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## D3.4 Guidelines for the selection of foods for data checking and quality assessment of national food composition tables in target countries

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The guidelines presented in this report were thoroughly discussed and agreed upon by WP3 partners and external experts in the field of food composition databases during the WP3 training workshop on Food Composition Databases which took place in Hanoi, Vietnam, in April 2012. For details on this training workshop, see Deliverable 3.3 *“Report SMILING WP-3 training workshop on Food Composition Databases”*.

## **Background**

During the Kick-Off meeting of the SMILING project in Montpellier (France) in March 2012, each of the SEA partners involved in SMILING presented national data on the prevalence of nutrient deficiencies and health related problems. Based on the data provided, a selection of nutrients was compiled for inclusion in the quality assessment and update of the SMILING food composition tables (FCTs) (Decision 1 in Deliverable 3.1).

### ***Selection of key-nutrients***

The selected macronutrients are: energy, protein, total fat, carbohydrates (total or available) and moisture (proximates). These macronutrients will be used only for data checking following INFOODS guidelines. More details are given below.

The selected micronutrients are: iron, zinc, calcium, vitamin A expressed as retinol activity equivalents (so including provitamin A carotenoids), vitamin D, vitamin B1, vitamin B2, vitamin B6, folate, vitamin B12, and vitamin C (11 micronutrients in total). These micronutrients will be subjected to data checking using INFOODS guidelines and to a more detailed quality assessment following EuroFIR guidelines. More details are given below.

### ***Selection of foods***

In WP4, a selection of about 200 food items (first selection) will be made for inclusion in the OPTIFOODS program which will be used for modelling purposes. This selection will not include composite dishes, but only single food items.

This selection of foods will be based on

- a) Consumption of the food by >10% of population
- b) Consumption of the food by <10% of population but high density in nutrients of interest (underutilized foods)

The ~200 food item list will be made available for WP3 by Elaine Ferguson (WP4).

The ~200 food item list and the above mentioned nutrients are the starting point for data checking and quality assessment in SMILING WP3!

### Step 1: Completion of the ~200 food item list with nutrient data

On the ~200 item food list from WP4, a data check will be performed on macronutrients and micronutrients following INFOODS guidelines (**Annex 1**).

This food list needs to be completed with data on nutrient composition (see table 1). The starting point for doing this is the national food composition table or database, or the one that is commonly used if no national FC database exists (e.g. in case of Laos and Cambodia the ASEANFOODS table can be used, supplemented with available data on country specific foods). When nutrient data are missing in the national FCT, the next FCT to consult is the ASEANFOODS table. If the information cannot be retrieved from the ASEANFOODS table, then a different table from the region can be used. This is for decision of the individual countries but the order of the FCT used needs to be prioritized in advance, documented, and consulted in a systematic way! Recommended regional tables are: Thai FCT, Vietnamese FCT, Indonesian FCT, Malaysian FCT and Chinese FCT. In addition, non- regional databases can be consulted (such as the French FCT or the USDA database) if the regional databases give no information. Imputation can be considered as well if none of the above sources give you the information for the specific nutrient.

**Table 1: ~200 food item list to be completed for nutrient content by WP3 SMILING partners**

					WP3	
WP4	WP4	WP4	WP4	WP4	To be completed	To be completed
Food name	Food Code <sup>1</sup>	Food group	Process method (raw, boiled, etc)	Amount consumed (g)	Content (micro)nutrient 1 (mcg/mg or g per 100 g food)	Content (micro)nutrient 2 (etc...)
1						
2						
3						
..						
..						
~200						

<sup>1</sup> Food Code – is the food code in your food composition table for each food

The nutrients to be included in the table are: Iron, zinc, calcium, vitamin A (expressed as retinol activity equivalents, so including pro vitamin A carotenoids), vitamin D, vitamin B1, vitamin B2, vitamin B6, folate, vitamin B12, vitamin C and proximates. The format is excel.

## Step 2: Data check on nutrients in ~200 food item list

A data check on all selected macro- and micronutrients in the ~200 food item list will be performed using the INFOODS guidelines in **Annex 1**: “guidelines for checking food composition data prior to publication”. Especially chapter 3 is of importance for the data check in the SMILING project. In addition the relevant information in the “guidelines on conversion among different units, denominators and expressions” need to be applied.

## Step 3: Selection of key foods for detailed quality assessment

A detailed quality assessment cannot be performed for each of the 200 food items and selected nutrients. Therefore a 2nd selection of these foods needs to be made: this second selection is based on the key foods approach. The principle of the key foods approach is demonstrated on the Thai survey data of 15-19 year old women (see **Annex 2**, table A-D: output from demo excel file from the Thai survey).

For each of the selected micronutrients, 10 foods will be identified that contribute most to the intake of the nutrient, and 3 foods that have the highest micronutrient density (which can be underutilised food items with a high nutritious potential). The number of 10 foods plus 3 foods is arbitrarily chosen but takes into account feasibility (in terms what can be done in ~5 month time). For these foods, quality assessment/update is performed for the micronutrients under consideration. The total number of foods to be included in the detailed quality assessment is therefore:  $(11 \cdot 10) + (11 \cdot 3) = 143$  (11 micronutrients and 10+3 foods).

Based on experience with a previous quality assessment, a total number of ~100 – 150 foods can be assessed in the given time span.

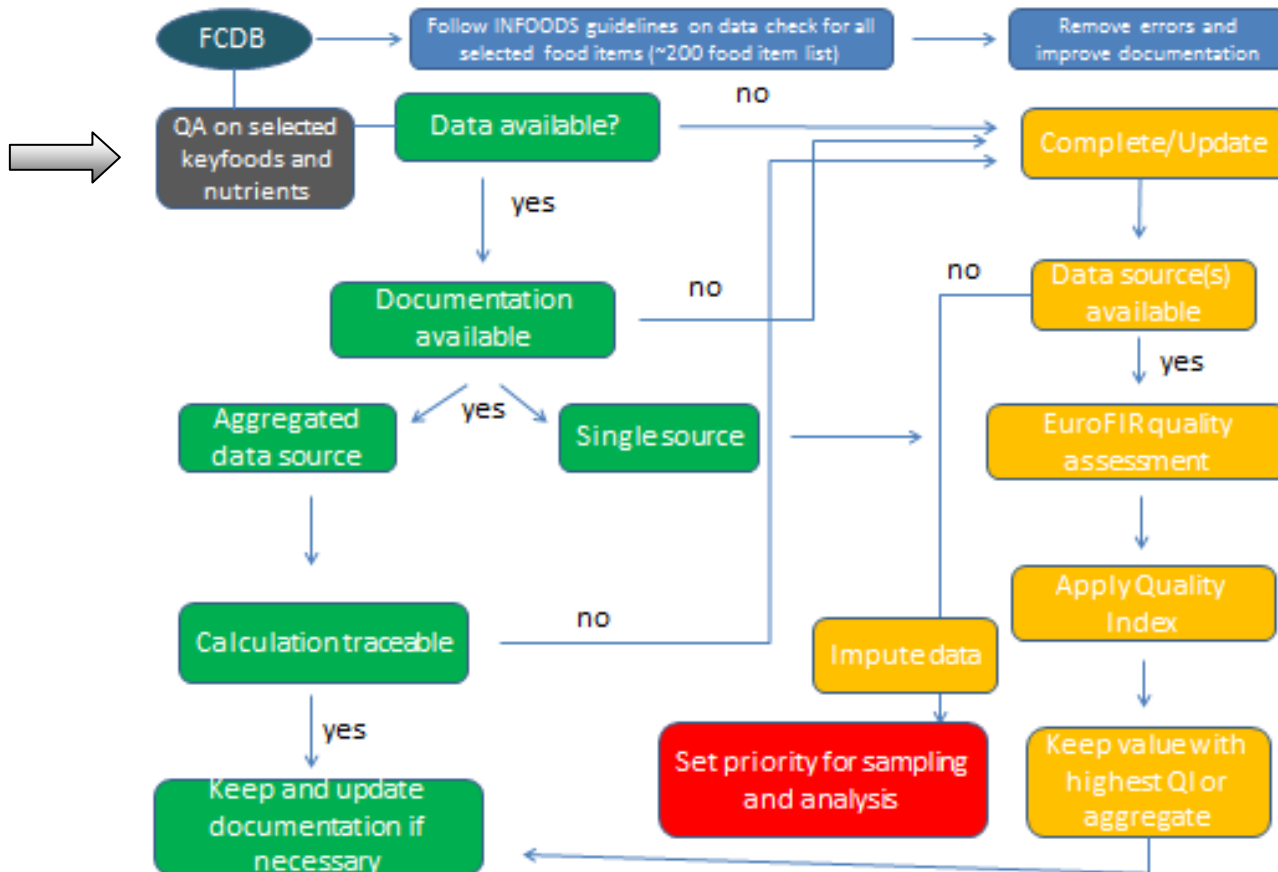
It should be emphasized that we are making a “ball-park” estimate (rough estimate), since we do not know much about the quality of the data yet. But for the purpose of food selection this approach will do.

The selection of key foods will be done as follows:

- a) Add the micronutrient content per 100 g for each nutrient of interest to table 1. Make sure the correct units are used and that the value refers to the proper cooking method.
- b) Calculate for each food the micronutrient contribution to intake as follows:  $(\text{amount consumed} \cdot \text{micronutrient content per 100 g})/100$ .
- c) Select for each nutrient the top 10 foods that contribute most to intake of the specific nutrient (group 1-key foods list). Select per nutrient 3 foods with the highest nutrient density (group 2-nutrient density food list). When one or more food items in group 2 also appear in group 1, then the selection should be extended in order to have 3 food items in group 2 that do not overlap with group 1. (see **Annex 2**, table A-D: output from demo excel file from the Thai survey)

#### Step 4: Outline of detailed quality assessment on key foods and selected micronutrients

On the 13 foods retrieved by the above approach, a quality assessment will be done on the selected micronutrients according to the flow diagram below:



The basic philosophy of the flow chart is that it is not acceptable to have undocumented data in your database!!

Data sources can be analytical reports, journal articles, etc, but not another FCDB from which the data source is not available. So data sources are sources that have a traceable documentation of the values. If no data sources are available for the key foods then imputation of nutrient data is possible but the quality of the data should be assessed in the same way. See page 7 of Greenfield & Southgate book for definition of “imputed data”.

