EUROFIR PROJECT – A KEY ROLE IN CREATION AND COMPILING OF BULGARIAN FOOD COMPOSITION DATABASE

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ABSTRACT

The food chemical composition databases provide a detailed information on nutritional composition, derived from the specific needs of each country. Data sources and their quality should be documented for each nutrient and in accordance with international and regional standards. The collaboration with leadership of the EuroFIR Project and contacts with various representatives of the participating countries contributed to capacity development in our country in a following way: EuroFIR workshops, training courses, self training.Thus, only helped the professional growth of staff to learn the basic criteria for correct description, identification of foods and establishment and compiling of Bulgarian food chemical composition database. Bulgarian Food Composition Data Base includes 828 foods with 37 nutrients for each food:

- *English food names and Bulgarian food names*
- *No Scientific names*
- *828 food codes*
- *Original Food Group*
- *Nitrogen to protein conversion factor (NCF) and the Fatty acid conversion factor (FACF) were provided for a number of foods*
- *LanguaL food description - for all foods*

Contribution/ Originality

This study documents the steps in the construction of a new, modern food chemical composition database of Bulgarian foods, relying on rules and requirements in the collection, identification and description of the foods according to European standard EuroFIR.

1. INTRODUCTION

EuroFIR (European Food Information Resource) is a non-profit international Association, which supports use of existing food composition data and future resources through cooperation and harmonization of data quality [1], functionality and global standards. The European Food Information Resource Network project (EuroFIR - 2005-2010) is a Network of Excellence (NoE)

comprising of 48 partners from academia, research organizations and small-and-medium size enterprises (SMEs) in 27 countries. The project is funded by the European Community's Sixth Framework Programme (Priority 5: Food Quality and Safety; Contract no FP6-513944). The purpose of the Association is the development, management, publication and exploitation of food composition data, and the promotion of international cooperation and harmonization through improved data quality, food composition database search ability and standards, for example, with the European Committee for Standardization (CEN) on the standard for food data [2]. Other work includes that on ethnic [3] and traditional foods [4] and critical evaluation of data on nutrients [5]. The EuroFIR Network [6] and its main objective are delivering a comprehensive, coherent and validated databank for nutrients and bioactive compounds.

1.1. The Project Objectives of EuroFIR are:

EuroFIR provides the first comprehensive pan-European food information resource,using state-of-the-art database linking, to allow effective management, updating, extending and comparability. This is an essential underpinning component of all food and health research in Europe [7] and provides:

- the building blocks for health surveys, medical research and interventions, and health policies based on them;

- information for public health government bodies and regulators to educate their populations about health and food heritage;

- laboratory and data analysis best practices to ensure data quality, reliability and comparability;

- data that enables food industry to produce healthier foods, and obtain a larger share of the international food market;

- information to consumers – via labels and via printed/electronic information – to enable them to play a more active role in protecting and enhancing their health.

EuroFIR also identifies and provides a new information for missing data for nutrients and biologically active compounds with putative health effects, and all food groups including traditional and ethnic foods. International epidemiological studies and multi-centre research have highlighted the need for harmonization and standardization of food composition data produced at a national level [8]. In addition to forming the basis of nutritional labeling, food composition data has a number of other uses within the food manufacturing industry, including the optimization of product composition and supporting health claims substantiation [9-13].

There has been a growing interest in food composition data [14] interchange and harmonization, both within Europe and further afield. Based on earlier work [15], EuroFIR has developed a framework for the documentation of food composition data, which formed the basis of a new European Standard [16]. National compilers within the EuroFIR consortium have undertaken documentation of their datasets, according to the value documentation [17] framework developed.

