pressure drops and contact times of about 10 minutes at 260 C.

Sato described how his company, Nissin Oil Mills in Yokohama, Japan, has installed computer controlled oil processing. This reduces operating costs and labor requirements and helps ensure that the oil products have uniformly high quality.

Haraldsson reviewed many of the possibilities for energy conservation in an oil refinery. Special examples were described in detail for conservation by regenerative heat exchangers, optimization of vacuum equipment, use of heat pumps and optimization of steam generation. Substantial savings in operating costs can be achieved during oil fractionation, deodorization, hydrogenation, vacuum production and pumping.

Session V

"Industrial Uses of Palm, Palm Kernel and Coconut Oils" were covered on Wednesday morning. Knaut, in the paper on "Trends in Industrial Uses of Palm and Lauric Oils," discussed the importance of these oils over the next 10 years in industrial applications in Western Europe. Many

potential substitutions of these oils for petrochemical applications are possible—especially in the detergent field. Much will depend on price competition. Major increases in palm oil use will depend on the relation of its price to that of tallow. Lauric oil consumption will depend on synthetic fatty acid/alcohol prices. Shortages of lauric oils tend to drive up prices, resulting in a loss of market share. Scenarios were described that could increase Western European use of lauric oils by 3.6% p.a. and tallow/palm oils by 2.4% p.a., both up to 1990.

Palm kernel and coconut oils are particularly important to the fatty acid industry because they are the major sources of lauric acid. Combs described the processes used to convert coconut and palm kernel oils into their corresponding fatty acids. These may be used as is or fractionated by distillation, solvent crystallization, winterization, panning and pressing, and hydrophilization methods. These products are important major raw materials for soaps, detergents and the oleochemicals industries.

Ogoshi described the continuous ES-Process for preparation of methyl esters which can be used directly to make soaps and α-sulfo fatty methyl ester. Quality soaps are being made by this process, starting with tallow and coconut oils. The continuous process for making the α-SFMe using palm stearin is described as producing high quality products with essentially no α-$SFNa_2$. The product is a surfactant equal or superior to LAS, AES, AS or AOS and may become one of the significant materials for detergents.

Akaike described some of the competitive problems of using palm oils in industrial products. He predicted an increase in percentage of palm oil in oleochemicals. A solid phase enzymatic hydrolysis of various fats, including palm oil products, may produce improved quality fatty acids at lower energy costs.

Wakatsuki et al. studied experimentally the reaction conditions for sulfating lauryl alcohol and lauryl alcohol ethoxylate with gaseous SO_3. Based on their results, they designed a new reactor which they call a "rising film reactor." The reaction takes place as the gas and liquid ascend the columns in a thin film. Better control over reaction conditions and better temperature control are credited with attaining reaction yields of 98% in products containing less than 1% NA_2SO_4 and having very low colors.

Session VI

On Wednesday afternoon we had four papers on "Industrial Uses of Palm, Palm Kernel and Coconut Oil." Ho called attention to current and future supply situations favoring uses of palm oil stearin and palm kernel oil as major raw materials for fatty acids. Methods of processing to fatty acids include high temperature/high pressure splitting and the newer techniques of enzymatic hydrolysis. The latter process may have energy saving and quality advantages. Anyone planning to add new capacity should consider the advantages of enzymatic hydrolysis.

Smith described several areas where vegetable oils, especially palm and coconut oils, can be the raw materials for manufacture of oleochemicals to be used in plastic products. These include lubricant additives, vinyl stabilizers, plasticizers and nylon polymers. He stressed the point that the illustrations he gave are only examples of opportunities for using agricultural materials in various oleochemical applications. He predicted that by the mid 1990s the cost of petroleum products would begin to increase to the point that chemicals from agricultural crops are competitive. He encouraged developing countries with increasing agricultural production capacity to consider growing and processing the crops with downstream chemicals for use at home and for export.

Reck discussed in considerable detail dozens of oleochemicals that can be made from palm, palm kernel and coconut oils. He described manufacturing processes, physical and chemical characteristics and applications for industrial or commercial fatty acids, alcohols, amides, nitriles, amines, quaternary ammonium compounds, amine oxides and polyoxyalkylene alkylamines.

The term "quality" includes not only the intrinsic properties that we all recognize, but also such concepts as availability, service, packaging, price level, price stability, delivery time and transport logistics. DeWaet discussed this definition as it relates to the oleochemicals markets for commodity chemicals, specification chemicals and performance chemicals. The trend has been from commodity chemicals toward more specification and performance type chemicals, especially in Europe. In the interest of consumer satisfaction, the chain from initial production to the consumer should be as short as possible in time and space. Price relationship and stability compared to that of ethylene and tallow is sometimes a major obstacle to sustained use of palm stearin in oleochemicals.

