



REPORT

Food Composition Programme of ASEANFOODS 1995–1999

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ASEANFOODS was established in 1986, with six member countries including Brunei Darussalam, Indonesia, Malaysia, the Philippines, Singapore and Thailand. Institute of Nutrition, Mahidol University (INMU) was designated as the Regional Centre. In 1996, Vietnam was included as a new country member. This report emphasizes the main activities carried out in 1995–1999 at the regional centre to fulfill the specific objectives of ASEANFOODS. To strengthen the analytical performance of food analysis laboratories in ASEAN, a new set of reference materials, weaning food (AS-FRM5) and fish flour (AS-FRM6) with consensus values of mandatory nutrients for nutrition labelling was developed. The reference materials were used as test materials for the third round of laboratory performance study, including government and private laboratories in ASEANFOODS member countries and laboratories in other regions. A collaborative programme involving three countries — Indonesia (LIPI, Bandung), Thailand (INMU) and Australia (QHSS) was conducted in 1997–1998, with support from AusAID to strengthen the technical and analytical capabilities and quality assurance programme in Indonesia. This programme can eventually strengthen laboratories to generate good quality food composition data. Such activities will be extended to other member countries. In keeping with the need of the members, the first regional food composition data are being developed. Current activities on development of national food composition tables are also summarized.

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Key Words: ASEANFOODS; INFOODS; food composition tables (FCTs); reference materials.

1. INTRODUCTION

ASEANFOODS was established 13 years ago, with six member countries including Brunei Darussalam, Indonesia, Malaysia, the Philippines, Singapore and Thailand. In 1996, Vietnam was included as a new country member. Activities carried out during the first 9 years were reported at the second IFDC and published in *Food Chemistry* 57:179–181, Puwastien *et al.* (1996). This paper emphasizes the activities at the regional centre, and some activities at the national level, during the year 1995–1999.

2. STATUS AND PROGRESS OF ACTIVITIES DURING 1995–1999: AT REGIONAL LEVEL

The main activities carried out from 1995 to 1999 have been to fulfill the specific objective of ASEANFOODS in strengthening the analytical performance of food

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TABLE 1
Quality control system in ASEAN laboratories

	Pilot survey ¹ 1996 (N = 6) %	Comprehensive survey ² 1998 (N = 23) %
Replicate analysis	—	91
% recovery	83	70
Repeated analysis	—	4
In-house QC sample	67	48
QC chart	50	35
Check for accuracy by AS-FRMs	—	9
Check for accuracy by CRMs	50	26
Laboratory performance study	50	35

¹ Laboratories at the six national centres.

² Participating laboratories in ASEANFOODS Interlaboratory study, 1998.

analysis laboratories in ASEAN and in developing the regional food composition database.

2.1. Development of Regional Food Reference Materials

Reliable analytical data are required by both food analysts and data users. According to the pilot survey in 1996 [Report of the ASEANFOODS WORKSHOP (1996)] and more recently in 1998 [Puwastien *et al.* (1999)], several quality control systems are practised among ASEANFOODS member countries (Table 1), including the use of in-house quality control samples with a quality control chart to assess analytical precision, and a limited use of certified reference materials for checking accuracy. These limits might be due to the prohibitive cost of, and lack of comprehensive coverage of nutrients in, each material.

The ultimate goal of this activity is, therefore, to develop food reference materials with consensus values of various nutrients. As reported earlier (Puwastien *et al.*, 1996, 1989; Puwastien and Sungpuag, 1994), with collaboration among expert laboratories in the Asia-Pacific region, USA (USDA), Austria and ASEANFOODS member countries, four food reference materials, namely rice flour (AS-FRM1), soybean flour (AS-FRM2), cereal-soy (AS-FRM3) and fish flour-1 (AS-FRM4), with consensus values of main nutrients and minerals, were developed and are now available at the regional centre. These reference materials have been used for laboratory quality control programmes and as test materials for laboratory performance studies in ASEAN and other developing countries.

