

FOOD SCIENCE AND FOOD TECHNOLOGY IN THAILAND

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Introduction

Food science and food technology is a study of all aspects of food processing, viz. the raw material, processing, finished products, storage and distribution. It comprises a wide range of fields such as the study of consumer needs, nutrition, food science, food engineering, quality assurance and management.

Food is a complex biological material made up of fats, proteins, carbohydrates, water, vitamins and minerals. Such foods as meat, fish, vegetable and cereals in their natural state are usually perishable and prone to deterioration by means of microbiological, chemical, and enzymatic reactions. Therefore, to produce more food to meet the increasing world need is not only to increase the production, but also to make it storable. A trained food scientist and food technologist should have a good basic understanding of the underlying chemical, physical and biological changes that may occur in the food material during various phases of food manufacturing and have the technical know-how to arrest or stop these undesirable changes through available processing means such as thermal processing and freezing in order that a storable, more palatable, nutritious and high quality food product can be obtained.

The Role of Food Science and Food Technology in Thailand

Food industry in Thailand has been expanding rather rapidly in variety, capacity and efficiency in recent years. This is due partly to the availability of plentiful raw materials, cheap labour, and increase of population and income on the one hand, and keener competition among food processes and brighter prospect of exporting potential for processed food on the other hand. Agricultural production index shows an increasing trend from 177.01 in 1974 to 190.19 in 1975 and to 200.27 in 1976 while the national income from food production during the same period were 80,085, 87,920 and 96,883 million baht respectively¹. As is already known, a part of this production was turned into processed products for export. In 1976, a value of 23.4 million baht of vermicelli and noodles, 6825.9 million baht of raw sugar, 16.8 millions baht of refined sugar, 1158 million baht of fishery products and 73 million of fruit and vegetable products were exported². Not only are many food products exported, but at the same time also a variety of foods once imported are now locally produced, such as instant coffee, tomato sauces and other sauces, snack and crackers and a variety of dairy products like butter, canned condensed milk and milk

powder. It is evident that food science and technology has an important role to play in the development of the local food industry.

Food Science and Food Technology Education in Thailand

With the rise in number and variety of food industry, there follows a growing need for more specially trained personnel for the industry. In the earlier years prior to about 1964, because of the lack of qualified food scientists and food technologists, the industry had to rely on graduates who had general degrees in science or engineering to fulfil their need. However, since then, professional courses in food science and technology have been offered by Chulalongkorn and Kasetsart Universities. They were joined by Chiang Mai, Khon Kaen and Songkhla Universities respectively. Table I shows the departments, faculties and universities offering training in food science and/or technology and also the levels of degrees offered.

TABLE I: UNIVERSITIES, FACULTIES AND DEPARTMENTS OFFERING DIFFERENT LEVELS OF TRAINING IN FOOD SCIENCE AND FOOD TECHNOLOGY.

University	Faculty	Department	Level of degree
Kasetsart	Agriculture	Food science and technology	Bachelor and master degrees
Chulalongkorn	Science	Chemical technology	Bachelor and master degrees
Chiang Mai	Agriculture	Food science and technology	Bachelor degrees
Khon Kaen	Agriculture	Agricultural products	Bachelor degrees
Songkhla	Natural resource	Agricultural industries	Bachelor degrees

A bachelor degree curriculum is generally divided into 3 fields of study, social science and humanities account for 20%, basic science for 20% and special or professional subjects for 60% of the total programme. In general, approximately 145 credits are required and the usual length of time is approximately 4 years. Out of the total credits, approximately 85 credits are provided for professional subjects. This compares favorably well with the international standard³ for the degree of food technology which set the minimum requirement of professional subjects as follows:

1. Food chemistry 4 credits
2. Food analysis 4 credits
3. Food microbiology 4 credits
4. Food engineering 8-9 credits
5. Food processing 8 credits

The rest can be directed into a more specialized and other related subjects such as administration and management.

The master degree requires another 30 credits in addition to bachelor level. It is structured from the advanced level of specialized subjects plus a compulsory research thesis.

Prospects for graduates in food science and food technology are very good at present as the food industry is still growing and the processing of foods is getting more sophisticated. The employment positions for graduates are in process supervision, quality control, product development, analytical and general laboratory work, product promotion, marketing, research and administration. There are also employment opportunities in government departments and state enterprises such as in the Department of Science, Department of Medical Science, Food and Drug Administration, research institutes and universities.

Current Research Activities in Food Science and Food Technology.

