MESSAGE FROM INFOODS

The world of nutrition and agriculture relies on the availability of relevant, up-to-date and easy-to-use food composition tables and databases (FCT/FCDB) in order to combat malnutrition, to monitor progress, to well tailor food security and nutrition programmes and policies in a cost-effective manner, and to render agriculture programmes and policies more nutrition-sensitive and thus contributing in closing the existing nutrient gap through foods. These data are also fundamental in assisting countries and food companies in fulfilling their obligations of mandatory nutrient labelling of processed foods according to Codex Alimentarius standards.

The Thai Food Composition Tables of 2015 is greatly welcomed and is expected to play an important role in Thailand for many stakeholders. The new and updated data will be useful to inform policies and programmes, assist researchers, food companies, dieticians and other professionals. It will also feed into the next edition of the ASEAN Food Composition Tables and thus be of value for the ASEAN region and its stakeholders.

The Thai Food Composition Tables was systematically and carefully compiled by applying international standards (INFOODS) thriving for highest possible quality and relevance. Many users are often not aware of the amount of rigorousness, time, efforts, funds and scientific judgments behind each single value of a FCT/FCDB. In recognition of this tremendous work, I wish to congratulate the authors of this FCT for their high commitment and high scientific standards resulting in a new and more complete Thai Food Composition Tables 2015

U. Ruth Charrondiere
INFOODS coordinator
FAO, Nutrition Division, Rome

FOREWORD

Nutrition is the key factor of food quality, which values quality of life of human being. Diet-related diseases can mainly be preventable by foods of appropriate nutritive values. Under the world of limited resources, limited land for agriculture must be efficiently managed especially areas for food and non-food productions in order to produce adequate foods of right nutrients for the world population. Nowadays, nutrition is also used as a tool for trade and becomes a non-tariff trade barrier for more-developed countries. Food composition data (FCD) can provide essential information on nutritive value of foods, which is very useful for the implementations at both macro- and micro levels of public and private sectors in various disciplines and professionals such as health and medical sciences, nutrition, dietetics, food science and technology, agriculture and trade as well as policy making. FCD are required for food's nutritive value estimation, food formulations for diet therapies, nutrient intake assessment of individual and population, assessment of diet-related diseases, institutional food service management. For food industry, the need of FCD becomes more and more significant in their product development and promotion processes as the nutrition is an important issue for the world food trade. At macro-levels, FCD can be used as a tool for policy makers at national and regional levels in establishing policies on agriculture zoning, food balance sheets, food fortification and supplementation.

A country or even a region, therefore, is required to generate and disseminate of their own food composition tables. To support such activities, the International Network of Food Data Systems (INFOODS) appointed the Institute of Nutrition, Mahidol University (INMU, the Regional Centre of ASEANFOODS) to be the INFOODS Regional Database Centre in 1991 with the mission on encouraging Thailand and ASEAN countries to improve quantity, quality, and accessibility of their food composition data. The 1st edition of Thai Food Composition Tables (FCTs, English version) was produced in 1999 by following INFOODS Guidelines. Nutrient composition of fresh, cooked, and commercially processed of commonly consumed foods totally 1,055 items were included. During the past 15 years, the FCT's has included about 1,700 food items, which can certainly serve more needs of our stakeholders. This update version is available in electronic form on the INMU website, http://www.inmu.mahidol.ac.th/.

Visith Chavasit
Professor and Director
Institute of Nutrition, Mahidol University, Thailand

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INFOODS Technical Team, led by Dr. U. Ruth Charrondiere (FAO Nutritionist and INFOODS Coordinator, Rome), for their untiring work in initiating and producing various FAO/INFOODS Guidelines for developing good quality food composition data. The guidelines are widely used among data generators, compilers and users around the world.