2. VALUE DOCUMENTATION – THREE STEP PROCESS:

- **Food description**
  - LanguaL indexing
  - EuroFIR Classification
- **Value Reference Documentation**
- **Full Value Documentation**

For each value, document the bibliographic reference:

  - Original Reference Code
  - Reference Type (THS)
  - Acquisition Type (THS)
  - Citation

Title, authors, publication date, original language …

All mandatory fields in EuroFIR Technical Annex [16]: It concerns the following entities:

  - *Food*
  - *Component*
  - *Value*
  - *Reference*

- **Food**
  - Original Food name
  - English Food name
  - Scientific name (if applicable)
  - LanguaL indexing
  - [nitrogen-to-protein conversion factor (NCF)]
  - [fatty acid conversion factor (FACF)]
  - [Remarks]*

* Not mandatory

- **Component**
  - Original Component Code
  - Original Component Name
  - EuroFIR Component Identifier
  - [English Component Name]*
  - [Remarks]*

* Not mandatory

- **Value**
  - Original Component Code
  - Original Food Code
  - Selected Value
  - Unit (THS)
  - Matrix Unit (THS)

- Value Type (THS)
- Acquisition Type (THS)
- Method Type (THS)
- Method Indicator (THS)
- Method Parameter (NCF/FACF)
- Value Reference
- [Date of generation]*
- [Date of evaluation]*
- [Remarks]*

* Not mandatory

- **Reference**
    - Original Reference Code
    - Reference Type
    - Acquisition Type
    - Citation
    - *title, authors, publication date, original language, …*

LanguaL stands for **"Langua aL**imentaria" or "language of food". It is an automated method for describing, capturing and retrieving data about food [18]. LanguaL [19] has been developed in collaboration with the US National Cancer Institute (NCI), and, more recently, its European partners, notably in France, Denmark, Switzerland and Hungary. Since 1996, the European LanguaL Technical Committee has administered thethesaurus. The thesaurus provides a standardised language for describing foods [18].

LanguaL is based on the concept that:

• Any food (or food product) can be systematically described by a combination of characteristics.

• These characteristics can be categorised into viewpoints and coded for computer processing

• The resulting viewpoint/characteristic codes can be used to retrieve data about the food from external databases [20].As constructed, LanguaL is a multilingual thesaural system using facetted classification. Each food is described by a set of standard, controlled terms chosen from facets characteristic of the nutritional and/or hygienic quality of a food.

3. BULGARIAN FOOD COMPOSITION DATABASE

Bulgaria is represented by National Center for Public Health and Analysis- a general contractor as undertaken in the project, by department "Food Chemical Composition".

3.1. Food Table

The Food entity is required and used to describe the foods in the database [21] and any interchange package. The original food names in Bulgarian language and in English, are included in the FOOD entity to keep the FoodNames (synonyms) entity optional.

Extraction of **828** food codes and names for the Bulgarian data set was straightforward and did not present any major problems. Food Codes, English food names and Bulgarian food names are extracted. In the beginning of 2009, 98 new foods from Bulgarian database are described according to the requirements of the European standard.

On 23 April 2009, the data set contains 98 foods, all of which were in the original food list. The data set also contains Bulgarian food name in Cyrillic characters in addition to the Bulgarian food name transcribed in Roman characters. This new food list is therefore used to update food names and conversion factors in the FOOD table.

The Nitrogen to protein conversion factor (NCF) and the Fatty acid conversion factor (FACF) are provided for a number of foods. When these factors were not known, the field was filled by "N".

The Original Food Group field has been updated. These food group codes have therefore been used to update the FOOD table in the Access database for eSearch.

3.2. Langual Description Table

LanguaL food description is done and all of the food identifiers (IDs) in the Bulgarian Excel file match food IDs in the LanguaL file.

3.3. Components Table

The COMPONENT table includes the component codes, component names in original language and in English, as well as corresponding EuroFIR component identifiers.

3.4. Value Table

The VALUE entity is mandatory. A field called "Selected Value" is provided to store a single figure as the best representation of the statistic or other compositional information (e.g. logical zero, a standard fat content in milk or estimated from a related food), based on the decision of a data compiler. For some components such as Energy and Vitamin A activity, the value have been calculated from the values of contributing components. A number of statistical parameters are also be included (e.g. n, mean, median, minimum, maximum, standard deviation).