Aggregated data are nutrient values which have been compiled from several data sources. The selection and calculation procedure for one user data point from aggregated data should be done according to the scheme developed at Mahidol University (**Annex 3**)

Note: it is not recommended to have copied values from overseas databases (USDA, European, etc) for key foods (so for those foods that significantly contribute to intake of a specific nutrient).

A detailed quality assessment on key foods should be done using the EuroFIR guidelines (**Annex 4**).

**Step 5: Regrouping of foods into food groups required for OPTIFOODS**

The number of food groups for the OPTIFOODS linear programming model is 17. So foods from each country have to be regrouped into food groups and sub food groups according to **Annex 5**.

**Annex 1: FAO/INFOODS guidelines**

FAO/INFOODS Guidelines for checking food composition data prior to publication, including the guidelines on conversion among different units denominators and expressions (version 1): at this stage only available as draft hard copy for the workshop participants. These guidelines are under embargo until final publication (expected final version June/July 2012). Therefore the guidelines are NOT included in this Annex.



**Annex 2: selection of key foods, table A to D.**

**Annex 2, Table A:** part of the food list file showing intake of foods (grams/day), nutrient content (Iron (mg/100g) and contribution to intake (mg))

Foodcode	Foodname	Grams/day	Iron (mg/100)	Intake
14028	Soybean milk, vegetarian formula	273,18	1,20	3,28
14024	Orange juice, 100%	210,40	0,30	0,63
09011	Cow milk	200,00	0,10	0,20
04049	Gourd, bottle (bidao)	167,13	0,30	0,50
05037	Mango, okrong variety, ripe	139,00	0,40	0,56
05015	Guava, common	138,43	1,30	1,80
05084	Pear	131,79	2,30	3,03
05009	Rose apple, green (roi)	127,25	0,50	0,64
04142	Mushroom, pleurotus sp.	122,00	5,20	6,34
05030	Coconut meat, immature	120,10	1,00	1,20
05066	Cantaloupe (dua hong)	109,67	0,40	0,44
05003	Banana, nam-wa variety, ripe	101,44	0,60	0,61
05058	Pineapple	90,72	0,50	0,45
07094	Prawn, giant freshwater (tom nuoc ngot, tom su)	64,60	4,60	2,97
09052	Milk powdered, bear brand (honey)	64,00	1,10	0,70
03011	Soybean curd, white, soft (tao pho)	63,38	0,30	0,19
06011	Chicken, breast (nguc ga)	57,58	1,50	0,86
04138	Radish (cu cai)	53,12	1,10	0,58
04075	Cabbage, chinese, white	52,66	1,10	0,58
04030	Cucumber	46,26	1,00	0,46
07099	Sardines, canned in water, liquid excluded	45,50	2,30	1,05
04123	Egg plant	43,23	0,70	0,30
07114	Crab, blue swimming, meat (cua be)	39,35	3,80	1,50
04113	Gourd, bitter, chinese (muop dang)	39,18	0,60	0,24
07044	Mackerel, spanish (ca thu)	35,68	1,30	0,46
06040	Beef, meat medium fat	35,59	2,70	0,96
05087	Grapes, red (small)	31,00	0,60	0,19
06054	Pork, liver	30,35	12,00	3,64
09087	Milk, powder, reduced fat	28,00	0,45	0,13
06151	Pig, blood, raw	26,27	20,40	5,36

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**Annex 2, Table B:** Key foods showing top 10 foods (marked yellow) that contribute most to iron intake. This was compiled by ranking iron intake from table A.

Foodcode	Foodname	Grams/day	Iron (mg/100 g)	Intake	Column	Colu
04142	Mushroom, pleurotus sp.	122,00	5,20	6,34	13%	
06151	Pig, blood, raw	26,27	20,40	5,36	11%	
06054	Pork, liver	30,35	12,00	3,64	7%	
14028	Soybean milk, vegetarian formula	273,18	1,20	3,28	7%	
05084	Pear	131,79	2,30	3,03	6%	
07094	Prawn, giant freshwater (tom nuoc ngot, tom su)	64,60	4,60	2,97	6%	
05015	Guava, common	138,43	1,30	1,80	4%	
04188	Amaranth (rau den)	26,00	6,10	1,59	3%	
07114	Crab, blue swimming, meat (cua be)	39,35	3,80	1,50	3%	
06073	Pork, kidney (Fat 3.9%)	17,75	8,00	1,42	3%	
03027	Soybean, seeds, dried	11,43	11,00	1,26	3%	
05030	Coconut meat, immature	120,10	1,00	1,20	2%	
07099	Sardines, canned in water, liquid excluded	45,50	2,30	1,05	2%	
06056	Pork, lung	15,95	6,40	1,02	2%	
06066	Pork, heart	16,50	5,90	0,97	2%	
06040	Beef, meat medium fat	35,59	2,70	0,96	2%	
06011	Chicken, breast (nguc ga)	57,58	1,50	0,86	2%	
09052	Milk powdered, bear brand (honey)	64,00	1,10	0,70	1%	
05009	Rose apple, green (roi)	127,25	0,50	0,64	1%	
14024	Orange juice, 100%	210,40	0,30	0,63	1%	
05003	Banana, nam-wa variety, ripe	101,44	0,60	0,61	1%	
04138	Radish (cu cai)	53,12	1,10	0,58	1%	
04075	Cabbage, chinese, white	52,66	1,10	0,58	1%	
11001	Sugar, white	9,66	5,80	0,56	1%	
05037	Mango, okrong variety, ripe	139,00	0,40	0,56	1%	
04049	Gourd, bottle (bidao)	167,13	0,30	0,50	1%	
07044	Mackerel, spanish (ca thu)	35,68	1,30	0,46	1%	
04030	Cucumber	46,26	1,00	0,46	1%	
05058	Pineapple	90,72	0,50	0,45	1%	
05066	Cantaloupe (dua hong)	109,67	0,40	0,44	1%	

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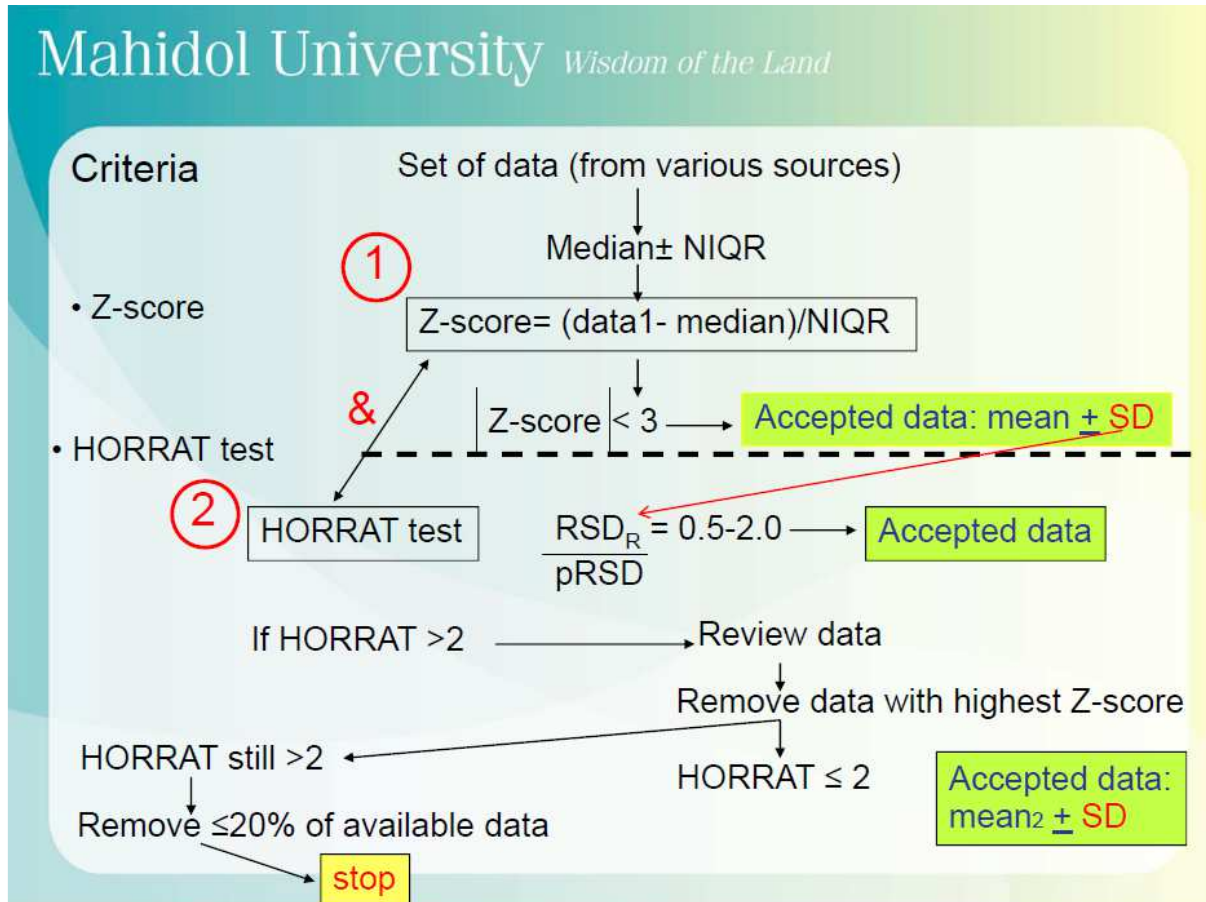
**Annex 2, Table C:** Nutrient density list showing foods having the highest nutrient density (top 5 marked blue). This was compiled by ranking iron content from table A.