Since 1994, nutritional labelling has been increasingly presented on food products in many countries as an effective means of providing nutritional information to consumers. To ensure the quality of the generated data on the label, in 1998, with the collaboration of the same expert laboratories (except Austria which was replaced by the Netherlands), a new set of ASEANFOODS reference materials — weaning food (AS-FRM5) and fish flour-2 (AS-FRM6) — with consensus values of nutrients mainly for nutritional labelling were developed at the regional centre with support from the National Science and Technical Development Agency (NSTDA) (Puwastien *et al.*, 1999). The reference materials were used as test materials for the third round of laboratory performance study.

2.2. *Laboratory Performance Study*

In 1998, the regional centre conducted the third-round laboratory performance study using AS-FRM5 and 6 as the test materials. About 21 private and government laboratories in ASEAN, one laboratory in Nepal and one in Papua New Guinea participated in the study. Laboratories with satisfactory, questionable and unsatisfactory results were identified. The preliminary reports were distributed among participants. Activities at national level, e.g. technical workshops, discussions, training, and exchanging information, which help in improving or upgrading laboratories with unsatisfactory and questionable results, are encouraged. Identified laboratories with satisfactory results will be invited to participate in future studies to develop regional reference material.

2.3. *Strengthening Analytical Performance of Food Analysis Laboratories in Indonesia*

In 1997-1998, the Research and Development Centre for Applied Chemistry, LIPI, Bandung, Indonesia, organized a national one-year programme on "*Development of Analytical Quality Assurance for Indonesian Food Laboratories*". It was the AusAID-funded project under a collaboration of three countries — Indonesia (LIPI), Thailand (INMU, the Regional Centre) and Australia (QHSS). The objective of the project was in line with one of the main objectives of ASEANFOODS, i.e. to strengthen laboratories in developing good-quality food composition data. The holistic programme included several workshops covering lectures and laboratory training, intra- and inter-laboratory performance studies, development of in-house quality control samples and national reference materials, intensive training (for laboratories providing unsatisfactory results), national seminar and laboratory audits. Participants from 24 government and food industry laboratories across Indonesia have made commitments to participate in the series of workshops and activities. The ASEANFOODS technical coordinator found that such a programme provided mutual benefits to the participating laboratories and the three counterpart countries. It helped in strengthening the technical and analytical capabilities, standardizing the analytical performance and providing guidelines to develop quality assurance programmes in food analysis laboratories which will eventually strengthen laboratories to generate good-quality food composition data. Participants' enthusiasm and dedication to the programme, as well as financial support for the whole activity, are required for success. Such activities will be extended to other ASEANFOODS member countries.

2.4. *Creation of the First ASEANFOODS Food Composition Database (Report of the ASEANFOODS Workshop, 1996)*

Although some National Food Composition Tables have been developed in most ASEAN member countries, incomplete information surrounding nutrient data and certain common food items is a persistent problem facing users. The availability of an ASEANFOODS regional food composition database to obtain, retrieve, compare and exchange food composition data among ASEAN countries will help fulfill the data needs of ASEANFOODS member countries and others in the nearby regions where food composition data are lacking or not completely available.

To establish the ASEANFOODS food composition database, a technical committee was formed. It comprised coordinators from Malaysia (Dr Tee E Siong), the

Philippines (Dr Aida Aguinaldo) and Thailand (Dr Prapasri Puwastien) as well as one expert from New Zealand (Dr Barbara Burlingame). A plan for a workshop entitled "Creation of the first ASEANFOODS Composition Database" was submitted to and approved by the Japan International Cooperation Agency (JICA). This workshop was crucial since it was the first stage for developing a regional food composition database. Therefore, some pre-workshop activities were carried out. The existing national food composition databases, including a total of about 4500 food items, were modified based on the members' agreement in terms of format and food groups classification (18 food groups). Specific alpha-numeric food codes were given for food items from each country and the analysed nutrients were identified by INFOODS tagnames (Burlingame, 1996). Compilation and installation of the prepared database from each country, as spreadsheets, were pre-processed into a compilation system at the New Zealand Database Centre. Then, the workshop was convened at the Institute of Nutrition, Mahidol University, Thailand in March 1996.