Besides the five universities which are engaged in teaching and research, a considerable amount of work in the investigation and development of food products

TABLE II: THE CATEGORIES AND TYPICAL AREAS OF RESEARCH WORK CARRIED OUT AT VARIOUS UNIVERSITIES AND INSTITUTES.

Category	Typical area of investigation	Active agency ^a	References
1. Fruit and vegetable products	1.1 Processing of various products from coconut such as concentrated coconut cream, desiccated coconut	ASRCT IFRPD, DS	4-7 8, 9-10
	1.2 Products from rosella such as concentrated juice, extraction of pigment	ASRCT, KST	11-12, 13
	1.3 Products from tomato	DS, KST	14, 15
	1.4 Industrial uses of tamarind	IFRPD, CU	(b), 16
	1.5 Lime juice preservation and pectin extraction	CU, KST	17-18, (b)
2. Product from fermentation process	2.1 Wine and acetic acid from pineapple waste	CU, IFRPD, KST, DS, CM	19, 20, (b) 21, 9, 14, (b)
	2.2 Citric acid from coconut and pineapple waste	IFRPD	(b)
	2.3 Processing of fish sauce	DS, ASRCT	9, 14 22-23
	2.4 Wine from local fruits	KST, DS	14, 24
3. Nutritional products	3.1 High protein products from mungbean, soybean, peanut and other cereals	ASRCT, DS IFRPD, KK CM	14, 25 26, 27, (b) 28, 29
	3.2 Textured protein and snack food	ASRCT, IFRPD	30, 34, (b)
	3.3 Infant food	IFRPD CU, CM	35, 36, (b) 37, 38, (b)
4. Cereal products	4.1 Substitution of local flour to wheat flour in noodles and bakery products	ASRCT	39, 40
	4.2 Processing of cereal products	DS, CU	41, 42

- a. ASRCT = Applied Scientific Research Corporation of Thailand, Bangkok, Bangkok
- IFRPD = Institute of Food Research and Product Development, Bangkok
- CM = Chiang Mai University, Chiang Mai
- CU = Chulalongkorn University, Bangkok
- KK = Khon Kaen University, Khon Kaen
- KST = Kasetsart University, Bangkok
- DS = Department of Science, Ministry of Industry, Bangkok
- b. Under investigation

are carried out at the Institute of Food Research and Product Development, the Applied Scientific Research Corporation of Thailand and the Department of Science, Ministry of Industry. There is a long list of completed and current research work available at each place. Nevertheless, for overview of the current activities, they can be divided into broad categories. Despite the numerous research projects that are going on at the universities and research institutes, the research investigations generally fall into three main areas; viz. the investigation of existing and new food materials, the study of new processes and improvement of the traditional and conventional processing methods that are suitable for local industry need; and new product development. Table II gives an example of the typical areas of investigation and active agencies.

The Future of Food Science and Food Technology

The change in the demand of the food market is related to the change in the socioeconomic structure such as income, education, size of the family, the necessity for working wives to supplement family income and the availability of more household appliances such as gas cookers and refrigerators. All these factors lead to the demand for a greater variety of high quality convenience foods. To develop high quality convenience foods, however, requires more basic knowledge about the mechanisms of changes in foods—chemical, enzymatic, and biological. It also means development of good manufacturing practices.

The problems of malnutrition in Thailand is real, especially in preschool children. Approximately 50 percent of children under 5 years old suffered from malnutrition⁴³ and nutritionally adequate food for weaning period is urgently needed⁴⁴. This may be one of the reasons why the Fourth National Economic and Social Development Plan for 1977-1981 had emphasized on the improvement of nutritional status of infant, preschool children and mothers and the encouragement on the industrial production of nutritional supplement food for infant.

The uncertain world-price dilemma facing our unprocessed or partially processed agricultural export commodities such as maize, tapioca, etc. is also a perennial headache for growers, exporters and the responsible government agencies. Also, the Fourth National Economic and Social Development Plan had placed emphasis in the development of agroindustries so that more of our farm products can be exported in the form of processed foods.

Also the constant increase in the cost of energy for the last few years has set off a vicious cycle of inflation. The food industry is no exception; the cost of production has been rising tremendously. Labour and raw materials now account for 60% of food cost⁴⁵. There is therefore an urgent need for the food industry to conserve energy as best as possible and make full use of waste material or look for other cheaper processing methods in order to optimize productivity and reduce food cost. There may not be ready-made solutions but every effort should be made to use our resources and technical know-how to solve the above-mentioned problems. Food science and technology therefore occupy a prominent place in the progress and

development of the local food industry as well as the improvement of the health and nutritional status of the people.

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