Foodcode	Foodname	Grams/day	Iron (mg/100 g)	Intake
06151	Pig, blood, raw	26,27	20,40	5,36
12066	Turmeric, roots, powder (bot nghe)	1,83	18,60	0,34
03005	Sesame seeds, white	0,72	14,55	0,10
06054	Pork, liver	30,35	12,00	3,64
03027	Soybean, seeds, dried	11,43	11,00	1,26
06073	Pork, kidney (Fat 3.9%)	17,75	8,00	1,42
06056	Pork, lung	15,95	6,40	1,02
04188	Amaranth (rau den)	26,00	6,10	1,59
06066	Pork, heart	16,50	5,90	0,97
11001	Sugar, white	9,66	5,80	0,56
04142	Mushroom, pleurotus sp.	122,00	5,20	6,34
07094	Prawn, giant freshwater (tom nuoc ngot, tom su)	64,60	4,60	2,97
12019	Pepper, black	5,41	4,60	0,25
07114	Crab, blue swimming, meat (cua be)	39,35	3,80	1,50
06040	Beef, meat medium fat	35,59	2,70	0,96
04020	Ginger, young	10,93	2,50	0,27
05084	Pear	131,79	2,30	3,03
07099	Sardines, canned in water, liquid excluded	45,50	2,30	1,05
12053	Soybean sauce-black, thick	8,50	1,93	0,16
06011	Chicken, breast (nguc ga)	57,58	1,50	0,86
12033	Garlic, dried bulbs	4,34	1,50	0,07
04035	Mungbean sprout (gia dau xanh)	23,33	1,40	0,33
05015	Guava, common	138,43	1,30	1,80
07044	Mackerel, spanish (ca thu)	35,68	1,30	0,46
14028	Soybean milk, vegetarian formula	273,18	1,20	3,28
09052	Milk powdered, bear brand (honey)	64,00	1,10	0,70
04138	Radish (cu cai)	53,12	1,10	0,58
04075	Cabbage, chinese, white	52,66	1,10	0,58
05030	Coconut meat, immature	120,10	1,00	1,20

**Annex 2, Table D:** Final food list for quality evaluation of iron. This was compiled from table B and C. Top 1 and 4 from the nutrient density list (group 2) overlap with top 2 and 3 from the keyfoods list (group 1), therefore, the selection was extended so that in total 13 foods were selected.

<b>Group 1</b>		<b>Group 2</b>	
<b>From keyfoods list</b>		<b>From nutrient density list</b>	
Mushroom, pleurotus sp.		Pig, blood, raw	
Pig, blood, raw		Turmeric, roots, powder (bot nghe)	
Pork, liver		Sesame seeds, white	
Soybean milk, vegetarian formula		Pork, liver	
Pear		Soybean, seeds, dried	
Prawn, giant freshwater (tom nuoc ngot, tom su)			
Guava, common			
Amaranth (rau den)			
Crab, blue swimming, meat (cua be)			
Pork, kidney (Fat 3.9%)			
overlap between the groups			
overlap between the groups			
<b>The final list of foods (group 1 and 2 combined):</b>			
Mushroom, pleurotus sp.			
Pig, blood, raw			
Pork, liver			
Soybean milk, vegetarian formula			
Pear			
Prawn, giant freshwater (tom nuoc ngot, tom su)			
Guava, common			
Amaranth (rau den)			
Crab, blue swimming, meat (cua be)			
Pork, kidney (Fat 3.9%)			
Turmeric, roots, powder (bot nghe)			
Sesame seeds, white			
Soybean, seeds, dried			

**Annex 3: Criteria of acceptance for generating user data from a set of aggregated data (see details in presentation of Prapasri Puwastien on day 8 of the WP3 training workshop on Food Composition Databases)**



**Annex 4: Guidelines for detailed quality assessment and assignment of a Quality Index, normalized on a 0-10 scale.**

The EuroFIR guidelines were developed for use in Europe, but are more widely applicable. Where in the guidelines reference is made to “EuroFIR thesauri” or “EuroFIR method guidelines”, it can be read as “ASEANFOODS guidelines” or for component identification, “INFOODS guidelines” can be read.

The EuroFIR guidelines allow calculation of a Quality Index. In the SMILING project the Quality Index is converted to a “Normalized Quality Index” on a scale from 0-10. The calculation of a “Normalized Quality Index” based on Quality Index is given at the end of paragraph 11.1 of this Annex.

The EuroFIR guidelines are included in this document on pages 15-40.



## EUROFIR WP1.3 TG4

### GUIDELINES FOR QUALITY INDEX ATTRIBUTION TO ORIGINAL DATA FROM SCIENTIFIC LITERATURE OR REPORTS FOR EUROFIR DATA INTERCHANGE

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#### **ABSTRACT:**

*The purpose of this document is to give guidelines for quality assessment and Quality Index attribution to original data from scientific literature and laboratory reports in EuroFIR interchange data. This system was partially inspired by existing systems (USDA, AFSSA, BASIS, CSPO, BLS) and it should allow compilers to evaluate the quality of their original data according to common guidelines. The system provides 8 scores to be stored and interchanged: one score for each of the 7 categories (see below), plus the summary score, the so called Quality Index (QI).*

*Quality evaluation is based on the following categories: 1. Food description 2. Component identification 3. Sampling plan 4. Number of analytical samples 5. Sample handling 6. Sample analysis 7. Analytical quality control.*

*To help compilers in the evaluation, a set of criteria is proposed within each category: answers to the criteria will guide the compiler to evaluate the quality of the datum that is entered in the interchange files. Each category receives a score from 5 for high quality to 1 for low quality. All scores are then summed to form the QI, ranging from 35 (high) to 7 (low).*

*A set of examples is reported at the end of the document.*

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## 1. PRINCIPLES

The purpose of this document is to provide guidelines for quality assessment and QI attribution to original data from scientific literature and reports in EuroFIR interchange data.

The new system of quality assessment for EuroFIR data interchange presented below was inspired by existing systems - USDA, AFSSA, BASIS, CSPO, BLS (see Appendix 2,3,4,5,6) - and should allow compilers to evaluate the quality of their original data according to common guidelines.

As currently proposed, the system allows for 7 scores from each of the quality categories (see below) and a total score for the quality index (QI). These 8 quality indicators will all be interchanged. A Confidence Code (CC) based on the quality index may be developed and could also be interchanged.

### 1.1. CATEGORIES

Previous work conducted by WP 1.3 TG4 to compare the existing quality assessment systems described the following common CATEGORIES:

1. Food description
2. Component identification
3. Sampling plan
4. Number of analytical samples
5. Sample handling
6. Analytical method
7. Analytical performance

An evaluation of documentation and quality assessment was carried out by compilers in August 2007 and the results were used to revise the quality assessment system. The main conclusion of the testing exercise was that categories related to analytical method (4, 5, 6 and 7) were difficult for compilers without an analytical background to assess and that consideration should be given to simplifying those categories.

The initial seven categories described above were reduced to four with 'number of analytical samples', sample handling', analytical method' and 'analytical performance' merged into a single category. Following further discussion at the EuroFIR compiler network meeting in Norwich, March 2008, it was agreed to revert back to 7 categories to enable compilers to interchange the specific scores for all relevant sampling and analytical questions, for compatibility with the EuroFIR BASIS quality assessment system and to allow more direct comparison with the USDA data evaluation system.

### 1.2. CRITERIA

In each category CRITERIA will be used to assess the level of quality, e.g., in the category food description, one of the criteria will be: "for primary foods, was the part of plant or part of animal clearly described?"

For each criterion the compiler will give one answer: YES, NO, or NOT APPLICABLE. NOT APPLICABLE means that the criterion considered is not relevant for the food and nutrient considered, it does not mean that the information is missing in the data source.

The criteria presented in this document are for quality assessment of original data within the framework of EuroFIR data interchange. For quality assessment of original data aimed at producing representative food composition data for a specific country, sampling plan and food description may be assessed using different criteria. For EuroFIR data interchange, the aim of the quality assessment of the sampling plan is to know if samples are representative for the consumption of the food in the country where the study was conducted, whereas for quality assessment of original data to be included in a national database, it is important for

compilers to evaluate the sampling plan in terms of representativeness of the samples for the consumption of the food in the compiler's own country (*see practical examples in the categories mentioned*).

### 1.3. SCORING OF EACH CATEGORY

Based on answers to all criteria within a category, the compiler will assign a score (1-5) to the category, based on their *subjective* judgment. Criteria that are NOT APPLICABLE are not counted in the total score for the quality assessment and they will not have a negative effect on the quality score for the category.

The answers given to each criterion should be kept for future reference/validation/reproducibility of the final score that was assigned (*please note: this implies however that these answers be kept in a separate file/spread sheet/dataset, not to be interchanged at this stage*).

The following scores can thus be assigned to each category:

5 = high quality

4= less than high quality but better than intermediate

3= intermediate

2= better than low quality but less than intermediate

1= low quality

When data is interchanged, compilers can refer to the quality scores given in each category and can make their own assessment of whether or not the data interchanged is fit for purpose.

Where all criteria are YES or NOT APPLICABLE the score for this category should be 5 (high quality). When all criteria are NO (with or without some NOT APPLICABLE criteria), the score for this category should be 1 (low quality). Where there are criteria with a mixture of YES and NO answers, the compiler should score the category according to the answers to the most important criteria for that food/component pair.

### 1.4. QUALITY INDEX – QI

The individual scores assigned to the seven categories should be summed, to obtain the overall Quality Index, a number that will range from 7 (low quality) to 35 (high quality).

Scores for the four categories could also be weighted to comply with the USDA scheme (0-100%) and to make the resulting CC easier to establish (e.g. 0-25: D, 26-50: C, 51-75: B, 76-100: A). Initially the weighting of each category could be 1 (all categories are weighted equally); however there is a strong case for some categories, e.g. food description and component identification to be considered more important than the others.

In addition to the overall QI, the individual scores of the seven categories will be recorded as part of EuroFIR value documentation.

### 1.5. CONFIDENCE CODE – CC

In some systems, quality index is summarized in a so called "confidence code" (CC), that is in general expressed as A, B, C or D depending on the quality index scoring. The CC easily summarizes the level of confidence that can be given to the specific component in the interchange dataset, where A = high and D = low.

At the present time, no confidence code is assigned to the EuroFIR quality assessment process

## 2. FOOD DESCRIPTION

### 2.1. GENERAL COMMENTS AND DEFINITION

The description of a food in the data source should be unambiguous. However, the type of information needed in terms of food description will not be the same for all types of food. Compilers will have to assess if the information provided in the source reference is appropriate in terms of food description. Some evaluation criteria will apply to all kinds of food, some apply only to manufactured food and some to homemade or restaurant made dishes.

