

Report from The Netherlands: Centraal Instituut voor Voedingsonderzoek TNO, Zeist¹

After World War I, scientists in The Netherlands began to realize that application of their research to the general economy could be of great importance, in particular to the development of industry, agriculture, animal husbandry and fishery, as well as to the improvement of public health and housing. This concept led, in 1930, to the introduction and subsequent passing of the Applied Scientific Research (in Dutch: *Toegepast Natuurwetenschappelijk Onderzoek* = TNO) Act. Under this act, the Central Organization for Applied Scientific Research was established in 1932, to direct scientific research toward the general interest. This is being achieved by conducting investigations, as well as by stimulating and coordinating diverse activities, for which the government grants annual subsidies, through close cooperation between TNO scientists and those of industrial

and other sectors of the community. To this effect, the Central Organization TNO has jurisdiction to create special institutions for specific fields of interest or branches of welfare. For example, the Organization for Nutrition and Food Research TNO was founded in 1940, the most important institute of which is the Centraal Instituut voor Voedingsonderzoek TNO (Central Institute for Nutrition and Food Research TNO). Its main task is to carry out research work in two fields: (a) food technology—analysis of foods and food products, as well as research for methods to improve their quality and keeping properties; (b) nutrition—study of the influence of nutrition on the health of man, particularly children. In addition to this work, the Institute is engaged in assisting food manufacturers in The Netherlands, and in giving advice on food and food products and on nutritional problems at home and abroad. Furthermore, industrial research workers are given the opportunity of carrying out certain investigations at the various laboratories.

¹This information is published as a result of the creation of the European Club of Centers for Lipid Research, January 1972, in Paris. For details regarding this new club, see *JAACS* 49:236A(1972). Reports from four other countries have been published to date: Belgium, *JAACS* 49:330A(1972); Germany, *JAACS* 49:372A(1972); Spain, *JAACS* 49:374A(1972); and France, *JAACS* 50:4A(1973).

After 1945, increased activities resulted in the establishment of a series of departments and sections: Analysis of Foods; Flavor Research; Sensory Analysis; Microbiology; Food Technology and Packaging; Oils, Fats and Margarines;



Meat and Meat Products; Biology and Toxicology; Pesticides; Nutrition of Children; Nutritional Status of the Population, etc. This development soon caused a shortage of space and in June 1965—just 25 years after the Institute's foundation in Utrecht—a new building was opened in Zeist, with a total floor area of 15,000 m² (160,000 ft²). Modern instruments for chromatography, spectroscopy, mass spectrometry, electron microscopy and NMR measurements, etc., are now available for all kinds of investigations. At present, Director G.J.M. Engel is assisted by a staff of 55 university graduates, 160 chemical, technical and biological assistants, and 60 other collaborators. The necessary funds for fundamental research on foods and nutritional problems are provided mainly by government subsidies and contributions from corporate industrial organizations. The costs of analysis of samples, "trouble shooting," advice and the use of Institute facilities are charged to the firms concerned.

The Institute possesses a research library of ca. 15,000 volumes, ca. 500 current periodicals and serials, as well as a large collection of foreign laws and regulations on foods and allied products.

The technical service department comprises a maintenance section and well equipped workshops, enabling the Institute to have laboratory and technical apparatus constructed that cannot be obtained commercially.

Oils, Fats and Margarine Department

The staff of the Oils, Fats and Margarine Department consists of 16 persons: 5 graduates (M.Sc. level), 1 technical college engineer, 9 laboratory assistants and 1 assistant for general duties. The Department comprises sections for routine and special chemical and physical analyses—equipped with apparatus for thin layer chromatography (including a densitometer), gas chromatography, wide-line NMR measurements, spectrophotometric and AAS determinations—as well as for semitechnological work in the field of oils, fats and margarine. Apart from normal routine work and development of analytical procedures, a number of special research projects are underway.

Deep fat frying: Investigations concern high temperature heating of oils and fats and frying of products such as potato chips under conditions used in practice. They involve chemical and physical characterization of the changes taking place in the oils and fats, including organoleptic quality determination. In addition, the heated oils and fats as well as the fried products are examined for possible deleterious effects when fed at high dietary levels to rats; this latter work is being carried out by the Department for Biology and Toxicology.