Session VII

Thursday morning five speakers discussed "Modification Processes" especially as they applied to the subject oils. Young discussed the importance of having good and complete identification of physical and chemical properties of fats and oils to provide maximum flexibility in their interchangeability. Many factors affect the availability of fats to be used and thus their availability for interchange for other fats. The interchange may consist of simple substitution of one oil or fat for another. Or, it may involve tailor making or blending specific products using such processes as hydrogenation, fractionation and catalytic or enzymatic interesterification. Problems are concerned mainly with polymorphism, which frequently sets limits on the proportion of particular fats that can be used. Palm and lauric oils are particularly important because of their fatty acid and glyceride compositions. Computers are essential if the least-cost formulations are to be achieved.

Palm oil, because of its fatty acid composition, can be partially crystallized and separated into a high melting fraction or stearin and a low melting fraction or olein. Defense gave details of the three commercial processes for fractionating palm oil, the fast dry process, slow dry process and the detergent process. Commercial samples from all three processes were collected, and their detailed physical and chemical characteristics were described. Also, commercial samples of superoleins and palm-mid-fractions were described. This paper presents much interesting and useful information about these products.

Lauric oils, mainly palm kernel and coconut oils, contain about 48% lauric acid, which gives them unique chemical and physical properties. For specific uses in the food industry, these oils can be separated into stearin and olein fractions. Rossell described the physical and chemical characteristics of the two fractions and how these characteristics can be further modified by hydrogenation, interesterification and blending to obtain specific properties important to specific applications, especially in chocolate and substitute chocolate products.

Grothues described the technology and equipment for hydrogenating fats and oils. Advantages and disadvantages of various batch and continuous processes were discussed.

Continuous hydrogenation was suggested for plants that process essentially only one type of oil. When several different feedstocks are to be processed in the same equipment, the use of batch autoclaves is preferred. Hydrogenated palm kernel and coconut oils or fractions have many uses in food products, especially because of their melting characteristics and oxidative stabilities. Trends in hydrogenation indicate that more and more energy saving and automation devices will be used, especially in batch processes.

Chemical interesterification of fats, especially palm, palm kernel and coconut oils, extends the ranges of their physical and functional characteristics so that they can be used in a much broader spectrum of consumer products. Interesterification often is combined with hydrogenation and fractionation to tailor make fats for specific applications. Pease presented Laning's paper, which described the interesterification processes in commercial use. Catalysts most often used are the alkali metals and their alkylates (e.g., sodium methylate), and their hydroxides. The Na/K alloy is low melting and can be used at lower temperatures. Lowest cost catalysts are the hydroxides. Random rearrangements and directed rearrangements are variations of the process for obtaining specific products, e.g. cocoa butter equivalents. Interesterification not only alters the melting characteristics, but also influences the crystal morphology and rate of crystal formation. Commercial applications of interesterified palm, palm kernel and coconut oils include incorporation in margarines and reduced calorie spreads, special cooking and frying fats, and confectionery and other specialty fats commonly called hard butters.

Session VIII

Friday morning started out with five discussions about the use of palm, palm kernel and coconut oils in "Edible Products." Palm oil in its various forms has been used as a cooking fat by local populations for centuries. It is especially adaptable to modern margarine and shortening products. Duns described the characteristics which affect its use in such products. Fractionation, especially by the dry and detergent processes, provides a great deal of versatility in the use of palm oil. The crystallization characteristics of palm oil limit its direct use in margarine and shortening. Limitations are crystal behavior, post hardening effect and low EFA. These can be overcome by modification through fractionation, interesterification, hydrogenation, proper blending with other fats in the formulation and aeration of products.

Kheiri described the physico-chemical characteristics of fat products marketed in several different countries. Fractionated, hydrogenated and/or interesterified palm oil products can be blended to make fats that meet specifications and consumer acceptances in most cases. Many such formulations with their characteristics were described. Palm oil and its products impart advantageous functional properties required in many of the applications of edible fats in baking, icings, fillings, etc.

Traitler described a procedure he and his associate developed for dry fractionation of palm oil by selective crystallization and removal of liquid olein in a hydraulic press. A direct correlation was found between yield and quality of palm mid-fraction (PMF) and the crystallization temperature. Yields from palm oil are 60% olein with IV 64-67, 30% PMF of IV 36-38 and 10% high melting stearin of IV 20-22. The products, as might be expected, have specific applications in various food products (e.g. CBE). Such applications were the reasons why the Nestle group developed their selective fractionation process.