The THAIFOODS Technical Committee, Institute of Nutrition, Mahidol University, chaired by Assoc. Prof. Prapasri Puwastien and composed of FCD generators, compilers, programmers, users, developers of innovative user-friendly tools, and INMU webmaster. The technical committee included Assoc. Prof. Kunchit Judprasong, Asst. Prof. Uraiporn Chitchang, Asst. Prof. Nipa Rojrungwasinkul, Ms. Orapin Banjong, Ms. Chayanit Wanichakul, Mr. Amnat Somjai, Assoc. Prof. Pongtorn Sungpuag, Assoc. Prof. Prapaisri Sirichakwal, Ms. Treerat Saiwan, and Asst. Prof. Wantanee Kriengsinyos. The THAIFOODS meetings identified and proposed key foods for analysis, mainly from the national dietary survey and considering the format of the published FCD and the development of the electronic database and website. The committee also developed several guidelines relating to FCD development.

Special thanks to our consultant, Asst. Prof. Anadi Nitithamyong, for her generous contribution and helpful guidance, particularly providing invaluable suggestions and editing as well as writing introduction for each food group.

The staff of the Food Chemistry and Food Microbiology (vitamins analyses) laboratories, Institute of Nutrition, Mahidol University, involved in the systematic analyses of nutrients (FCD generation).

The team of young staff who have taken turns to actively assist in the work: Ms. Naruemon Intharachak, data collection from different sources and developing archival files; Ms. Siriporn Tanjor, food sampling, sample preparation and data collection; Ms. Natcha Sangsawat, reviewing FCD and preparation of fatty acids reference FCDB; and Ms. Numphung Rungraung, data compilation, preparation of archival, reference and user FCDB.

We wish to thank all the above INMU staff for their active contributions as FCD generators, compilers, users and developers of the tools for FCD users, and the webmaster. The encouragement and support they gave to the development of the printed and electronic versions of Thai Food Composition Tables 2015 are much appreciated.

The authors of published papers, theses and reports (as shown in **Appendix 2**).

Dr. David Owens, University of Reading, United Kingdom, for his kind contribution in proof reading and improving the English as well as his continuous encouragement and moral support.

BACKGROUND ON THE DEVELOPMENT OF THE THAI FOOD COMPOSITION TABLES

Early versions of the printed Nutritive Values of Thai Foods (1970 and 1987) were published by Nutrition Division, Department of Health, Ministry of Public Health (MOPH) and comprised about 25% of analysed nutrient data of various Thai foods. The rest was borrowed from other national and regional food composition tables. In 1984, the MOPH compiled data on the nutrient composition (15 nutrients) of Thai foods (353 items) obtained from actual analyses at the institute. In 1992, an updated version of the nutrient composition tables of Thai foods was published which covered analysed data of more food items (total of 512), including raw, cooked one-plate dishes and desserts, and data on total dietary fibre for some food items. However, the published food composition tables were still not complete in terms of nutrients or food items. A great deal of additional food composition data, both published and unpublished, had been generated over the years by the Institute of Nutrition, Mahidol University (INMU) and other sources. Nevertheless, these data had not been compiled or included in the printed nutritive values of the Thai FCTs. Since 1990, the FCD compilers started to compile data of Thai foods analysed at INMU, published food composition data from local and international journals, university theses, research reports and some unpublished data from government laboratories in Thailand, based on the FAO/INFOODS Guidelines. In 1999, the first Thai Food Composition Tables, English version, were published[(1)]. They contained data on energy and 23 nutrients of 1055 food items, were presented in 16 food groups. The data were combined with food composition data from other ASEAN countries, systematically processed and statistically evaluated to generate the first ASEAN food composition tables, published in 2000[(2)].

Thus, from 1999, there were two sources of food composition tables (FCTs); a Thai version from the Bureau of Nutrition (former name was Nutrition Division), Department of Health, Ministry of Public Health; and an English version from the Institute of Nutrition, Mahidol University.

In 2001, the Bureau of Nutrition published a new version of Nutritive Values of Thai Foods[(3)] which included data of three new nutrients - cholesterol, iodine, and vitamin E - and more data on dietary fibre. Additionally, the Ministry of Public Health published FCTs on Cholesterol and fatty acids in Thai foods (current version, 2014)[(4)]. The FCTs published by the MOPH are available online as PDF at: http://nutrition.anamai.moph.go.th/temp/main/index.php.