In the EuroFIR interchange files (either for original data or aggregated, compiled data) all foods must be described by the LanguaL food indexing system. Most of the criteria for assessment listed below are thus based on LanguaL facets.

### 2.2. CRITERIA FOR ASSESSMENT

	FOOD DESCRIPTION	YES	NO	N/A
	A. FOR ALL TYPES OF FOOD			
1	Is the <b>food group</b> (e.g. beverage, dessert, savory snack, pasta dish) known?			
2	Was the <b>food source</b> of the food or of the main ingredient provided (best if scientific name included, cultivar/variety, genus/species, etc.)?			
3	Was the <b>part of plant or part of animal clearly</b> indicated?			
4	If relevant was the <b>analyzed portion</b> described and is it clear if the food was analyzed with or without the inedible part?			
5	Is the extent of <b>heat treatment</b> known?			
6	If the food was cooked, were satisfactory <b>cooking method</b> details provided?			
7	Was relevant information on <b>treatment applied</b> provided?			
8	Was information on <b>preservation method</b> provided?			
9	If relevant, was information on <b>packing medium</b> provided?			
10	If relevant, was information about the geographical <b>origin of the food</b> provided?			
11	If relevant, was the <b>month or season</b> of production indicated?			
12	Was the <b>moisture</b> content of the sample measured and the result given?			
	B: FOR MANUFACTURED PREPACKED FOOD ONLY			
13	Was the <b>generic name</b> provided (e.g. chocolate paste with hazelnuts)?			
14	Was the <b>commercial name</b> provided (e.g. Nutella)?			

15	<i>If relevant</i> , Was the <b>brand</b> provided (e.g. Ferrero)?			
16	Was relevant information on <b>consumer group/ dietary use/label claim</b> provided?			
	<b>C: FOR HOME MADE DISHES OR FOODS SOLD IN RESTAURANTS</b>			
17	Was the <b>complete name and description</b> of the recipe provided?			

## 2.3. COMMENTS ON CRITERIA FOR ASSESSMENT

### A. FOR ALL TYPES OF FOOD

#### **Criterion 1. Is the food group (e.g. beverage, dessert, pasta dish) known ?**

This is a basic criterion to understand what the food is, even if the main ingredient is not known, e.g. in composite foods. Food classification is indexed using facet A of the LanguaL thesaurus.

#### **Criterion 2. Was the FOOD SOURCE of the food or of the main ingredient provided (best if scientific name included, cultivar/variety, genus/species, etc.)?**

Food source is indexed using facet B of the LanguaL thesaurus.

For primary foods, the biological source (plant, animal, mineral) needs to be specified. If facet B is a generic term (e.g. MEAT ANIMAL (MAMMAL) [B1134] or VEGETABLE-PRODUCING PLANT [B1579]) or NOT KNOWN) then the answer to this criterion is NO.

For composite manufactured foods, the food source of the main ingredient might be specified (in which case, the answer is YES). In some cases, a generic term is acceptable, for example SUGAR—PRODUCING PLANT for sugar (it is not essential to know the source of the sugar used as an ingredient). If the main ingredient is not known, then the criterion should be NOT APPLICABLE.

#### **Criterion 3. Was the PART OF PLANT OR PART OF ANIMAL clearly indicated?**

This criterion is needed to specify if the part of the plant or animal that is the principal ingredient of the food was defined in the paper. The criterion should be described by LanguaL facet C. What constitutes a clear indication will depend on the food. For example, for a fruit or vegetable it should be clear whether or not the peel or skin was present. In the case of wheat bread, we need to know if it was made with refined flour or whole grain flour, including or excluding the germ. For an animal product we want to know if we are talking about a muscle, an egg, an organ, etc.

#### **Criterion 4. If relevant, was the analyzed portion described and is it clear if the food was analyzed with or without the inedible part?**

The analyzed portion should be described because in some cases it may be a major determinant of quality (e.g. for a fruit it should be clear whether or not the value relates to the fruit with or without skin).

This information is also included in 'part of plant or animal' (criterion 3.), but it is better to explicitly include it as a criterion. It applies to all types of food, even processed: for example we can have canned mackerel that was analysed with bones or without bones. If the paper specifies what part was analysed, then the answer will be YES. If the food could contain an inedible part but the part analysed was not specified then the answer will

be NO. If the food clearly wouldn't have an inedible portion (e.g. a beverage) the answer will be NOT APPLICABLE.

**Criterion 5. Is the extent of HEAT TREATMENT known?**

This criterion is meant to assess if any type of heat treatment has been applied to the food. If information on whether the food was heat treated or not is provided, then a specific LanguaL facet F can be assigned, and the answer to the criteria will be YES. In particular, if it is clear that no heat treatment was applied, i.e. the food was "raw", the answer is YES. If facet F is NOT KNOWN, then the answer to this criterion is NO. In many cases this information will not be stated but will be implied by the type of food, for example bread or pasteurized dairy products and in that case the answer will be YES.

**Criterion 6. If the food was cooked before consumption, were satisfactory COOKING METHOD details provided?**

Cooking procedure can affect the nutrient content of food. Therefore it is essential to know how the food was cooked. In other words, can a specific LanguaL facet G be assigned to the food? The cooking method details that may be provided (where applicable) include:

- Instrument (traditional oven or micro-wave oven, pan) or method (boiled, deep-fried...)
- cooking time
- cooking temperature
- Ingredients added for cooking (salt, water, fat...)

For primary foods, if facet G is NOT KNOWN or if important cooking method details are missing, then the answer to this criterion is NO. If the food was manufactured (e.g. breakfast cereal) or not cooked, then the answer is NOT APPLICABLE.

**Criterion 7. Was relevant information on TREATMENT APPLIED provided?**

Was any **relevant** treatment applied to the food e.g. adding, removing or substituting any component-? Treatments applied are described by LanguaL facet H. Many foods will have treatments applied that may not be relevant in terms of food description and may not affect nutrient content. This criterion should be considered in terms of treatments that are relevant for food description or nutrient content e.g. addition of nutrients in foods that may be fortified, coatings, water addition or removal.

If the food is indexed with relevant treatment(s) or with NO TREATMENT APPLIED (e.g. raw food), the answer will be YES, as the information has been provided. If the food is indexed with TREATMENT APPLIED NOT KNOWN or if there is likely to be a relevant treatment that is not described, the answer will be NO.

**Criterion 8. Was information on PRESERVATION METHOD provided?**

Preservation method can have an impact on nutrient content therefore information concerning treatments applied to the food specifically for preservation purposes is required. This criterion is described by LanguaL facet J. If the food is indexed with PRESERVATION METHOD NOT KNOWN, then the answer to this criterion is NO. If the food is indexed with NO PRESERVATION METHOD USED, the answer is YES, as the information has been provided. .

***Criterion 9. If relevant, was information on PACKING MEDIUM provided?***

Food can be packed in a medium for preservation or handling. If a packing medium is used then a specific LanguaL facet K should be assigned. If the food is indexed with PACKING MEDIUM NOT KNOWN, then the answer to this criterion is NO. If no packing medium was used, the answer is NOT APPLICABLE.

***Criterion 10. Was information about the geographical origin of food provided?***

The origin of the food sample (geographical place or region) is important, because it allows verification of the applicability of the data to the country of the compiler. This criterion is described by LanguaL facet R and may relate to place of origin, production (for primary foods) or sale (for manufactured products) of the food. Identification of country or fishing zone will lead to the answer YES. If the geographical origin is not indexed but the compiler thinks that this would be relevant information, then the answer to this criterion is NO. If the geographical origin is not indexed but the compiler thinks it is NOT relevant information, then the answer to this criterion is NOT APPLICABLE.

***Criterion 11. If relevant, was the MONTH or SEASON of production indicated?***

For some foods the season of production is relevant (e.g. some fish are more or less fat depending on the season, fruit can contain more vitamins in the peak season), while for other foods it is irrelevant (e.g. soft drinks, etc). It is therefore important to look for this information in the paper. The answer will be YES if available and relevant, NO if not available and relevant, and NOT APPLICABLE if not relevant.

***Criterion 12. Was the moisture content of the sample measured and the result given?***

In order to be sure that nutrient data refer to a food with similar characteristics to the food in your database, it is important to compare the moisture of the samples. If the information is provided, answer YES, if not provided answer NO.

***B: FOR MANUFACTURED PREPACKED FOOD ONLY***

***Criterion 13. Was the GENERIC NAME provided (e.g. chocolate paste with hazelnuts)?***

For manufactured food, it is important that a generic name is provided, so that users in different countries can understand what type of product was analysed. And even in the same country, a brand name may not be sufficient to identify a food. If information is provided, answer YES, if not provided and the type of product is not certain, answer NO.

***Criterion 14. Was the COMMERCIAL NAME provided (e.g. Nutella)?***

For manufactured food, it is also important that the commercial name is provided. For example, when compilers have to aggregate data from different sources, it can be useful to know if the different data correspond to the same brand analyzed at different times (in this case, compilers may select the most recent data only), or to different brands. Commercial name and brand are criteria belonging to the category 'food description', but they may be relevant at a later stage, i.e. for aggregation. If a composite sample was analyzed, the commercial names of the primary samples should be given.

If information provided, answer YES, if not provided, answer NO.

**Criterion 15. If relevant, Was BRAND provided (e.g. Ferrero)?**

For manufactured food, it is also important that the brand name is provided. The brand can help compilers to better identify products because in some cases, commercial names are different from one country to another, whereas brands are generally worldwide.

If information provided, answer YES, if not provided, answer NO. For composite samples, a list of commercial names of the primary samples (Criterion 14) may be sufficient and an answer N/A be given.

**Criterion 16. Was relevant information on CONSUMER GROUP/DIETARY USE/LABEL CLAIM provided (e.g. enriched, low sodium, etc?)**

Manufactured food can be designed for a specific consumer group or a specific dietary use, and sometimes specific claims are made concerning the food. This criterion is described by LanguaL facet P. Compilers should only use the answer 'NOT APPLICABLE' when they are sure (i.e. when specified in the source or when they know the legislation applied in the country where the sampling was done) that no relevant label claim or dietary use etc is possible for the food / component pair considered.