Mori reported on a study of the effects of diglycerides and trisaturated glycerides (PPP) on the tempering process and hardness of confectionery products containing fats. They found that diglycerides lower the temperature required for tempering and soften the confectionery product. Addition of PPP increased the viscosity of products during the tempering process but increased the hardness of products very little.

Pease presented an excellent review of the preparation of cocoa butter alternatives or hard butters by using palm and lauric oils. Lauric oils can be modified by interesterification and hydrogenation to yield lauric cocoa butter substitutes which are both good eating and inexpensive. Fractionation, although adding to the cost, can provide lauric hard butter with eating qualities virtually identical to cocoa butter. Such products made with lauric oils unfortunately have low tolerance for cocoa butter.

Palm oil is a source of symmetrical triglycerides vital to the formulation of cocoa butter extenders. It can be hydrogenated or hydrogenated/fractionated to give hard butters with limited compatibility with cocoa butter allowing some chocolate liquor to be included in a coating for flavor enhancement. The fact that CBE fats are very expensive tends to limit cost savings compared to cocoa butter. The potential for CBE products is still questionable in countries where chocolate labeling standards preclude use of fats other than cocoa butter. The non-lauric CBS products, while cheaper than the CBE types and able to tolerate limited levels of cocoa butter, do not have the eating quality characteristics of lauric hard butters.

An economical non-lauric CBS made predominantly from palm oil and having the eating quality of a fractionated lauric CBS and having good compatibility with cocoa butter would receive great interest in the chocolate and confectionery industry. As for lauric oils, greater compatibility with cocoa butter would enhance their chances for greater uses. As for CBE products, the major issue is cost.

Session IX

The last session of four papers on Friday afternoon dealt with the importance of maintaining quality of the products from tree to consumer. Attention to the quality of edible oils and fats during transportation and storage is extremely important, especially so for partially or fully refined products. Berger described examples of deterioration caused by use of brass samplers, by reheating during voyage, by contamination in a pipeline and by adsorption of oxygen during various processing and handling steps. Trade associations have published recommended procedures to minimize some of these things. From these and from personal experiences, the PORIM has drafted a "code of practice" bringing together elements of good design of physical facilities and of good operating practices. Special points include codes for tank coatings, tank and pipeline design, previous cargoes, heating, collection of first runnings at discharge, inert gas protection, temperatures for storage, transport and pumping, contamination with water, and the importance of wide dissemination of the information to people involved in the transportation chain. Berger also discussed the use of additives in maintaining quality of oil in transport and storage.

Most of the palm, palm kernel and coconut oils move in international trade. Subramaniam described how the surveyor provides guidance and assistance for cargo protection, as well as determining whether or not the oils meet contractual requirements. The surveyor, who is unbiased, also can

assist in arbitration and insurance claims and can supply general, commercial and maritime information relative to the cargo contract. The surveyor in many ways can protect the interests of the buyer, seller, financier, underwriter and ship owner. Subramaniam also provided an appendix showing the characteristics, storage and transport recommendations for these three oils. It is important to keep them as cool, clean and free from contamination as possible.

Sakata discussed the use of palm oil products in foods in Japan. Total consumption of palm oil in Japan in 1982 was nearly 150,000 tons. Forty-five per cent was used in margarine and shortenings, 15% in chocolates, 15% for frying and spraying snack products, 15% for instant noodles and 10% for oleochemicals. These food applications require high flavor and oxidative stabilities. Experiments with frying instant noodles, snack foods and peanuts showed that use of 2 ppm of silicone oil greatly reduces increases in AV and POV and in loss of tocopherols.

Efficient methods of extracting oil from palm fruits have led to production of high quality crude oils. This high quality oil provides technical benefits to edible oil refiners.

A recent alternative option is to purchase partly or fully refined oils at the source. Willems drew particular attention to the qualities needed for use in margarine and shortenings, frying fats and fractionated products. Preservation of quality requires scrupulously avoiding contamination by polymers from overheating, from heat exchange media, from metals and moisture. Experience has led to recommendation of preferred conditions for deodorization of caustic refined oils with less than 50 ppm soap at 240 C for 60 minutes and deodorization of physically refined oil at 270 C for 30 minutes.

As a major user of edible oils, the author called particular attention to the potential risks, especially of contamination in the international movement of refined palm oil products.