INTRODUCTION TO THE THAI FCTs 2015

Thai Food Composition Tables (FCTs) 2015 is the updated version of Thai FCTs 1999, which was the first English version food composition tables in Thailand, published by the Institute of Nutrition, Mahidol University – the Regional Food Data Centre of INFOODS. The analysed FCD included in the Thai FCTs 2015 comprises new analysed data derived mainly from the Food Chemistry and Food Microbiology laboratories at INMU during 1997 - 2014. The new data and the old data from Thai FCTs 1999 were aggregated and reviewed using *FAO/INFOODS Guidelines for Checking Food Composition Data Prior to the Publication of a User Table*[5, 6]. Then, the accepted reference FCD of each nutrient in each food was submitted to systematic statistical evaluation using user-friendly and practical statistics. The process followed the same protocol as the Thai FCTs 1999, with some modifications to improve the quality of the updated version. Detailed information on each step is given in the Explanatory Notes. The final data for individual nutrients of each food is presented as mean value with standard deviation or with minimum-maximum values, together with the number of combined data sets for each nutrient. The updated hard copy Thai FCTs 2015 comprises about 1700 food items distributed between 16 food groups. Each food item contains data on energy value and up to 21 common nutrients. In addition, entries for some food items include data on cholesterol and five types of fatty acids. The FCTs are presented together with explanatory notes to the users, including detailed information on important components of FCTs. These aim to make the FCTs user-friendly and provide assistance to enable users from different areas to use the FCTs correctly and effectively. The electronic version of the Thai FCTs 2015 is being developed and will be available in the INMU website at http://www.inmu.mahidol.ac.th/ by the end of 2015.

The major changes/modifications in the 2015 version are as follows:
In terms of format:

- Presenting food composition tables with full nutrient names and their Tagnames in the heading of the first page of the table for each food group and without nutrient Tagnames on the following pages.
- Including data on density (liquid foods) in relevant food groups, where they are available.
- Deleting “Retinol” column and presenting β-carotene and Total vitamin A (Vitamin A expressed in retinol activity equivalent [RAE], μg retinol plus μg beta-carotene/12)
- Including additional columns for Magnesium (after Phosphorus) and Sugars, total (after Vitamin C) in the relevant food group(s).

- Rearrangement of the order between Water and Energy columns and the sequence of mineral columns to be as follows: Calcium, Phosphorus, Magnesium (where it is available), Sodium, Potassium, Iron, Zinc, and Copper.
- Presenting the amount of each nutrient per 100 g (or 100 mL for clear liquid foods) in a food as mean, standard deviation or min to max and number of combined data sets for each nutrient
- Including more information on fatty acids, i.e., monounsaturated fatty acids, polyunsaturated fatty acids, omega-3 (n-3), and omega-6 (n-6) polyunsaturated fatty acids in **Section 2**.

In terms of food name and food group:

- modifying the name of Food group N to be “Spices, herbs, condiments and other seasonings”. Rearranging and moving some food items to and from Group D, Vegetables, as appropriate; e.g., moving fresh coriander, spring onion, hot pepper and shallot bulb to Group D; moving hoary basil leaves from food Group D to Group N;
- updating/correcting English names and scientific names of foods, especially in Group D, Vegetables and their products;
- modifying the name of Food Group T to be Mixed foods: ready-to-eat and rearranging the foods into 6 sub-groups: Main dishes, One-plate dishes, Desserts, Snacks, Bakery, and Other mixed foods;
- deleting country code ('TH' for Thailand) from the food code. The country code will be added to the food code when the Thai FCDB is combined with FCDBs from other ASEAN countries to develop the ASEAN FCDB.