If a specific LanguaL facet P can be assigned, answer YES. If the food is indexed CONSUMER GROUP NOT KNOWN, then the answer to this criterion is NO. If the food is indexed CONSUMER GROUP NOT APPLICABLE, answer N/A.

**C: FOR HOME MADE DISHES OR FOODS SOLD IN RESTAURANTS**

**Criterion 17. Was the COMPLETE NAME AND DESCRIPTION of the recipe provided?**

The description of the recipe should at least include the ingredients used and any other relevant information, excluding the cooking method, which should already have been evaluated (if relevant) in criterion 6.

If name and description of the recipe are provided and are satisfactory, answer YES. If name and description of the recipe are not provided or are not satisfactory, the answer to this criterion is NO. If the item is not a home made or restaurant dish, the answer to this criterion is NOT APPLICABLE, answer N/A.

**2.4. SCORING CATEGORY 'FOOD DESCRIPTION' USING ITS CRITERIA**

At the end of the evaluation of all the criteria for the category, the compiler should judge the level of the available information and assign an appropriate score. Criteria that are NOT APPLICABLE are not counted in the total score for the quality assessment. The number of YES criteria should be multiplied by 5 and then divided by the total number of criteria where the answer was either YES or NO. The result can then be rounded to the nearest integer to provide the score for this category. For example if 8 categories are YES, 2 NO and 2 N/A the quality score is  $(8*5)/10 = 4$ .

**3. COMPONENT IDENTIFICATION AND RELATED TERMS**

**3.1. GENERAL COMMENTS AND DEFINITION**

All components included in EuroFIR databases are clearly identified according to EuroFIR Standards and the related EuroFIR component thesaurus. In the process of quality assessment, compilers should be able to precisely assess if the component reported in the scientific publication used as a source refers to the same component that is included in the database. The work related to the quality assessment of the component



identification is closely linked to the work related to category “analytical method” and “analytical quality control”, especially since component identification may depend on the analytical method.

In addition to simply comparing component as presented in the paper and as presented in the EuroFIR component thesaurus, compilers should also pay attention to the unit (e.g. g, mg) and the matrix unit (e.g. per 100g) used to express the value in the paper. The unit and matrix unit should be unambiguous so that values can be converted from the unit and matrix unit used in the source to that used in a food composition database.

### 3.2. CRITERIA FOR ASSESSMENT

	COMPONENT IDENTIFICATION	YES	NO
1	Is the component described unambiguously?		
2	Is the unit unequivocal?		
3	Is the matrix unit unequivocal?		

### 3.3. COMMENTS ON CRITERIA FOR ASSESSMENT

#### **Criterion 1. *Is the component described unambiguously?***

The component should be clearly identified and it should match the definition used in the EuroFIR component thesaurus. The chemical identity of the component must have been correctly established, e.g. based on the analytical method used.

#### **Criterion 2. *Is the UNIT unequivocal?***

The value source should give the concentration of the component using a clear unequivocal unit. The unit does not need to match the unit used in the compiler’s databank because if the unit reported is clear the value can be re-calculated without affecting data quality.

#### **Criterion 3. *Is the matrix unit unequivocal?***

The value source should give the matrix unit of the component using a clear unequivocal unit.

### 3.4 SCORING CATEGORY ‘COMPONENT IDENTIFICATION’ USING ITS CRITERIA

At the end of the evaluation of all the criteria for the category component identification, the compiler should judge the level of the available information, and assign an appropriate score. If all three criteria are satisfied the score should be 5 but if 1 or more criteria are not satisfied the score should be 1. An intermediate score is not possible because if the component, unit or matrix unit are not unequivocal then the data is low quality for this category.

## 4. SAMPLING PLAN

### 4.1. GENERAL COMMENTS AND DEFINITIONS

Nomenclature for sampling in analytical chemistry has been defined by the IUPAC (International Union of Pure and Applied Chemistry) Compendium of Chemical Terminology, informally known as the IUPAC Gold Book. Its electronic version is freely available at <http://goldbook.iupac.org/T06284.html>. The definitions of this nomenclature were also presented by W. Horwitz, in Nomenclature for Sampling in Analytical Chemistry (Recommendations 1990). Pure Appl. Chem., Vol. 62, No. 6, pp. 1193-1208, 1990. IUPAC recommendations will be the basis (with slight adjustments) of the assessment for all categories related to sampling. EuroFIR sampling definitions are given in Appendix 1.

When the same publication concerns different types of food, different sampling plans may have been developed for these different types of food reported in that publication. The quality assessment of an original datum must be based only on the information concerning the sampling of the precise food being assessed.

### 4.2. CRITERIA FOR ASSESSMENT

	SAMPLING PLAN (FOR ALL TYPES OF FOODS)	YES	NO	N/A
1	Was the sampling plan developed to represent the consumption in the country where the study was conducted?			
2	Was the number of primary samples > 9?			
3	If relevant, were samples taken during more than one season of the year?			
4	If relevant, were samples taken from more than one geographical location?			
5	If relevant, were samples taken from the most important sales outlets (supermarket, local grocery, street market, restaurant, household etc)?			
6	If relevant, was more than one brand (for manufactured pre-packed product) or more than one cultivar (for plant foods) or subspecies (for animal foods) sampled?			

### 4.3. COMMENTS ON CRITERIA FOR ASSESSMENT

***Criterion 1: Was the sampling plan developed to represent the consumption in the country where the study was conducted?***

For original data interchange in the context of EuroFIR, the representativeness of the sampling plan has to be evaluated from the point of view of the country where the study was conducted. As a consequence, the country of origin of the compiler performing the assessment should not intervene in this assessment.

Criterion 1 is important because it allows rapid identification of data produced with sampling plans that could be inadequate for inclusion in a national food composition databank (e.g. some sampling plans can aim at studying the effect of an experimental diet or experimental growth conditions on the composition of a food).

A sampling plan can be developed statistically, covering several seasons, geographical locations, sales outlet and brands, but the purpose of the sampling plan can be different from representativeness of the whole national consumption (e.g. the sampling plan can concern foods consumed by elderly women with low income)

***Criterion 2: Was the number of primary samples >9?***

If the number of primary samples is >9, the data should be considered high quality in terms of the number of primary samples because 10 or more would be appropriate for most foods.

***Criterion 3: If relevant, were samples taken during more than one season of the year?***

For some foods, it is not relevant to sample in different seasons (for example, some foods are consumed only during one season, e.g. Christmas pudding, and some foods may have the same composition year long, e.g. soft drinks), while for some foods it may be relevant and very important to sample during more than one season. For that reason, relevance of season is considered during evaluation of this criterion.

For some foods, it is not the number of seasons for sampling that counts, but the relevance of the seasons themselves: when a food is consumed mainly in summer and autumn, sampling in winter and spring may not be relevant. Usually, manufactured pre-packed products are consumed all year, so it can be relevant to sample them at any time. Fruits and vegetables have seasonal peaks of production and consumption even if the majority of them are consumed most of the time - if there is only one season for sampling and if this season is the season of maximum consumption, then the answer to the criterion would be N/A. When the food is consumed during the period of sampling but is also equally consumed in other seasons, then the answer to the criterion should be NO.

***Criterion 4: If relevant, were samples taken from more than one geographical location?***

It would be difficult for compilers to assess the relevance of the choice of a region and the number of regions for food sampling in a country that is not their country of origin or residence. So, to be pragmatic, for all types of food the assessment will be based only on the number of geographical locations for sampling. In the specific context of EuroFIR original data quality assessment, a geographical location is for example a city, or a region (or Länder in Germany, for example), but it does not refer to the smallest entities such as an area of a city.

***Criterion 5: If relevant, were samples taken from the most important sales outlets (supermarket, local grocery, street market, restaurant, household...)?***

In order to be representative of the food consumed by the national population, it is advisable that the samples taken are as available to consumers. A representative sampling plan is not done by sampling the 'freshest' foods right at the end at the production line or in the field.

Most foods are sold in many different types of sales outlet, this being a potential source of variability in composition. Compilers should be aware of sales outlets that are important for each food. When samples are taken from more than one sales outlet that are not the most important, the answer to the Criterion should be NO. For some foods e.g. branded processed and packaged foods, different types of sales outlet may sell the same product and in that case this criterion is not relevant.

When a food is sold in only one type of sales outlet, then the answer to the criterion will be NOT APPLICABLE, since the issue is not relevant.

***Criterion 6: If relevant, was more than one brand (for manufactured prepacked product) or more than one cultivar (for plant foods) or subspecies (for animal foods) sampled?***

This criterion is relevant to generic foods, whether primary (for example fresh strawberries) or manufactured (for example pasteurised half-skimmed milk, canned beans). In this case, a relevant sampling plan should include the most consumed brands, cultivars or subspecies in the country of sampling.

When the data assessed concern a unique cultivar or subspecies described as such with LanguaL, then this criterion is NOT APPLICABLE.

#### **4.4. SCORING CATEGORY 'SAMPLING PLAN' USING ITS CRITERIA**

Depending on the type of foods considered, some criteria can be considered by compilers as more important than other criteria. Therefore, if a criterion which seems especially important to the compiler for the food considered is not fulfilled, whereas other minor criteria are, the compiler can decide to assign a low level to the category considered. The judgment made by the compiler can depend not only on the food considered but also on the nutrient and the amount of the nutrient in the food. For example, if the fish considered is a fatty fish that is consumed year round and if the constituent considered is total lipids, because the reproductive cycle has a strong influence on the content of total lipids in the muscle, then samples have to be taken in more than one season to be representative. These changes may also impact on other nutrients if the values are expressed as per 100g edible portion (i.e. if fat content is higher, nutrients related to fat content may also be higher and others be lower). It is not possible to define and weight criteria for assessment to take into account all type of foods and all nutrients so compilers should pay special attention to primary foods such as meat, fish, milk and milk products, fruit and vegetables. For these foods, season, geographical location and possibly sales outlet, may be considered as critical criteria, whereas for some manufactured, branded products (cookies, breakfast cereals, candies, chocolate spreads), it is generally less critical to sample all over the country.

It is important to remember that the assessment should be based on what is documented in the source rather than what could (and may) have been done, although, in some cases it may be possible to clarify details with the author.

## **5. NUMBER OF ANALYTICAL SAMPLES**

### **5.1. GENERAL COMMENTS AND DEFINITION OF SAMPLES (IUPAC)**

Definitions of sampling terms can be found in 'EuroFIR sampling Definitions' Appendix 1.