Representatives from each ASEAN country who were actively involved in food composition data compilation were invited. Nineteen ASEAN delegates from Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam, and two experts from New Zealand participated in the workshop. The policy decision making for harmonization and standardization of the data files took place and the group discussed and agreed upon a set of criteria for evaluation of the national food composition databases for inclusion into the ASEANFOODS food composition database. The participants were then divided into three working groups, each consisting of a representative from each country. Each working group evaluated the assigned data files on the following aspects:

- ensure identity of food items and food code in each country's data files
- select the relevant food items from about 4500 in the national food composition tables
- evaluate the identity (based on the available nutrient data) and the completeness of the data files
- identify the selected data of similar foods from different countries to be merged for inclusion into the ASEANFOODS data files. Most foods consisted of 22 different nutrients and percent edible portion
- standardize all the food descriptors according to the agreed criteria.

The derived archival files were then reviewed and examined by the technical experts and a data file of more than 1800 food items was derived. Since the database of some participating countries still required scrutiny and merging, following the workshop, these countries spent about two years completing their databases. The databases are presently re-evaluated, edited, completed and finalised. Camera-ready food composition tables (FCTs) will be prepared and published by the regional centre in Thailand in 2000.

3. STATUS AND PROGRESS OF ACTIVITIES DURING 1995–1999: AT NATIONAL LEVEL

3.1. *Current Activities and Status of the National Food Composition Tables*

The status of national food composition tables in ASEAN countries is summarized in Table 2. All countries have their own FCTs except Brunei. English language is used as

TABLE 2

Status of food composition tables in various ASEAN countries

Status	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam
Current edition	1995	1997	1997	1993 + 1998 ¹	1992	1994
To be revised	2000	1999	—	1999	1999	—
Source of data						
Self-generated (%)	82	100	~ 98%	100	100	36
Number of food groups	10	14 (Raw) and 7 (cooked)	17	15 (1993) and 16 (1998)	13 and 16 (1999)	16
Number of food items	525	783	1541	200 + 151	519 (> 1000 in 1999)	504
Number of nutrients	14 (28) ²	19	17	14 and 23	17 (24)	28 +
Main nutrients						
With DF	(+)		+ ³	+	+	
With CF	+	+	+		+	+
Other main nutrients				Sugar, starch		
Minerals						
Ca, P	++	++	++	++	++	++
Na, K	(++)	++	(+)	++	(++)	++
Fe	+	+	+	+	+	+
Zn	(+)	+	(+)	+	(+)	+
Cu	(+)	+	(+)		(+)	+
Other minerals	(Mg, I, Mn, Co, Cr)	Mg	(Mg, Mn, I)	Se	(Mg, Se)	> 10
Vitamins						
Thiamin	+	+	+	+	+	+
Riboflavin	+	+	+	+	+	+
Niacin	+	+	+		+	
Vitamin C	+	+	+	+	+	
Vitamin A	+	+	+	+	+	+
β-carotene		+	+	+	+	
Other vitamins	(Folate, B12)		(Folate, B12, B6)		(Folate, B12)	All B vitamins
Fatty acids	(+)	+ pattern		+	(+)	
Cholesterol	(+)	+	(+)	+	(+)	
Amino acids	+		(+)		+ 369 items	
Antinutritional factors			(+) oxalate, phytate		(+)	
Nutrient computation software		NutriCal (Windows-based)		Nutrilogic (Windows-based)	INMUCAL (Dos-based)	
Electronic data product		+		+		

Note: ¹ Hawker foods.

² Items in parentheses represent unpublished data, which may be included in the next edition of the FCTs.

³ Dietary fibre values are borrowed data from foreign FCTs/local studies.

the standard in all tables except those of Indonesia and Vietnam where English is provided in the index only. The number of food items with available data ranged from 350 to 500. Most of the data were self-generated, except for Vietnam. All food composition tables cover macronutrients; however, some have not included the value

for dietary fibre. Common minerals included are calcium, phosphorus and iron. Others also present sodium, potassium, copper and zinc. Data on vitamins include thiamin, riboflavin, niacin, vitamin C, A and β -carotene. Moreover, Malaysia, Singapore and Thailand have developed nutrient computation software to facilitate data users. Malaysia and Singapore also have electronic data products, such as web site for public education.

Current activities and details on national FCTs are as follows.