AOAC report

[Former AOCS President David Firestone, senior research chemist with the U.S. Food and Drug Administration, serves as general referee on fats and oils for the Association of Official Analytical Chemists. The following is his report given to the AOAC at its annual meeting held Oct. 27-Nov. 2, 1984. His report includes a report on the August 1984 meeting of the Commission on Oils, Fats and Derivatives of the International Union for Pure and Applied Chemistry (IUPAC).]

Antioxidants. B.D. Page is continuing to investigate procedures to confirm the presence of antioxidants detected by the HPLC method (1). Current work involves isolation of individual antioxidants from the HPLC column for GC examination with or without derivatization.

Emulsifiers. H. Bruschweiler has conducted an interlaboratory study of procedures for determination of anionic emulsifiers and surfactants (lauryl sulfate, dioctylsulfosuccinate, etc.) and nonionic emulsifiers (ethoxylated and propoxylated compounds such as polyoxyethylene fatty acid esters). The associate referee also carried out a collaborative study of a method for GC determination of components of mono- and diglyceride emulsifer concentrates involving conversion of the sample into trimethylsilyl ether derivatives prior to GC analysis. A recommendation for adoption of the method for mono- and diglycerides will be made after completion of a second collaborative study of the method applied to mono- and diglycerides in fats and oils.

Hydrogenated Fats. R.A. DePalma was appointed associate referee on this topic. He has completed background work on development of a capillary gas chromatographic method for determining *trans* fatty acid content of hydrogenated fats and oils, including selection of a specific capillary column and GC conditions. A preliminary study involving several laboratories will be carried out to determine the ruggedness of the proposed method.

The packed column GC method for determination of *trans* unsaturation in margarines (2) underwent successful collaborative study (3) and was granted interim first action status. The referee recommends that the method be adopted official first action.

Lower Fatty Acids. G. Bigalli is planning collaborative study of a simplified method for determination of lower fatty acids by GC which employs pentane or decane solvent and a nonpolar GC column for analysis of the methyl esters prepared by saponification of the sample followed by methylation with BF_3.

The IUPAC Commission on Oils, Fats and Derivatives completed initial study of a method for determination of butyric acid based on that published by Phillips and Sanders (4), which provides for determination of free (underivatized) butyric acid. Results of analysis of a butterfat sample [N=9 after elimination of four outliers; mean = 3.40; CV (repeatability) = 0.88%; CV (reproducibility) = 12.6%] indicated

that the method was sufficiently rugged to warrant more detailed study (5). It was proposed that additional study include analysis of samples containing various levels of butterfat using the Phillips and Sanders method and a related procedure in which the fat is saponified with barium hydroxide instead of potassium hydroxide.

Marine Oils. R.G. Ackman is continuing study of methodology for analysis and identification of marine oils. The associate referee has evaluated bonded Carbowax-20M fused silica capillary columns with hydrogen carrier gas and has proposed that these columns, with life expectancies of over 6 months at 180 C, be made the basis of a standard AOAC method for analysis of marine oils.

Olive Oil Adulteration. Methods used in Italy and supplied by the associate referee are under review. These include methods for determining adulteration of olive oil with olive husk oil (olive residue oil) as well as detecting the presence of esterified oils in olive oil. Choukroun and coworkers (6) recently reported that determinations of erythrodiol can be used to detect the presence of 5% olive husk oil in pressed and refined olive oils. Motta and coworkers (7) described a rapid method for lipase determination of fatty acids in the 2-position of triglycerides used for detection of esterified oils in olive oil.

Oxidized Fats. There was no activity on this topic during the past year.

Pork Fats in Other Fats. L. El Sayed is planning collaborative study of a method for detecting pork fat in other fats and oils.

Sterols and Tocopherols. H.J. Slover, the associate referee, has resigned. R.J. Reina has been appointed associate referee.

The IUPAC Commission on Oils, Fats and Derivatives completed preliminary study of a method for determination of tocopherols by HPLC (8). A sample of blended soybean/corn oil was sent to 18 laboratories. Results received from 13 participants demonstrated that fluorescence detection was preferable to UV detection (better resolution of the tocopherols from other unidentified peaks and fewer interfering peaks), although UV detection also can be satisfactory depending on the choice of mobile phase and column packing material. The method will be subjected to additional study. In addition, Micali and Curro (9) and Weber (10) have reported on HPLC determination of tocopherols in vegetable oils and tocols in corn grain, respectively.