In terms of nutrients/analytical data:

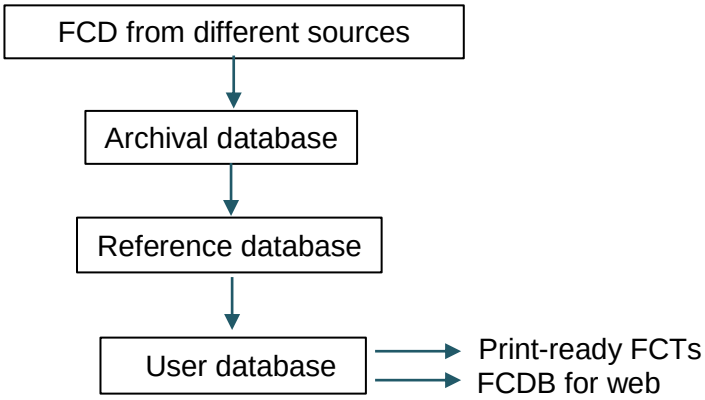
- Presenting value of available carbohydrate where data on dietary fibre is available.
- Re-computing total energy where available carbohydrate is available.
- Presenting Total vitamin A as retinol activity equivalent (RAE).
- Presenting each nutrient value as mean, standard deviation or min to max, and with number of combined data sets for each nutrient.

EXPLANATORY NOTES

SYSTEMATIC DEVELOPMENT OF THE THAI FOOD COMPOSITION DATABASE

The updated version of the Thai Food Composition Tables (Thai FCTs 2015) was prepared based on guidelines given by FAO/INFOODS (International Network of Food Data System) on the generation and compilation of good quality food composition data[7], using a modified FAO/INFOODS Compilation Tool format[8, 9], with the approval of the THAIFOODS Technical Committee at the Institute of Nutrition, Mahidol University (INMU). Throughout the process, the committee discussed, proposed, and agreed upon a set of criteria for the development of the Thai food composition database and also agreed criteria for the evaluation of analytical data.

Food composition data compilation includes the systematic development of archival, reference and user databases which are used in the preparation of food composition tables as a hard copy or electronic online food composition database.



Summary flowchart on the process for FCDB development

The activities on development of the Thai FCDB 2015 were carried out step by step as follows:

1. Systematic preparation of archival file

The essential components for developing archival FCDB are food composition data (FCD) from various sources and the criteria for their selection, FCD compilation tool, including nutrients, methods of analysis to be used as a criterion for selection FCD, food group classification with their codes, and the process for archival FCD preparation.

1.1 Selection of FCD from published and unpublished data

Food composition data (FCD) included in Thai FCTs 1999 was derived from analytical data collected at INMU from 1977 to 1997 and from published data in various sources up to 1999, as listed in **Appendix 2.** FCD presented in FCTs 2015 is mainly analytical data from the Food Chemistry and Vitamins laboratories at INMU from 1997 to April 2014 and reference data sets from Thai FCTs 1999. Some of the data were compiled from MSc theses at INMU and

published research papers, and some from the current Thai version of the 'Nutritive Values of Thai Foods' 2001, published by Nutrition Division (presently the Bureau of Nutrition), Dept. of Health, MOPH (available online at http://nutrition.anamai.moph.go.th/FoodTable/Html/frame.html). Sources of FCD compiled in FCTs 2015 are shown in **Appendix 2**.

Criteria for selecting FCD to be included in Thai FCTs 2015

Published and unpublished food composition data, as nutrient per 100 g (or 100 mL) edible portion on a fresh weight basis, were selected according to the following criteria:

1) it must be original analytical data;
2) sampling, sample preparation, analytical methods, and the number of samples analysed should be documented appropriately;
3) origin of the analytical data can be traced;
4) minimum data available includes proximate composition or minerals or vitamins and all with water content.

1.2 FCD Compilation tool

Microsoft Excel spreadsheets were used for preparing data files of individual food groups of the Thai FCD. The FAO/INFOODS Compilation Tool version 1.2.1 (http://www.fao.org/infoods/infoods/software-tools/en/)[9], was modified to be used as a compilation system for archival, reference and user data files by selecting only nutrient columns for which there was available information and nutrient data.