Cocoa and cocoa products: In this field, the department is cooperating with a group of Dutch manufacturers. Of the subjects studied hitherto the following can be mentioned: (a) composition of the fatty acids of cocoa butter, obtained by pressing kernels and beans of known origin; (b)

influence of roasting—with variations in time and temperature—of beans and kernels, as well as alkalinized and nonalkalinized nibs (with or without shell), on the quality and characteristics of the pressed butter; (c) effect of deodorization of pressed cocoa butter, under various conditions, on its quality and stability; (d) particle size and particle size distribution in cocoa products.

Margarine: Margarine forms a very important part of the diet in The Netherlands (annual consumption per head, 17.2 kg); ca. 30% of the total fat intake is covered by this product, which contains at least 80% fat. However the consumption of *halvarine*, containing 40% fat, is steadily increasing: in 1972 from 0.8 to 1.2 kg per head. In this connection, much attention is being paid to the structure of margarine and to the manufacture of both margarine and *halvarine* in relation to their quality.

To characterize the structure and structural changes of margarine, several methods are used. Spreadability is measured on the basis of penetration values before and after kneading. From determinations of the solid fat content (by wide-line NMR measurements, dilatometry or a dye dilution method), the oil exudation tendency and the viscosity of the liquid oil, information can be derived on the properties of the solid network and on the specific surface area of the fat crystals. In particular, changes of the solid fat content, crystal size and oil exudation tendency under different storage conditions are being studied.

During the last few years, the influence of polymorphic changes on the keeping properties of margarine has also been extensively investigated; a microscopic test method was developed for studying recrystallization phenomena.

The department's margarine section possesses a laboratory unit with a capacity of 30 kg/hr. By introducing some changes in the apparatus, samples of 5 kg can be produced to study the effect of various additives at different concentrations in the water and/or fat phases on the stability, organoleptic characteristics, etc. and, as far as margarine is concerned, also on the frying properties (spattering and sediment quality).

Technology: The technological section is equipped with apparatus suitable for studying such processes as degumming, neutralization, bleaching, and deodorization, as well as hydrogenation and interesterification, on 2 kg and 40 kg scales. Mention can be made of the following investigations, part of them carried out in close cooperation with a group of Dutch companies.

a) Hydrogenation—Formation of aromatic fatty acids during the catalytic hydrogenation of oils containing polyunsaturated fatty acids, e.g., Peruvian fish oils, herring oils, was studied. It was found that, by proper choice of processing conditions (pressure, temperature and agitation), this formation can be avoided.

Copper catalysts were tested with soybean and other oils for their linolenic selectivity. Special attention was paid to the removal of residual copper from the hydrogenated products. Present work relates to comparative studies of nickel catalysts with various types of oils and fats on selectivity, activity and re-use value.

b) Quality specifications of crude oils and fats—Activity in this field comprises the characterization by chemical and physical means of crude oils and fats, e.g., soybean and palm oil, and of the completely refined products. The object is to find out whether there exists a correlation between the quality of the crude oil and the stability after refining.

Collaboration with other organizations

For many years, the department has collaborated closely with national and international organizations dealing with the standardization of methods of analysis, e.g., The Netherlands Normalization Institute, the International Organization for Standardization, the Oils and Fats Section of IUPAC, and the Office International du Cacao et du Chocolat.

Parkson Corp. appoints Rowan product manager

Charles M. Rowan, Jr., has been appointed product manager at Parkson Corp., Fort Lauderdale, Fla. Rowan has 8 years of diversified experience in research and development, production, economic evaluations, and marketing in the chemical and fats and oils industries. Since joining Parkson in 1970, his most important work has included the technical and market development of new Parkson processes for the fats and oils industry, including steam refining, deodorizing and various evaporation applications. Rowan holds a B.Sc. in Chemical Engineering from Ohio University and is a member of AOCS, AIChE and Tau Beta Pi.