According the EuroFIR Standard [16], the VALUE table should contain at least Food ID, Component ID, Unit, Matrix unit, and selected value, Value Type, Acquisition Type, Method Type and Method Indicator.

In 2009, the data set contained 3626 records in EuroFIR format, which were appended to the VALUE table. Note: The FOOD table contains records for 828 items, but only 98 of these have nutrient values in the present data set.

> ➢ All values are expressed with 3 significant figures. For future updates, we should examine, case by case and according to the precision of the analytical method, whether the number of significant figures should be 3 or 2 or just one.

➢ Method Type + Method Indicator combinations shown in Table 1 are more consistent in the present version of the data set, and can therefore be published. However, it would improve the quality of the database.

Table-1. Method Specification table

Method Type	METYPGB	Method Indicator	TERM	Count	Suggested Method Type
A	analytical result(s)	MI0004	Ingredient level calculation procedure	1	R
A	analytical result(s)	MI0183	Carbohydrate, available, calculated by difference	1	S
AG	analytical, generic	MI0207	Fatty acids, total fatty acids calculated from total fat	3	T
AG	analytical, generic	MI1049	Schoorl method	2	A
G	calculated as aggregate food item	MI0131	Carbohydrate, total, calculated by difference	1	S
	Continued…..				

In Bulgarian data set some of the **Method Type** and **Method Indicator** codes have been updated. The VALUES table in the Access database for eSearch has been updated.

3.5. REFERENCE Table

The REFERENCE entity is required and holds bibliographical information of various publication types. Properties linking to the Reference entity are included in various entities such as the FOOD, VALUE and METHOD SPECIFICATION entities.

Bulgarian data set lists 27 references and includes the new suggested RefIds.

3.6. Reference_Link Table

The REFERENCE_LINK table documents the source of the data in the data set. The table consists of 3 fields/columns: food code, component code, reference codeThe current data set contains a new REFERENCE_LINK table (table 2) with 3805 records, which is imported into the Access database. All records in the VALUES table have at least one reference documented; 179 of the values had 2 references. EuroFIR has encouraged and supported national food database compilers in making data available online. Over 20 European databases are now available online. EuroFIR is also developing a facility that will allow users to search data across a range of food composition databases and thus improve accessibility to international data.

The EuroFIR eSearch platform [22] consists of a network of servers based in a distributed configuration using client – mediator – server applications. The prerequisite of the EuroFIR platform is that the national databases communicate between themselves and with the EuroFIR eSearch using a standardized XML template, the EuroFIR Food Data Transport Package (FDTP), for data transfer. In 2010, [22], 26 national datasets are currently connected including Bulgaria. The following table 3 shows the current status:

Table-3. Hosted Datasets

Current Short name	Current Name	Status	Web Service
AESAN/BEDCA v1.0	Spanish Food Composition Database. BEDCA v.1.0	Connected	Own
AT FCDB 2010	Austrian Food Composition Database 2009	Connected	Hosted
BG NCPHP 2009	Bulgarian Food Composition Database 2009	Connected	Hosted

Continued ….

4. CONCLUSION

According to [23], food composition databases should include the foods most commonly eaten by the national or study population together with a selection of other foods (e.g. those that are important sources of one or more nutrients in population subgroups). Samples should be representative of the national level or study population. Nutrient coverage should include components that are of high priority for public health or for scientific interest. Values should be presented as mean and range. Used analytical methods ~~used~~ should be supported by documented quality assurance procedures.

Currently, Bulgarian Database is hosted and documented. The original data set under Excel is transformed to EuroFIR standard format. The 828 foods are LanguaL indexed but still lack protein conversion factors (NCF) and Fatty acid conversion factors (FACF). The crosstab (food x component) format is converted to column format (food code, component code, value) for the Access database. All values are expressed with 3 significant figures; Method Type and Method Indicator codes. All records in the VALUES table have at least one reference documented.

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