1.3 Nutrients and methods of analysis

In FCTs 2015 format, a set of nutrient data for each food includes energy value and a maximum of 27 nutrients. The nutrients, standard unit of expression and the number of decimal places for each nutrient are shown in **Table 1**. Criteria for acceptance of nutrient values based on analytical methods are shown in **Table 2,** together with INFOODS nutrient tagnames (more detail is given in the section 'Information to Users').

Table 1. Nutrients, standard units of expression and number of decimal places[5]

Nutrients	Unit	Number of decimal places
Energy	kcal	none
Water	g	1
Protein	g	2
Fat	g	2
Available carbohydrate, total carbohydrate	g	2
Dietary fibre	g	1
Ash	g	2
Calcium	mg	none
Phosphorus	mg	none
Sodium	mg	none
Potassium	mg	none
Magnesium	mg	none
Iron	mg	2
Copper	mg	2
Zinc	mg	2
β-carotene	μg	none
Vitamin A; retinol activity equivalent (RAE)	μg RAE	none
Thiamin (vitamin B1)	mg	2
Riboflavin (vitamin B2)	mg	2
Niacin	mg	2
Vitamin C	mg	none
Sugars	g	2
Cholesterol	mg	none
Fatty acids, total (saturated, monounsaturated, polyunsaturated, n-3 and n-6)	g	2

Table 2. Nutrients, analytical methods and INFOODS Tagnames

	Nutrients	Analytical method(s) used for acceptance of nutrient values[11, 12]	INFOODS Tagnames[5,10]
1	Water	All methods	WATER
2	Protein	Total N x converting factor	PROTCNT
	(True protein)	Protein N x converting factor	PROTCNP
3	Fat	Choose values obtained from method with acid digestion	FAT
4	Dietary fibre	Enzymatic gravimetric method	FIBTG
5A	Carbohydrate, available, by difference	Calculated by difference: CHOAVLDF = 100 g* – (weight in grams [water + protein + fat + dietary fibre + ash] in 100 g food)	CHOAVLDF
5B	Carbohydrate, total, by difference (present the value, *in brackets,* at the same column as CHOAVLDF	CHOCDF = 100 g* – (weight in grams [water + protein + fat + ash] in 100 g food) (use this calculation when FIBTG data was not available) **for liquid sample, replace 100 g with the weight of 100 mL sample and express carbohydrate as g per 100 mL*	(CHOCDF)
6.	Ash	All methods	ASH
	Energy	Calculated by (4 x g protein) + (9 x g fat) + (4 x g CHOAVLDF) + (2 x g dietary fibre) (not include alcohol)	ENERC
	(Energy)	If CHOAVLDF was not available, CHOCDF was used. Value was calculated as follows and is put in parenthesis at the same column of ENERC: Calculated by (4 x g protein)+(9 x g fat)+(4 x g CHOCDF)	(ENERC)
7	Calcium	All methods	CA
8	Phosphorus		P
9	Sodium		FE
10	Potassium		NA
11	Magnesium		K
12	Iron		MG
13	Zinc		ZN
14	Copper		CU
15	Thiamin (vitamin B1)		THIA
16	Riboflavin (vitamin B2)		RIBF
17	Niacin		NIA
18	Vitamin C		VITC
19	β-carotene		CARTB
20	Vitamin A; retinol activity equivalent	Calculated by μg retinol + 1/12 μg β-carotene	VITA_RAE
21	Sugars, total	Sum of free monosaccharides and disacchrides	SUGAR
22	Fatty acids, total saturated	Gas-liquid chromatography, with correction factors for converting data as % fatty acids distribution to total fatty acids per 100 g edible portion of food	FASAT
23	Fatty acids, total mono unsaturated		FAMU
24	Fatty acids, total polyunsaturated		FAPU
25	Fatty acids, total n-3		FAPUN3
26	Fatty acids, total n-6		FAPUN6
27	Cholesterol		CHOLE