Water Content. R. Bernetti has completed work on validation of the Karl Fischer method for determination of water in oils and fats recommended by the International Standards Organization (ISO/TC 34/SC 11, N99), and the method has been adopted official first action (11). The associate referee recommends that the topic be discontinued and the referee concurs. (This method appears in the 1984 Additions and Revisions, AOCS Official Methods and Recommended Practices, as Ca 2e-84.)

Other Topics. The liquid-liquid extractor No. 4112A-E is no longer available from the source noted in the method for total fatty acids and unsaponifiable matter in crude fatty acids, 28.030-28.035. It is recommended that section 28.031 be revised to indicate that this apparatus can be supplied by Tommy Howe Scientific, PO Box 7246, Cut and Shoot, TX 77303.

The general referee recommends that official first action method 28.030-28.035, Crude Fatty Acids-AOAC-AOCS Method, be adopted official final action.

The general referee recommends that ISO/TC 34/SC 11 N 285 (Draft Proposal ISO/DP 6883) Determination of Apparent Weight per Unit Volume (Specific Gravity) replace 28.003-28.005 while retaining the details in 28.003 describing the cleaning, rinsing and drying of the pycnometer prior to weighing.

Method 28.036-28.037 [Soluble and Insoluble Volatile Acids (Reichert-Meissl and Polenske Values)] is used to detect adulteration of butterfat and other fats and for the measurement of Reichert-Meissl values of certain food additives such as acetylated monoglycerides. Dr. Kiyoto Murakawa, Riken Vitamin Co. Ltd, Tokyo, Japan, recently identified a problem with certain acetylated monoglycerides with high Reichert-Meissl values whereby there was insufficient sodium hydroxide available in the saponification step to completely saponify the sample. Accordingly, the referee suggested that the Reichert-Meissl method be investigated using less than a five g sample. The results of replicate analyses by Dr. Murakawa of three g portions of an acetylated monoglyceride sample and several diluent oils (to permit analysis of a total of five g as specified in 28.037) are shown in Table I. Similar results were obtained with and without diluent oil, but use of a diluent oil permits revision of the method to accommodate high Reichert-Meissl samples while retaining the five g sample.

Accordingly, the referee recommends that 28.037 be revised to read: "Accurately weigh 5 ± 0.1g sample into clean, dry 300 ml r-b flask. Take less than five g sample with certain fats or derivatives, e.g. acetylated monoglycerides, that require more alkali for complete saponification than available with the prescribed amount of glycerol-soda soln, 28.036 (b). Add a diluent oil with Reichert-Meissl value less than 0.2, e.g. cottonseed oil, to the sample flask to provide a total of five g of sample plus diluent oil. Add 20 ml glycerol-soda soln ---," and the last sentence of 28.037, paragraph two replaced with the following:

Reichert-Meissl value =

$$1.1 \times (\text{titration of sample-titration of blank}) \times \frac{5}{\text{g sample}}$$

(This method appears in the 1984 Additions and Revisions, AOCS Official Methods and Recommended Practices, as Cd 5-40).

The general referee recommends that IUPAC Method 2.311, Determination of Erucic Acid (12,13) be adopted official first action, with the precision statement (8. Repeatability) revised as follows:

8. Precision

8.1 Repeatability

The difference between the results of two determinations

TABLE I

Reichert-Meissl Analysis of Acetylated Monoglyceride (Saponification Value, 453) and Diluent Oil[a]

Diluent oil	Reichert-Meissl value 1	2	3	4
Tallow	0.2	0.2	0.1	0.2
Cottonseed oil	0.1	0.1	0.2	0.1
Safflower oil	0.2	0.1	0.4	0.2

Acetylated monoglyceride

Diluent		Reichert-Meissl value			
Sample, g	Cottonseed oil, g	1	2	3	Average
3	0	185.0	185.3	186.5	185.6
3	2	184.8	185.7	185.7	184.4

[a]Data submitted by Kiyoto Murakawa, Riken Vitamin Co., Ltd, Tokyo, Japan.

carried out simultaneously or in rapid succession on the same sample, by the same analyst, under the same conditions, and for erucic acid present in excess of five per cent should not exceed 1.5 g per 100 g of sample or three per cent of the determined value, whichever is greater. For erucic acid present in an amount less than five per cent, the precision diminishes.

8.2 Reproducibility

The difference between the results obtained in two different laboratories on the same test material for erucic acid present in excess of five per cent should not exceed 2.2 g per 100 g of sample or five per cent of the determined value, whichever is greater. For erucic acid present in an amount less than five per cent, the precision diminishes.