Analytical sample refers to the amount or volume of the test sample taken, from the primary or laboratory sample, for analysis, usually of known weight or volume. An analytical portion, of proper size for measurement of the concentration or other property of interest, can be taken from the analytical sample. Do not confuse **analytical samples** with **primary samples** (evaluated with the sampling plan) or with **replicate analyses** (evaluated with the analytical quality control).

### **5.2. CRITERIA FOR ASSESSMENT**

Assessment of the number of analytical samples is based on the question

Is the number of analytical samples 1, 2, 3, 4 or  $\geq 5$ ?

### 5.3. COMMENTS ON CRITERIA FOR ASSESSMENT

#### *Number of analytical samples*

It is obvious that the assessment of the number of analytical samples is totally arbitrary. Some situations (depending on the food, nutrient, amount of nutrient in the food and level of representativeness required) will require more analytical samples and some less! This category is considered important because analysis of a number of analytical samples allows measurement of variation around the mean value.

### 5.4. SCORING CATEGORY 'NUMBER OF ANALYTICAL SAMPLES'

When the number of analytical samples is not given in the publication, by default, it has to be considered for assessment as being minimal (i.e.1, so level 1 has to be chosen). If the number of analytical samples is  $\geq 5$ , the score should be 5. If the number of samples is 2 – 4 the score should be equal to the number of samples.

## 6. SAMPLE HANDLING

### 6.1. GENERAL COMMENTS

As mentioned earlier in the chapter regarding sampling plan, when referring to the IUPAC definition, sample handling is a part of the sampling plan itself, but will be considered in a distinct category.

As shown by W. Horowitz in Nomenclature for Sampling in Analytical Chemistry (Recommendations 1990). Pure Appl. Chem., Vol. 62, No. 6, pp. 1193-1208, 1990, sampling usually ends with the removal of the analytical portion from the analytical (or test) sample. If the laboratory sample is homogenous, then, the analytical portion can be taken directly from the laboratory sample (skipping the analytical sample step).

In the context of EuroFIR original data quality assessment, 'sample handling' correspond to all steps leading up to taking the analytical portion, excluding the steps considered in the categories 'sampling plan'. 'Sample handling' also excludes chemical operations done in order to extract or purify the analyte from the analytical portion (these chemical operations are to be considered in the assessment of the analytical method).

As the purpose of the analysis is to estimate the concentration of the analyte in the primary sample from the analyte in the analytical portion, sample handling should be conducted so as to preserve the concentration of the analyte during the different steps of sample handling.

Adequate sample handling conditions can depend on:

- The analyte: some may be sensitive to microbial activity, to oxidation (enhanced by light, heat, catalysts) - Greenfield and Southgate (2003) summarize in table 5.6 p80 the effects of sample storage on nutrient content and precautions required to minimize them
- The food or food matrix: if the matrix is sensitive to drying out, then the concentration of the analyte in the matrix may change over time if samples are not kept in sealed containers. Some food matrices will be very difficult to homogenize (e.g. biscuits with jam filling), others such as liquids, will require less precautions.
- Storage duration: if sample storage is very short (similar in time and conditions to storage by consumers), then it is probably not necessary to go through a process of freeze drying or freezing at very low temperature.

General recommendations were proposed by Greenfield and Southgate (p76 to 79) for appropriate sample handling and include secure storage in inert containers, cooling of samples with crushed ice or solid CO<sub>2</sub> with minimal headspace, minimum delay of storage, exclusion of possibilities of contamination during cutting, mincing or grinding food samples, use of plastic or Teflon coated tools.

## 6.2. CRITERIA FOR ASSESSMENT

It is not possible to describe, for each food and analyte, the list of critical points to be considered for adequate sample handling. It is up to compilers to select from the proposed list of potential hazards that could affect the nutrient content of foods the applicable criteria for the data assessed. EuroFIR Analytical Method Guidelines (<http://www.eurofir.org/eurofir/ValueDocumentationIII.asp>) considers the handling of samples, in relation to the analytical method and the component and can be referred to for more specific guidelines.

Sample handling including transportation and storage prior to taking the analytical portion can occur. The primary sample can be stored under some conditions while the analytical samples and analytical portions may be stored in other conditions,

	SAMPLE HANDLING	YES	NO	N/A
1	If relevant, were appropriate stabilization treatments applied (e.g. protection from heat/air/light/microbial activity)?			
2	Were the samples homogenized?			

## 6.3. COMMENTS ON CRITERIA FOR ASSESSMENT

### ***Criterion 1: If relevant, were appropriate stabilization treatments applied (e.g. protection from heat/air/light/microbial activity, etc)?***

This criterion is very much dependent on the type of component/food matrix considered. Some points are listed here as reminders of issues to be considered:

- **HEAT:** Greenfield and Southgate, 2003 p79, considers that storage in a frozen state is usually the minimum acceptable with preference given to –40°C or even –70°C. Storage at –20°C or –30°C is mentioned as acceptable for fat analyses.
- **AIR:** air contains dioxygen which can cause oxidation; air can also be a carrier of microbial organisms or particles. Depending on its water content and the water content of the food, air can also be responsible for water transfer. Protection against air in general can be achieved by storage in sealed container with at least minimum headspace or in vacuum packing.
- **LIGHT:** protection against light can be achieved by using aluminum bags for storage, or more simply, using closed cartons.
- **MICROBIOLOGICAL OR ENZYMATIC ACTIVITY:** some foods may naturally contain microbial organisms or particles (enzymes) which can modify the level of a nutrient in a food. Greenfield and Southgate, 2003 p79 indicate that sugars and vitamin C can be lost and folates deconjugated. Protection from deconjugation of folates can be obtained by addition of ascorbate).

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- Damages that can occur due to MICROBIOLOGICAL OR ENZYMATIC CONTAMINATION can be comparable to damages due to microbiological or enzymatic activity pre-existing in food.
- Microbiological or enzymatic contamination can occur because of inadequate cleaning procedures or inadequate application of the procedures.
- CHEMICAL CONTAMINATION can also be due to inadequate cleaning procedures or inadequate application of them. The use of Teflon coated tools can prevent chemical contamination. The operations of mixing, grinding, homogenization can be critical steps for chemical contamination.

If compilers judge that protection from these potential damages would have no impact on the level of the analyte in the food considered, they can choose the answer 'NOT APPLICABLE'.

As mentioned earlier, if sample transportation and storage time is short enough (similar in time and conditions to consumer application), then it is probably not necessary to take special measures to protect the analyte. Depending on the analyte, food matrix, duration of transportation and storage steps, precautions other than those described can be necessary.

#### ***Criterion 2: Were samples homogenized?***

Even when considering some liquids or other apparently homogenous primary samples, homogenization is necessary before taking any portion of material. The importance of homogenization depends on the food and nutrient considered: for a composite dish such as sandwiches or couscous (with semolina, vegetables, meat and gravy), homogenization is essential. If the food really does not need homogenization (water, soft drinks, whisky), then answer N/A.

Verification of homogenization is ideal, but this requires additional analyses and expense, which is rarely feasible when producing food composition data. Therefore, the guidelines proposed here do not consider that verification or validation of homogenization is compulsory.

### **6.4. SCORING CATEGORY 'SAMPLE HANDLING' USING ITS CRITERIA**

If compilers judge that the criteria have no impact on the level of the analyte in the food considered, they can choose the answer 'NOT APPLICABLE' for these criteria. When sample stabilization is necessary, but it is not described in the data source, the answer to this criterion should be NO. If the answer to either criterion 1 or 2 is NO then the category score should be 1 (low quality). If the answer to both criteria is Yes or one YES and one N/A, the score should be 5 (high quality).

## **7. ANALYTICAL METHOD**

### **7.1. GENERAL COMMENTS**

For EuroFIR data interchange, it was decided that the analytical method used to obtain a value in the source document will be described using a method type code from the EuroFIR Method Type Thesaurus and a method indicator descriptor from the EuroFIR Analytical Methods Thesaurus (e.g.: chromatography, HPLC). It was also decided that additional information on the key steps of an analytical method will be recorded in text fields as Methods Specifications in food composition databases and in the EuroFIR interchange files.

Some tools are currently developed within EuroFIR to link analytical methods and components and to define guidelines for assessment of analytical methods: Analytical method guidelines for each component will

describe appropriate methods of analysis (including official methods) for that component and will include the key method steps to consider for assessment. The documents also indicate criteria for analytical performance and quality control and will enable the compiler to decide whether or not an appropriate analytical method has been used. EuroFIR Analytical Method Component Guidelines are available at <http://www.eurofir.org/eurofir/ValueDocumentationIII.asp>

## 7.2. CRITERIA FOR ASSESSMENT

	ANALYTICAL METHOD	YES	NO
1	Does the analytical method used in the source match the list of appropriate analytical methods given in the guidelines for analytical methods?		
2	Are the key method steps appropriate for the method described?		

## 7.3. COMMENTS ON CRITERIA FOR ASSESSMENT

**Criterion 1: Does the analytical method used in the source match the list of appropriate analytical methods given in the guidelines for analytical methods?**

This assessment should be based on the EuroFIR Analytical Method Guidelines for each component, taking into account food matrix where applicable.

**Criterion 2: Are the key method steps appropriate for the method described?**

This assessment should be based on the EuroFIR Analytical Method Guidelines for each component, taking into account food matrix where applicable.

## 7.4. SCORING CATEGORY 'ANALYTICAL METHOD' USING ITS CRITERIA

If the headline method used is appropriate and all the key method steps are appropriate the score for this category is 5 (high quality). If the headline method used is not appropriate the score should be 1 (low quality) and if the headline method is appropriate but key method steps are not appropriate or unclear the score should be between 2 and 4.

## ANALYTICAL QUALITY CONTROL

### 8.1. GENERAL COMMENTS

The analytical method guidelines documents describe analytical performance standards for each nutrient and for each type of appropriate analytical method. The guidelines describe the use of analytical portion replicates, reference materials and accreditation and performance testing standards.