3.1.1. *Indonesia*. The current national food composition tables were published in 1995. More than 500 food items with 14 nutrients were included. About 80% of the data were self-generated. A new version which will cover more data on minerals, vitamins, fatty acids and cholesterol will be published in the year 2000. English information will be provided to facilitate international uses.

3.1.2. *Malaysia*. The fourth edition of Nutrient Composition of Malaysian Foods was published by Siong *et al.* (1997). Data were largely based on the 1988 edition. Out of 783 food items, 580 items are raw and processed foods and the remaining 203 items are cooked traditional Malaysian meals and dishes, as well as a number of fast foods. A numeric food code was given for each food item. There are two major changes in the 1997 edition, namely data presentation format and addition of new data. Nutrient content in several serving sizes for each food is presented, in addition to per 100 g, which makes the tables more "user-friendly" to various types of users. The new data included are cholesterol content of some raw and cooked foods, zinc, copper and magnesium content of about 200 foods and vitamin A and carotenoid composition of a variety of foods. Some funding from the government was given to the Malaysian Food Composition Database Programme for the activities during 1996–1998. The coorganizer of the programme, Dr Tee E Siong, reported that the same four institutions cooperated with the work and the current phase of the programme is to focus on ready-to-eat meals and processed foods and on additional nutrients including dietary fibre, cholesterol, minerals, and fatty acids. Since they have an updated manual of methodologies for food analysis, a new edition with improved quality data will be available in 1999. In addition, to improve and enhance the work of health-care professionals in the country, the Institute of Medical Research (IMR), in collaboration with the Malaysian Technology Development Corporation (MTDC) and a private computer firm, has developed a nutrient computation software, Window-based programme, namely NutrICal. The programme computes the nutrient content of menus, recipes and meals of individuals and communities and compares the calculated values with the recommended dietary allowances (RDAs). Further improvement of the software is being undertaken.

3.1.3. *Philippines*. The seventh edition of The Philippines Food Composition Tables was published by the Food and Nutrition Research Institute, Department of Science and Technology in 1997 (Portugal *et al.*, 1997). It was the first version to be harmonized with the ASEAN Food Composition Tables. The format and contents were modified based on suggestions from the FCT Task Force, and selected Philippines users, to suit local needs. The main modification *in terms of format* were: data for raw, cooked and processed foods were presented together; tables of amino acids, trace elements, cholesterol, phytins and some vitamins of a limited number of food items from the 1990 edition were not included; information on number of analyses was deleted and a column for total vitamin A was added. *In terms of food names and food grouping*: English is used for food names and descriptions which permits ease of use internationally. The number of food groupings was expanded from 16 (7 raw and

cooked, and 9 processed) to 17 with the cooked and processed foods under each food group; following the ASEANFOODS guidelines, food group codes and food ID (alpha numeric system) were also given. Other data processing included merging some food items with similar nutritive values, deleting some food items with incomplete or no matching data, standardizing all food descriptors, and updating the scientific names of food items. *Main modifications in terms of nutrients and analytical data* were: replacing the crude fibre data with dietary fibre values from local and international data, and recomputing the carbohydrate and energy values using 4-9-4 energy factors for protein, fat and carbohydrate, respectively. However, no INFOODS nutrient tagnames have been presented. Many non-tabular contents were also included, e.g., background on the development of FCTs, index for foods, description, and alternate names, sampling, and methods of analysis and calculation. The modifications of the FCTs have made the new published Philippines food composition tables more user-friendly, especially for the international users.

3.1.4. *Singapore.* The new version of the FCTs, namely "Composition of Food Commonly Eaten in Singapore", was published by the Food and Nutrition Department in 1998. It contained nutritional information on about 150 newly analysed foods and beverages. These FCTs contained the extended information of "The Composition of 200 Foods Commonly Eaten in Singapore", published in 1993. Extended analysed nutrients were total sugars, starch, thiamin, riboflavin, vitamin C, potassium, phosphorus, zinc, and selenium, and altogether 23 nutrition-related food components were given (Table 2). At present, about 800 locally cooked and processed foods are being analysed. The new version FCTs, containing about 1000 food items, is expected in 1999. Apart from printed food composition tables, Singapore has developed a computerized weight management programme, "Nutrilogic", to facilitate the data users and has established an electronic data product, a web site <www.healthylife.org> for public education.