Commission on Oils, Fats and Derivatives, Applied Chemistry Division, IUPAC. The commission met on Aug. 21-23, 1984 at the University of Turku, Turku, Finland. Forty delegates representing 17 countries and six international organizations were present. The activities of 18 working groups were discussed. It was agreed that eight of the working groups would arrange further collaborative studies of methods for emulsifiers, commercial lecithins, butyric acid (two procedures), linolenic acid and other n-3 polyunsaturated fatty acids, solvent residues in vegetable oils, thiobarbituric acid and tocopherols by HPLC. Study was completed of methods for qualitative and quantitative determination of phospholipids, total and free hexane residues in oilseed cakes, and copper, iron and nickel in edible oils by graphite furnace atomic absorption spectroscopy. These methods were adopted by the commission. To be considered for study during 1984/85 are methods for lead and other toxic metals in edible oils and detection of adulteration of olive oils with other oils.

Plans were discussed for publication of a seventh edition of the commission's *Standard Methods*, which would contain all the methods in the sixth edition along with the methods published in various parts of the First Supplement including methods for determination of oil content of seeds by NMR, oxidized acids by TLC, organochlorine pesticides, total fat in margarine, polyunsaturated fatty acids (enzymatic method), tocopherols (GC determination), polar compounds in frying fats (column chromatography), erucic acid (TLC-GC method), solid content of fats by NMR, total sterols, erythrodiol, mineral oil and triglycerides (carbon number) by GC.

REFERENCES

1. Page, B.D., J. Assoc. Off. Anal. Chem. 66:727 (1983).
2. Perkins, E.G., T.P. McCarthy, M.A. O'Brien and F.A. Kummerow, JAOCS 54:279 (1977).
3. Gildenberg, L., and D. Firestone, J. Assoc. Off. Anal. Chem. 68, to be published in 1985.
4. Phillips, A.R., and B.J. Sanders, J. Assoc. Publ. Analysts 6:89 (1968).
5. IUPAC Commission on Oils, Fats and Derivatives, Report of Work Group 3/83 (Determination of Butyric Acid), Working Report of June 1984, pp. A10-A16.
6. Choukroun, M., D. Faye, M. Marteau, M. Solere, D. Sudraud, G. Sudraud and O. Veretout, Rev. Franc. des Corps Gras 31: 191 (1984).
7. Motta, L., M. Brianza, F. Stange and G. Amelorri, La Riv. Ital. Sost. Grasse 60:625 (1983).
8. IUPAC Commission on Oils, Fats and Derivatives, Report of Work Group 4/83 (Determination of Tocopherols by HPLC), Working Report of June 1984, pp. A17-A22.
9. Micali, G., and P. Curro, La Riv. Ital. delle Sost. Grasse 61:95 (1984).
10. Weber, E.J., JAOCS 61:1231 (1984).
11. Bernetti, R., S.J. Kochan and J.J. Pienkowski, J. Assoc. Off. Anal. Chem. 67:299 (1984).
12. Standard Methods for the Analysis of Oils, Fats and Derivatives, Section II; Oils and Fats, 6th Ed., 1st Suppl., Part 6, Pure and Applied Chem. 54:2760 (1982).
13. Wessels, H., Pure and Applied Chem. 56:301 (1984).

New oils, fats section

The inaugural meeting of the Oils and Fats Section of the Malaysian Chemical Society was held Sunday, Nov. 11, 1984, in Kuala Lumpur in conjunction with the World Conference on Processing of Palm, Palm Kernel and Coconut Oils.

More than 60 persons participated in the opening session. Augustine S.H. Ong, of the Palm Oil Research Institute of Malaysia (PORIM) staff, delivered one of the inaugural talks, noting the Oils and Fats Section is the third specialty section for the Malaysian chemical association, the other two being analytical and environmental sections. About 144,000 persons are employed by Malaysia's oil palm industry, he said, with more than half a million people expected to depend on the oil palm industry for a livelihood by 1985.

Others speaking to the group included Dr. Bruno Werdelmann, president of the German Society for Fat Research, and Dr. A.R. Baldwin, past president of the American Oil Chemists' Society.

Soviets consume more oil

Per capita consumption of vegetable oils in the Soviet Union is expected to reach 10.0 kilograms annually during 1985, according to a forecast in the USDA agricultural attache's report from Moscow.