### 8.2. CRITERIA FOR ASSESSMENT

	ANALYTICAL QUALITY CONTROL	YES	NO	N/A
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1	Were analytical portion replicates tested?			
2	Was the laboratory accredited for this method or was the method validated by performance testing?			
3	If available, was an appropriate reference material or a standard reference material used?			

### 8.3. COMMENTS ON CRITERIA FOR ASSESSMENT

#### ***Criterion 1: Were analytical portion replicates tested?***

To satisfy this criterion, analytical portion replicates need to be tested (e.g. duplicate or triplicate determination for each sample ID). Analytical portion is defined in Appendix 1.

#### ***Criterion 2: Was the laboratory accredited for this method or was the method validated by performance testing?***

National accreditation usually applies to both analytical method and matrix. To satisfy this criterion, details of accreditation or method validation should be provided. EuroFIR method guidelines give details of accreditation and performance testing schemes that are available for each component.

#### ***Criterion 3: If available, was an appropriate reference material or a standard reference material used?***

Appropriate reference materials are described in the method guidelines documents.

### 8.4. SCORING CATEGORY 'ANALYTICAL QUALITY CONTROL' USING ITS CRITERIA

If all three criteria are YES then the score should be 5 and if all three criteria are NO the score should be 1. If a laboratory is accredited for a method in the food matrix studied, then the score should be at least 3 because even if number of analytical portion replicates, performance testing results or reference materials are not stated, accreditation would imply that the quality of performance is correct.

## 9. APPLICABILITY TO OTHER DATA SOURCES

### 9.1. GENERAL COMMENTS

The EuroFIR quality assessment system is designed for evaluation of data from original scientific literature but may also be applied to other sources of data, e.g. product labels.

The food description may be scored by making assumptions based on list of ingredients on the food label and by the compiler's knowledge of the relevant food-processing. Component identification should be assumed to be acceptable, since it should comply with food labelling regulations (*Council Directive 90/496/EEC of 24 September 1990 on nutrition labelling for foodstuffs*). The other categories can only be scored as low quality because there is no information available.

If these categories are scored as low quality then the overall quality index will also be low. If it were decided to compute a Confidence Code, consideration should be given to using a specific Confidence Code for data from industry. This code would imply that the data has not been quality assessed by EuroFIR and responsibility for data quality rests with the product manufacturer in accordance with EU labelling regulations.

## 10.0 SUMMARY OF CATEGORIES AND CRITERIA

### FOOD DESCRIPTION

#### A. FOR ALL TYPES OF FOOD

Was the source of the food or of the main ingredient provided (best if scientific name included, cultivar/variety, genus/species, etc)?

Was the part of plant or part of animal clearly indicated?

If relevant, was the analyzed portion described and is it clear if the food was analyzed with or without the inedible part?

If relevant, was the extent of heat treatment provided?

If the food was cooked, were satisfactory cooking method details provided?

Was relevant information on treatment applied provided?

Was information on preservation method provided?

If relevant, was information on packing medium provided?

If relevant, was information about the origin of food provided?

If relevant, was the month or season of production indicated?

Was the moisture content of the sample measured and the result given?

#### B: FOR MANUFACTURED PREPACKED FOOD ONLY

Was the generic name provided (e.g. chocolate paste with hazelnuts)?

Was the commercial name provided (e.g. Nutella)?

Was brand provided (e.g. Ferrero)?

Was relevant information on consumer group/dietary use/label claim provided?

#### C: FOR HOME MADE DISHES OR FOODS SOLD IN RESTAURANTS

Was the complete name and description of the recipe provided?

### COMPONENT IDENTIFICATION

Is the component described unambiguously?

Is the unit unequivocal?

Is the matrix unit unequivocal?

### SAMPLING PLAN

Was the sampling plan developed to represent consumption in the country where the study was conducted?

Was the number of primary samples >9?

If relevant, were samples taken during more than one season of the year?

If relevant, were samples taken from more than one geographical location?

If relevant, were samples taken from the most important sales outlet (supermarket, local grocery, street market, restaurant, household...)?

If relevant, was more than one brand (for manufactured pre-packed product) or more than one cultivar (for plant foods) or subspecies (for animal foods) sampled?

### NUMBER OF ANALYTICAL SAMPLES

Is the number of analytical samples 1, 2, 3, 4, or  $\geq 5$ ?

### SAMPLE HANDLING

If relevant, were appropriate stabilization treatments applied (e.g. protection from heat/air/light/microbial activity)?

Were the samples homogenized?

### ANALYTICAL METHOD

## D3.4 Guidelines and work plan on updating food composition tables

Does the analytical method used in the source match the list of appropriate analytical methods given in the EuroFIR guidelines for analytical methods?

Are the key method steps appropriate for the method described, considering the EuroFIR guidelines as a reference?

### **ANALYTICAL QUALITY CONTROL**

Were analytical portion replicates tested?

Was the laboratory accredited for this method or was the method validated by performance testing?

If available, was an appropriate reference material used?

## **10.1 SUMMARY OF SCORING CATEGORIES**

### **FOOD DESCRIPTION**

Scoring: number of criteria answered positively \* 5 / total number of criteria judged relevant

Possible scores: 1, 2, 3, 4 or 5 (after rounding)

### **COMPONENT IDENTIFICATION**

Scoring: arbitrary (no calculation can be done)

Possible scores: 5 or 1 only (1 if one or more criteria are not satisfied)

### **SAMPLING PLAN**

Scoring: arbitrary (no calculation can be done), some criteria may have more weight than others

Possible scores: 1, 2, 3, 4 or 5

### **NUMBER OF ANALYTICAL SAMPLES**

Scoring: unambiguous

Possible scores: 1, 2, 3, 4 or 5

### **SAMPLE HANDLING**

Scoring: arbitrary (no calculation can be done)

Possible scores: 5 or 1 only (1 if one or more criteria are not satisfied)

### **ANALYTICAL METHOD**

Scoring: arbitrary (no calculation can be done)

Possible scores: 1, 2, 3, 4 or 5

### **ANALYTICAL QUALITY CONTROL**

Scoring: arbitrary (no calculation can be done)

Possible scores: 1, 2, 3, 4 or 5 (3 is a minimum when the lab is accredited)

## APPENDIX 1 EUROFIR SAMPLING DEFINITIONS

Sampling and analysis are key components of quality evaluation of food composition data. The proposed EuroFIR quality assessment system will include assessment of sampling and analysis and it is essential that compilers and evaluators interpret information from value references in the same way. Recent EuroFIR meetings (WP2.4, Iceland, May 2007 and WP1.8/1.3, Paris, June 2007) have highlighted the problem of consistent interpretation of sampling and analysis methods.

The term 'sample' as used in analytical chemistry should be applied exclusively to represent a portion of material selected in some manner to represent a larger body of material. The result obtained from the sample is an estimate of the quantity or concentration of a constituent of the parent material. The use of a sample always introduces an uncertainty.

IUPAC definitions recommend confining the use of the term SAMPLE to its statistical concept. If a potential exists for sampling error due to the heterogeneity of a population, the term SAMPLE with an appropriate modifier to indicate its position in the sampling scheme should be used (i.e., increment, primary sample, secondary sample, laboratory sample, test/analytical sample).

'Nomenclature for sampling in analytical chemistry (Recommendations 1990)', contains definitions of a wide range of sampling terms. The following terms may be useful for value documentation and quality assessment in EuroFIR datasets:

- **Sample**

A portion of material selected from a larger quantity of material.

The term sample implies the existence of a sampling error. If there is no or negligible sampling error, the portion removed is an analytical (test) portion or aliquot.

- **Sampling Plan**

A predetermined procedure for the selection, withdrawal, preservation, transportation, and preparation of the portions to be removed from a population as samples.

- **Lot**

A quantity of material which is assumed to be a single population for sampling purposes.

- **Batch**

A quantity of material which is known or assumed to be produced under uniform conditions.

The distinction between a lot and a batch relates to knowledge of production history – a lot may consist of one or more batches.

- **Unit**

Each of the discrete, identifiable portions of material suitable for removal from a population as a sample or as a portion of a sample, and which can be individually considered, examined, or tested, or combined.

- **Replicate sample**

Multiple samples taken under comparable conditions. This selection may be accomplished by taking units in time or space.

Often the only thing replicated is the act of taking the physical sample.

- **Primary sample**

The collection of one or more units initially taken from a population.

- **Laboratory sample**

The sample or subsample sent to or received by the laboratory.

- **Analytical (test) sample**

The sample, prepared from the laboratory sample, from which analytical portions are removed for testing or for analysis.

- **Analytical portion**

The quantity of material, of proper size for measurement of the concentration or other property of interest, removed from the sample.

This portion may be taken directly from the primary sample or from the laboratory sample if no preparation is required (e.g. with liquids) but usually it is taken from the analytical sample.

## HIERARCHY OF TERMS

The primary sample delivered to the laboratory is the *laboratory sample*. If it is homogenous (e.g. a beverage), a portion may be removed directly for analysis as the *analytical portion*. If the laboratory sample requires preparation the prepared material is the *analytical sample*, from which an *analytical portion* is removed for analysis.

Sampling usually ends with the removal of the analytical portion from the analytical sample. Methods of analysis are usually designed so that any further subdividing (aliquoting) introduces negligible sampling error.

## BASIS DOCUMENTATION FOR QUALITY ASSESSMENT

The BASIS data evaluation form collects the following information for use in quality assessment:

- **Primary sample year**

Year the primary sample was collected

- **Primary sample unit size**

Amount of material comprising each unit of the primary sample (see IUPAC definition above), e.g. weight of 1 bottle of wine, weight of a frozen meal, weight of an ice-cream, weight of one bunch of grapes

- **Number of primary sample units**

The number of units comprising the primary sample (see IUPAC definition above).

- **Analytical portion size**

Amount of material comprising the analytical portion (see IUPAC definition above).

- **Number of analytical portions**

See IUPAC definition above.

- **Number of analytical portion replicates**

The number of analyses carried out on each analytical portion

### **SAMPLING DOCUMENTATION IN EUROFIR DATASETS**

Since sampling is an important aspect of quality assessment, the sampling details recorded by BASIS should be included in the EuroFIR standard for value documentation.

|

## 11. EXAMPLES

In this section we will discuss a few examples of quality assessment of scientific papers. For each paper the example will concentrate on one specific component/food pair.