1.4 Food groups and food group codes:

Foods in Thai FCTs 2015 database have been classified into 16 food groups. Each food group has a single alphabet letter representing the assigned food code as shown in **Table 3**. The letters I, L and O were excluded to avoid confusion with numbers. A decision was taken not to include Group R, snack foods, because none of the current national FCTs of ASEAN countries has such a group. In Thai FCTs 2015, snack foods are classified as one of the sub-groups under Group T, Mixed foods. Often foods are deemed appropriate for two or more groups. The general principle employed for food group allocation was to give preference to food usage rather than food origin for single source foods (for example, ginger is allocated to Group N, Spices, herbs, condiments, and other seasonings, rather than to Group D, Vegetables). A guideline for FCDB users on this aspect is given in the section 'Information to Users'.

Table 3. Food groups and food group codes in FCTs 2015

	Food group	Food group code*
1	Cereals and their products	A
2	Starchy roots, tubers and their products	B
3	Legumes, nuts, seeds and their products	C
4	Vegetables and their products	D
5	Fruits and their products	E
6	Meat, other animal and their products	F
7	Finfish, shellfish, other aquatic animals and their products	G
8	Eggs and their products	H
9	Milk and its products	J
10	Fats, oils and their products	K
11	Sugars, syrup and confectionery	M
12	Spices, herbs, condiments and other seasonings	N
13	Beverages: nonalcoholic	Q
14	Fast foods: franchise foods	S
15	Mixed foods: ready-to-eat - *main dishes, one-plate dishes, desserts, snacks (local and commercial), bakery, and other mixed foods*	T
16	Miscellaneous	U

*Following food codes used in Thai FCTs 1999[1] and ASEAN FCTs[2]
Group P (alcoholic beverage) is not included in this table because no data is available
Group R (snack foods) is not included in the FCTs; snack foods consist of mixed ingredients of several food groups; they are classified as one of the sub-groups under Group T, Mixed foods.

1.5 Preparation of archival files[7]:

Before compiling, each data set was carefully reviewed using the above criteria for acceptance. Unit of expression, conversion factors and calculations applied to each nutrient data were carefully checked and recorded. If data did not comply with the criteria for acceptance, they were modified to harmonise with the standard format of the compilation tool for FCTs 2015. Any modification of values was recorded. Accepted nutrient data from various sources were filled in the prepared Microsoft Excel spreadsheet of the archival file of the individual food group**.** Wherever possible, sources and details of the data, e.g., local name, sampling plan, number of samples collected, sample preparation, number of samples analysed, analytical methods, conversion factors, food ingredients, brand name and so forth were attached to the analytical data in the archival files.

2. Preparation of reference food composition database (FCDB)[7]

To generate reference database of a food group, FCD in the archival file of the particular food group were transferred to a new sheet in the same Excel file and named as Reference FCDB. Data sets of the same food from reference files of Thai FCTs 1999[1] were also transferred to this reference file. The previous and the new data of the same food were then aggregated. Individual nutrients of the data set were carefully inspected in detail for consistency and validity, using FAO/INFOODS 'Guidelines for Checking Food Composition Data prior to Publication of a User Table/Database - Version 1.0 (2012)'[5] (available at http://www.fao.org/infoods/infoods/standards-guidelines/en/). Thai names, English and scientific names were checked and completed according to documents from the Ministry of Agriculture and Cooperation and other sources, usually with illustrations [13-28]. Water content of some data sets needed to be modified to the mean value of available data before statistical evaluation. Sets of data for each nutrient of an individual food were then subjected to statistical evaluation to obtain a single data set of nutrients for each food. If any suspect data was found, it was checked against other data sources, and using professional judgment before and after the statistical analyses. Scrutiny and assessment of extreme values for the aggregated accepted data set of each nutrient in the reference database were carried out using robust statistics, z-score[29], and HORRAT Test[30] as described below . Conditions for applying statistics, based on the number of available data (n) of a nutrient in each set of aggregated data for each food item, were as follows:

If $n = 1$ use the data directly after systematic checking

If $n = 2$ calculate mean and present min and max values

If $n = 3$ calculate mean and SD for each nutrient

If $n > 3$ evaluate the data set using z-score

If $n \geq 5$ evaluate the data set using z-score and apply HORRAT test

For estimating z-score[29], the median and the normalised interquartile range (NIQR) for each nutrient were calculated. Extreme value(s) for each nutrient was identified by the use of the z-score, based on the median and the NIQR. A set of data for proximate composition was accepted when absolute z-score (lz-scorel) was less than 3. HORRAT test[30] was applied as an additional statistical test, when n $\geq$ 5. This test used Horwitz' Ratio (RSD_R/pRSD), which is the ratio of relative standard deviation (RSD) calculated from a set of nutrient data from different sources (RSD_R) and predicted RSD of Horwitz (pRSD). The accepted HORRAT value for reliable data should be 0.5 - 2. If the HORRAT value for a set of a nutrient was >2, each nutrient data was reviewed and extreme data with absolute z-score >2 were excluded. The HORRAT test was repeated until the remaining data was acceptable. However, a maximum of $\leq$ 20% of the total available data could be removed. Whenever an extreme value was found by z-score or HORRAT test, professional judgment was used to decide if the extreme value should be excluded. Although statistical evaluation was applied to identify extreme values for all nutrients it is more relevant in the case of proximate composition than for the nutrient with insignificant amount. Applying statistical evaluation to identify extreme values for minerals and vitamins has been shown to be inappropriate. In most foods these nutrients have greater variation than proximate composition data due to their lower levels and variation due to physiological and agricultural conditions, sample handling, and other factors. Therefore limited statistical evaluation can be applied and, if used, a wider range of acceptance criteria must be set up, with professional judgment, for a particular nutrient and concentration range. Consideration of extreme values of minerals and vitamins may also require referring to data for the same nutrient in other reliable food composition databases.

Following statistical evaluation, a set of data as mean, standard deviation (SD) or min to max values (if the number of combined data sets, N, for each nutrient was 2), and the N value for each nutrient were obtained. Available or total carbohydrate and energy value were then calculated. A complete set of the target nutrients for each food was obtained which was used for preparation of the user FCD.

3. Preparation of user database

Formats for the user database were prepared. The database was divided into 2 sections. The first section includes columns of food code, food and description in local Thai name, alternative English name, energy and major nutrients, as shown in **Table 2**, i.e., proximate composition, minerals, vitamins and total sugars. The second section includes data on water, total fat, total saturated, monounsaturated, polyunsaturated, n-3 and n-6 fatty acids, and cholesterol. To generate a user database of a food group, the FCD as mean, SD or min-max value, and N of each food item from the reference database were transferred and paste-linked to a new file of

user-linked FCD with set format. From the user-linked FCDB, an unlinked user database of each individual food group was prepared to be used for preparation of the final user database for printed FCTs and for online FCDB. Foods within each food group are arranged alphabetically by their Thai names. The alphanumeric system - a unique alphabet letter food group code (**Table 3**) and a unique number for a food item within each food group - was applied for food coding. It must be noted that once the food codes are assigned, they will remain unchanged. The final user data files were then constructed. Although FCTs 2015 contains some missing nutrient data, at this stage, missing values in the final file are left blank (-), without entries of borrowed data.

The Thai, English and scientific names as well as food composition data and the number of decimal places of each nutrient were checked before printing, according to the FAO/INFOODS Guidelines[5]. An index of specific food codes, English name, followed by scientific name, Thai name and source of data for each food in a specific food group and the entry page number are listed in **Appendix 1**.

4. Print-ready food composition tables

For the final step, '**The concise Thai food composition tables** (composition per 100 g edible portion) were prepared as print-ready food composition tables. The INFOODS tagnames are included as part of the table title only on the first page of each food group. Thai Food Composition Tables 2015 includes FCD of about 1700 food items, arranged in 16 food groups with values of energy and a maximum of 27 nutrients for each food item.