Per capita consumption in 1981 was 9.0, climbed to 9.3 in 1982, 9.6 in 1983 and is estimated at 9.7 for 1984. Total 1985 consumption would be 2.78 million tons, if the 10.0 kilogram per capita figure is achieved. Total Soviet

vegetable oil production in recent years has been 2.41 million tons in 1981; 2.43 million tons in 1982, and 2.58 million tons in 1983.

The major domestic vegetable oils in the Soviet Union are sunflower, cottonseed and soybean, accounting for more than 95% of total oil production. Production of those three oilseed crops has increased in recent years, but not as fast as called for in the official five-year plans. Soviet crushing facilities are estimated to be used at less than 80% of annual capacity, including crush of imported oilseeds.

The accompanying table (Table I) from the report shows figures on production of vegetable oils and related products in the Soviet Union.

TABLE I

USSR Production of Vegetable Oils and Products, 1981-83[a]

Product	1981	1982	1983	1984 est.	1985 forecast
Vegetable oil, total	2,606.0	2,629.0	2,782.0	2,750	2,900
Margarine	1,361.0	1,432.0	1,483.3	1,400	1,450
Laundry soap	681.3	701.7	724.4	–	–
Hand soap	291.5	294.4	280.6	–	–
Synthetic cleaning compounds	175.3	168.3	166.0	–	–
Hydrogenated fats	1,111.6	1,113.8	1,137.0	–	–
Mayonnaise	112.8	116.5	129.1	–	–
Drying oil	121.8	113.0	141.0	–	–
Phosphatide concentrates	10.5	10.8	10.73	–	–
– Food	1.8	1.8	1.92	–	–
– Feed	8.8	9.0	8.81	–	–
Stearine	33.4	35.8	34.9	–	–
Olein	34.0	33.0	34.0	–	–

[a]Ministry of Food Industry data.

South African drought ends

South African imports of oilseed and oilseed products could slow starting in February 1985 as a two-year drought has been broken and improved crops may be available early this year.

If the good crop does materialize, U.S. Department of Agriculture observers expect South Africa once again to become an exporter of edible peanuts, but domestic protein shortages may forestall sunflowerseed exports. Sunflower meal and oil imports could end, however. Sunflowerseed production, about 200,000 metric tons (MT) the past two years, could reach 575,000 MT. Peanut production, at 89,000 MT for 1983 and 62,000 MT for 1984, could reach 270,000 MT.

Harshaw/Filtrol relocates

Harshaw/Filtrol Partnership in October relocated its headquarters to Pepper Pike, Ohio, a Cleveland suburb. At the same time, the company established a central research and development facility in nearby Beachwood.

Approximately 70 management personnel moved to the new headquarters at Corporate Circle, 30100 Chagrin Blvd. The 74,000 square-foot center for research and development, meanwhile, is supported by more than 100 scientists and technicians. The company also has expanded its sales service center in Solon, Ohio.

Harshaw/Filtrol's 74,000 square-foot center for research and development is located in Beachwood, Ohio.

Harshaw/Filtrol Partnership was formed in October 1983 as the result of the merger of The Harshaw Chemical Company and Filtrol Corporation, subsidiaries of Gulf Oil Corporation and Kaiser Aluminum & Chemical Corporation respectively. Kaiser Aluminum, based in Oakland, California, manages the partnership. Harshaw/Filtrol is a manufacturer of specialty chemicals, pigments, catalysts, clay products, radiation detection systems and metal finishing processes and equipment.

APCC hit by fire

Offices of the Asian and Pacific Coconut Community were destroyed in a late November fire in Jakarta, Indonesia.

The organization lost all its records and its technical library. Subscribers to Cocomunity, the agency's newsletter, are asked to send their name and address to P.O. Box 343, Jakarta, Indonesia. The agency also has asked that individuals or organizations with copies of APCC reports send a list of them, so the agency can arrange to have duplicate copies made to recreate the technical library. The technical library also needs information on other coconut publications that may be available. Information should be sent to the post office box address in Jakarta given above.

News briefs

K. C. Rhee

AOCS member **K.C. Rhee** is one of 21 researchers at Texas A&M University named Texas Engineering and Experiment

Station Fellows. Rhee, with the Food Protein Research and Development Center at Texas A&M, specializes in food proteins. The award includes $5,000 to be used for research and professional development.

AOCS member **Dolores T. Kenney** has joined the firm of Dressler, Goldsmith, Shore, Sutker & Milnamow Ltd. of Chicago, Illinois, as an associate specializing in patent, trademark and related matters. She recently was admitted to the U.S. Patent and Trademark Office as a patent agent and to the Illinois bar as an attorney.