### 11.1 EXAMPLE 1

**Paper:** Sahan Y, Basoglu F, Gucer S. ICP-MS analysis of a series of metals (Namely: Mg, Cr, Co, Ni, Fe, Cu, Zn, Sn, Cd and Pb) in black and green olive samples from Bursa, Turkey. Food Chemistry 105 (2007) 395-399.

**Value assessed:** Zinc in green olives = 10.58 mg/kg

#### Food Description

CRITERION	YES	NO	N/A	NOTE
Is the food group (e.g. beverage, dessert, savory snack, pasta dish) known?	X			
Was the <b>food source</b> of the food or of the main ingredient provided (best if scientific name included, variety, species, cultivar)?	X			
Was the <b>part of plant or part of animal</b> clearly indicated?	X			
If relevant was the <b>analyzed portion</b> described and is it stated explicitly if the food was analyzed with or without the inedible part?	X			
If relevant, was the extent of <b>heat treatment</b> provided?			X	
If the food was cooked, were satisfactory <b>cooking method</b> details provided?			X	
Was relevant information on <b>treatment applied</b> provided?	X			Alkalized, fermented
Was information on <b>preservation method</b> provided?	X			Preserved in brine
If relevant, was information on <b>packing medium</b> provided?			X	Not stated – may be in brine
If relevant, was information about the <b>origin of the food</b> provided?	X			Bought in Bursa, Turkey
If relevant, was the <b>month or season</b> of production indicated?			x	Probably not relevant for Zn
Was the <b>moisture</b> of the sample measured and the result given?		X		

Seven positive answers were given out of 8 possible answers (four were considered Not Applicable).

To standardize the scoring system, the 7/8 of the maximum score were calculated as  $(7 \times 5) / 8 = 4.4$

**Food Description Score = 4**

**Component Identification**

Criterion	Yes	No	N/A	Note
Does the component, described in the publication, match the component as described in the databank?	x			
Is the unit unequivocal?	x			g
Is the matrix unit unequivocal?	x			W (/kg edible portion)

All criteria received a YES answer. **Component Identification Score = 5**

**Sampling Plan**

Criterion	Yes	No	N/A	Note
Representative sampling plan		x		
Number of primary samples >9	x			n = 46
Seasonal sampling (if relevant)			x	Not relevant for Zn?
Geographic sampling (if relevant)		x		
Different sales outlets (if relevant)		x		Market suppliers different to large retailers?
Different brand/cultivar/subspecies (if relevant)	x			25 brands

One criterion, seasonal sampling, was considered not relevant for zinc olives. Two criteria out of the remaining five obtained a positive answer. The score was therefore calculated as  $(2*5)/5 = 2$

**Sampling Plan Score = 2**

**Number of Analytical Samples**

The number of analytical samples is >5 therefore **Number of Analytical Samples score = 5**

**Sample Handling**

Criterion	YES	NO	N/A	
If relevant, was appropriate treatment for <b>stabilization</b> applied (e.g. protection from heat/air/light/microbial activity)	X			Steps taken to avoid metal and dust contamination
Were the samples homogenized?		X		

Samples were protected from contamination and but were not homogenized so **Sample Handling Score = 1**



**Analytical Method**

Criterion	YES	NO	N/A	
Does the <b>analytical method</b> used in the source match the list of appropriate analytical methods given in the guidelines for analytical methods?	X			ICP-MS
Are the <b>key analytical method steps</b> appropriate for the method described?	X			

The method and key method steps are both appropriate so the **Analytical Method score = 5**

**Analytical Quality Control**

Criterion	YES	NO	N/A	
Were <b>analytical portion replicates</b> used?		X		
Was the <b>laboratory accredited</b> for this method or was the method <b>validated</b> by performance testing?		X		
If available, was an appropriate <b>reference material</b> used?		X		

The answer to all three criteria was No so the category is low quality (score = 1)

**Analytical Quality Control score = 1**

**Total Quality Index = 4 + 5 + 2 + 5 + 1 + 5 + 1 = 23**

**Normalized Quality Index (on a scale from 0-10):**

$$= \frac{(23-7)}{(35-7)} \times 10 = 5.7$$

**Annex 5: The main food groups (in bold) and food sub-groups used in Optifoods**

<p><b>Added fats</b></p> <ul style="list-style-type: none"> <li>• Butter, ghee, margarine (unfortified)</li> <li>• Margarine (fortified)</li> <li>• MyFood_Special Fats</li> <li>• Other added fats</li> <li>• Red palm oil</li> <li>• Vegetable oil (fortified)</li> <li>• Vegetable oil (unfortified)</li> </ul>	<p><b>Added sugars</b></p> <ul style="list-style-type: none"> <li>• Honey/syrup/nectar</li> <li>• Myfoods_Special sugars</li> <li>• Sugar (fortified)</li> <li>• Sugar (unfortified)</li> </ul>
<p><b>Bakery &amp; breakfast cereals</b></p> <ul style="list-style-type: none"> <li>• Enriched/fortified bread, whole or refined grain</li> <li>• MyFoods_Special Bakery</li> <li>• Pancakes, waffles, scones, crackers</li> <li>• Ready-to-eat cereals, fortified</li> <li>• Ready-to-eat cereals, unfortified</li> <li>• Refined grain bread, unenriched/unfortified</li> <li>• Sweetened bakery products, enriched/fortified</li> <li>• Sweetened bakery products, unenriched/unfortified</li> <li>• Whole grain bread, unenriched/unfortified</li> </ul>	<p><b>Beverages</b></p> <ul style="list-style-type: none"> <li>• Alcoholic beverages</li> <li>• Brewed coffee</li> <li>• Brewed tea, herbal infusions</li> <li>• Cereal-based beverages</li> <li>• Chocolate beverages or powder mix</li> <li>• Fortified beverages or powder mix</li> <li>• Fruit/dairy containing beverage mixtures</li> <li>• Juices-commercial pure other</li> <li>• Juices-commercial pure vitamin A source</li> <li>• Juices-commercial pure vitamin C rich</li> <li>• MyFoods_Special Beverages</li> <li>• Other Beverages</li> <li>• Sugar-sweetened beverages</li> </ul>
<p><b>Composites</b></p> <ul style="list-style-type: none"> <li>• Broths</li> <li>• Grain products w/ fillings (sandwiches, burgers, etc)</li> <li>• Main meal recipes</li> <li>• MyFoods_Special composites</li> <li>• Other composites</li> <li>• Salads w/mixed food group ingredients</li> <li>• Soups</li> </ul>	<p><b>Dairy products</b></p> <ul style="list-style-type: none"> <li>• Cheese</li> <li>• Cream, sour cream</li> <li>• Flavoured milk (unfortified)</li> <li>• Fluid or powdered milk (fortified)</li> <li>• Fluid or powdered milk (unfortified)</li> <li>• Infant formula (fortified)</li> <li>• MyFoods_Special Dairy</li> <li>• Other dairy, excluding butter</li> <li>• Sweetened dairy products/desserts</li> <li>• Yoghurt, solid &amp; drinkable</li> </ul>
<p><b>Fruits</b></p> <ul style="list-style-type: none"> <li>• MyFoods_Special Fruits</li> <li>• Other fruit</li> <li>• Vitamin A source fruit</li> <li>• Vitamin C rich fruit</li> </ul>	<p><b>Grains &amp; grain products</b></p> <ul style="list-style-type: none"> <li>• Enriched/fortified grains &amp; products, whole or refined</li> <li>• MyFoods_Special Grains</li> <li>• Refined grains &amp; products, unenriched/unfortified</li> <li>• Whole grains &amp; products, unenriched/unfortified</li> </ul>
<p><b>Human milk</b> Breastmilk</p>	<p><b>Miscellaneous</b></p> <ul style="list-style-type: none"> <li>• Condiment, herbs, spices</li> <li>• MyFoods_Special Miscellaneous</li> <li>• Other miscellaneous</li> </ul>

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<p><b>Legumes, nuts &amp; seeds</b></p> <ul style="list-style-type: none"> <li>• Cooked beans, lentils, peas</li> <li>• MyFood_Special Legumes</li> <li>• Nuts, seeds, &amp; unsweetened products</li> <li>• Soybeans &amp; products</li> <li>• Sweetened legumes, nuts, seed products</li> </ul>	<p><b>Meat, fish &amp; eggs</b></p> <ul style="list-style-type: none"> <li>• Blood, blood sausage</li> <li>• Eggs</li> <li>• Fish without bones</li> <li>• Insects, grubs</li> <li>• MyFoods_Special Meats</li> <li>• Organ meats</li> <li>• Other animal parts</li> <li>• Pork</li> <li>• Poultry, rabbit</li> <li>• Processed meat</li> <li>• Red meat</li> <li>• Reptiles</li> <li>• Seafood</li> <li>• Small whole fish with bones</li> </ul>
<p><b>Savoury snacks</b></p> <ul style="list-style-type: none"> <li>• MyFood_Special Savoury Snacks</li> <li>• Savoury snacks, salted, spiced foods</li> </ul>	<p><b>Sweetened snacks &amp; desserts</b></p> <ul style="list-style-type: none"> <li>• MyFoods_Special Sweetened Snacks &amp; Desserts</li> <li>• Other sweetened desserts (gelatines, non-dairy ice)</li> <li>• Sweet snack foods (candies, chocolates)</li> </ul>
<p><b>Special fortified products</b></p> <ul style="list-style-type: none"> <li>• Fortified special biscuits</li> <li>• Lipid-based nutrient supplement</li> <li>• Multiple micronutrient powders</li> <li>• MyFood_Special Fortified products</li> <li>• Other special fortified products</li> </ul>	<p><b>Starchy roots &amp; other starchy plant products</b></p> <ul style="list-style-type: none"> <li>• MyFoods_Special Starchy Plant Foods</li> <li>• Other starchy plant foods</li> <li>• Vitamin A source starchy plant foods</li> <li>• Vitamin C rich starchy plant foods</li> </ul>
<p><b>Vegetables</b></p> <ul style="list-style-type: none"> <li>• MyFoods_Special Vegetables</li> <li>• Other vegetables</li> <li>• Vitamin A source dark green leafy vegetables</li> <li>• Vitamin A source other vegetables</li> <li>• Vitamin C rich vegetables</li> </ul>	