3.1.5. *Thailand.* Although the current version of the nutrient composition table of Thai foods, 1992 (Food and Nutrition Department, 1993), covered self-generated data on more than 500 food items, including one-plate cooked dishes and desserts and data on the total dietary fibre of some foods, it is still not complete in terms of coverage of nutrients and food items. A lot of additional information, published and unpublished, has been generated by the Institute of Nutrition, Mahidol University (INMU) over the years. Other sources of data are also available in many published and unpublished papers and reports. Nevertheless, these data have not been compiled or included in the printed nutritive values of Thai foods. Thus, a systematic compilation of the available food composition analytical data, both published and unpublished, has been carried out at INMU. Its development is based on the agreement of ASEANFOODS and the INMU adhoc FCT technical committee (food analysts, data compilers and users), which was established in line with INFOODS recommendations. Published and unpublished food composition data, as nutrient per 100 g food, were selected according to the agreed criteria. For example, it must be original analytical data with documented methods for sampling, sample preparation and analysis; the origin of analytical data can be traced back; it should contain minimum data of proximate composition or minerals or vitamins, and moisture content. The compiled data have been installed into a computerized system as spreadsheet data files. Microsoft Excel was selected as the compilation system for food composition data in the production of the archival files. Wherever possible, sources and data descriptors are attached. The identity of food items, Thai common and scientific names, have been carefully checked, according to the documents from Ministry of Agriculture and Cooperation,

Thailand, and other references with illustration. Food items were categorized into 16 food groups and the assigned food codes (alpha numeric system) were given in accordance with the ASEANFOODS food composition database. The nutrients in the database were identified by INFOODS tagnames (Burlingame, 1996). With the criteria for acceptance of the analytical data, the compiled database was scrutinized. An index of food items in each food group was alphabetically arranged by generic names (common English names) with their assigned food codes and ID number, Thai names and scientific names. A user database of about 1000 food items of fresh and cooked, processed and semi-processed foods, in the forms of a computer database and printed tables, should be available in early 2000. It is expected that future food and nutritional research on nutritional assessment and other related aspects will be based on the same national food composition tables which will facilitate the possibilities for all kinds of food and nutritional comparative studies. This national food composition database is being included in the ASEAN food composition database.

The Institute of Nutrition had also developed a nutrient computation software, currently on DOS, namely INMUCAL. Nutrient content of menus, recipes and meals of individuals and communities can be assessed and evaluated based on the Thai RDAs. To facilitate further statistical evaluation and effective use, INMUCAL is linked to SPSS and the programme will be updated and upgraded into a Window-based system soon.

3.1.5. *Vietnam.* The current food composition tables of Vietnam were published in 1994. The FCTs cover about 500 food items with more than 28 nutrients. However, over 60% of the total are borrowed data. The data are being revised and more self-generated data are being developed.

4. CONCLUSION

Activities at the regional level, from 1995 to 1999, have mainly included collaboration with other regions to strengthen member laboratories in producing reliable food composition data and development of regional food composition databases. Activities at each national level have stressed the improvement of national food composition databases, in terms of format, coverage of nutrients and food items, and standardization of data information. The emphasis has also been on development of quality food analysis laboratories, and ISO guide 25 is being explored in many institutions. The ASEANFOODS Regional Centre can provide food reference materials and technical support to help fulfill the needs and strengthen the activities of the members and other developing countries. At present, information about ASEANFOODS activities can be obtained from the APFAN/ASEANFOODS Newsletter which is being regularly published by Dr Tee E Siong, Editor and national technical coordinator in Malaysia.

All ASEANFOODS member countries deeply appreciate the linkages, cooperation, collaboration, financial and technical support from many organizations and Regional networks namely UNU/INFOODS and FAO, JICA, the ASEAN Sub-Committee on Science and Technology, the Inter-ASEAN Technical Exchange Programme, the National Science and Technical Development Agency (Thailand), the Aus-AID, APFAN, OCEANIAFOODS, and other institutions in different regions which have contributed to the success of regional and national activities.

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