DeWayne Ehler, district manager for National By-Products Inc. of Des Moines, Iowa, has become the new chairman of the board for the **National Renderers Association** (NRA). Ed Wieland, president of Central Bi-Products Co., is first vice chairman, and Wayne Whittaker, vice president of marketing for Carolina By-Products Co., is second vice chairman. Dean Specht has been re-elected president of the NRA, with David Gilcrest serving as executive vice president and chief operating officer.

AOCS member **Michael J. Hein** has been elected president and chief executive officer of SVO Enterprises Corporation, a subsidiary of Lubrizol Enterprises Inc. of Wickliffe, Ohio. Hein has held numerous positions in the chemical specialties and vegetable oil industries, serving most recently as vice president and general manager of chemical specialties, Capital City Products Co., a subsidiary of Stokely-Van Camp/Quaker Oats. SVO Enterprises develops, produces and markets unique vegetable oils and derivatives for the food and chemical processing industries.

Tony Chen, technical program chairman for the 1984 AOCS annual meeting, has joined 31 Corporation as president and partial owner. The corporation specializes in technology transfer, especially to countries in Asia and the Pacific area.

Timothy R. Black has been appointed assistant to the president of Vitamins Inc., which manufactures and supplies nutritional ingredients to the food, pharmaceutical, cosmetic and veterinary industries.

Kempas Edible Oil Sdn. Bhd., a supplier of refined palm oil products, has ordered a complete physical refining plant and downstream processing equipment from the South East office of Simon-Rosedowns Ltd. for its facility at Pasir Gudang, Malaysia. Scheduled start-up is mid-1985.

Ralston Purina Co. of St. Louis, Missouri, has agreed to acquire ITT Continental Baking Co. from ITT Corporation.

Nestle S.A., the Swiss-based food conglomerate, has agreed to purchase the Carnation Co. for approximately $3 billion. In the move, Carnation is to be merged with Nestle Holdings, a wholly owned subsidiary of Nestle.

New Refinery Announced

Continental (London) Ltd. plans to construct a new vegetable oil refinery at Gladstone Dock in Merseyside, England. Simon Rosedowns, supplier of a 420-ton per day deodorizer for the plant, said initial feedstock will be crude soybean oil processed for manufacture into margarine, cooking oils and other edible fats. The plant is expected to become operational in October 1985.

International Jojoba Group Forms

An International Jojoba Association, to consist of representatives of national or regional jojoba associations or growers, was formed at the Sixth International Conference on Jojoba and Its Uses held in October in Beer-Sheva, Israel. Initial members of the association include groups from Australia, Latin America, Israel, Mexico, South Africa and the United States.

Obituaries

DEMETRIOS M. YERMANOS

AOCS member Demetrios M. Yermanos, known for his research with the desert shrub jojoba, died of cancer Oct. 20, 1984 in a Riverside, California, hospital. He was 63 years old. Dr. Yermanos was professor of genetics in the Department of Botany and Plant Sciences, University of California at Riverside. He joined the society in 1971. Dr. Yermanos studied jojoba in the wild and experimented with cultivating the shrub and testing jojoba oil. He was one of eight men honored as pioneers in jojoba research at the Fifth International Conference on Jojoba and Its Uses held in 1982 in Tucson, Arizona. He earned a master's degree in agronomy in 1953 from Iowa State University and a doctorate in genetics from the University of California in 1960.

ARNOLD G. JOHANSON

Arnold G. Johanson, an AOCS member since 1946, died Nov. 10, 1984, in Leesburg, Florida. Mr. Johanson had retired in 1977 as senior product manager for Ashland Chemical Co. He was a member of the steering committee for the 1984 World Conference on Processing of Palm, Palm Kernel and Coconut Oils.

Mr. Johanson attended Pacific Lutheran College and had been involved in various aspects of the fats and oils industry since 1938. He moved to Florida in 1977 upon his retirement.

BENJAMIN N. ROCKWOOD

AOCS has been informed of the March 1982 death of emeritus member Benjamin N. Rockwood. Mr. Rockwood was a 1925 graduate of Illinois College who joined AOCS in 1934 while with Swift & Co. He remained with Swift for the rest of his professional career, retiring in 1965. During his membership, Mr. Rockwood served on several AOCS technical committees including soap and detergent analysis, color, soapstock, and spectroscopy subcommittee of the instrumental techniques committee. For a number of years, he was distributor of the liquid FAC Color Standards for AOCS. In recent years he had resided with a daughter in Normal, Illinois.