Analytical Methods

EuroFIR quality approach for managing food composition data; where are we in 2014?

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ABSTRACT

A EuroFIR quality management framework was developed to assure data quality of food composition data, incorporating several recommendations developed or improved during the EuroFIR projects. A flow chart of the compilation process with standard operating procedures to assure critical steps was the starting point. Recommendations for food description, component identification, value documentation, recipe calculation, quality evaluation of values, guidelines to assess analytical methods, document and data repositories and training opportunities were harmonized as elements of the quality framework. European food composition database organizations reached consensus on the EuroFIR quality framework and started implementation. Peer reviews of the European compiler organizations were organized to evaluate the quality framework, focusing on what was achieved and on improvements needed. The reviews demonstrated that European food database compilers have made good use of standards and guidelines produced by EuroFIR, as well as a common understanding that a quality framework is essential to assure food composition data quality.

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1. Introduction to quality of food composition databases

Food composition data are essential for all food and nutrition related work. These data are used in research, dietary advice, food industry, health education, trade and policy making (Greenfield & Southgate, 2003). Usually data on locally eaten foods are needed and are provided by country specific food composition tables. To assure the quality of data in food composition databases (FCDB) and publications, it is a prerequisite to have a quality management system (QMS) in place (Castanheira et al., 2007, 2009). Quality management system standards are available, such as ISO9001 applicable to general management processes, ISO17025 applicable to laboratories, ISO10006 applicable to network management, and ISO17024 to certify persons against specific requirements (Castanheira et al., 2007). However, for the area of the production and management of food composition data no such standard exists.

Although no formal quality system is in place for food data compilation, several quality requirements have been developed over the years. Achievements were made in European projects such as EuroFOODS, Cost action 99, the European Nutrient Data Bank project by IARC (Slimani, Deharveng, Unwin, Southgate, et al., 2007; Slimani, Deharveng, Unwin, Vignat, et al., 2007) and through the work of the INFOODS (International Network of Food Data Systems) organization (www.fao.org/infoods). This work together with the work of Greenfield and Southgate on the production, management and use of food composition data (Greenfield & Southgate, 2003) is used as basis for EuroFIR.

The EU FP6 and FP7 EuroFIR (European Food Information Resource) Network of Excellence (NoE) (2005–2010) and EuroFIR NEXUS (2011–2013) projects aimed to standardize and harmonize food composition data in Europe through improved data quality, database searchability and standards. It was one of the main goals to set up and implement a quality management framework for European food composition database compiler organizations to ensure food composition data quality. This quality framework enables the provision of traceable and reliable data with meta data for users.

An inventory among EuroFIR NoE partner organizations in 2006 demonstrated that the majority of these organizations had ISO9001 and/or ISO17025 QMS in place and were aware of its

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benefits (certification/accreditation) for their organization and for users and stakeholders satisfaction. To assure food composition data, the situation was less clear. Some countries used database management systems (DBMS) to assure their food data compilation process and had written guidelines available. Other countries had less advanced systems or no documentation available yet (Castanheira et al., 2007). Building on the achievements in previous projects, simultaneously harmonized approaches and tools were (further) developed for specific parts of the compilation process (Castanheira et al., 2007) in EuroFIR. In particular, the EuroFIR quality framework needed to be generic so partners can use it to create and maintain their own quality systems. Flexibility was important to produce a fit for purpose system that will enhance comparability and reliability of data over time (Castanheira et al., 2009). Eventually the quality framework could be used as a basis for future certification of national food composition data compiler organizations. The structure of the proposed EuroFIR quality framework was based on the principle that published values comply with specific quality requirements. These requirements encompass quality management principles and practices applied in organizations maintaining national FCDBs (Castanheira et al., 2009).

This paper gives an overview of the EuroFIR quality framework with a summary of the key results and future directions based on evaluations and compiler peer reviews carried out.

2. Outline of the EuroFIR quality framework

To produce FCDBs, production of data (food sampling and analyses), compilation of data (collection, aggregation & compilation and dissemination) and managing data (software/database management systems) are involved. Each of these specialisms requires a quality assurance approach.

In the EuroFIR quality framework it was envisaged that many interconnections exist between these areas and that collaboration is essential to produce harmonized and comparable food composition data for users (Fig. 1).
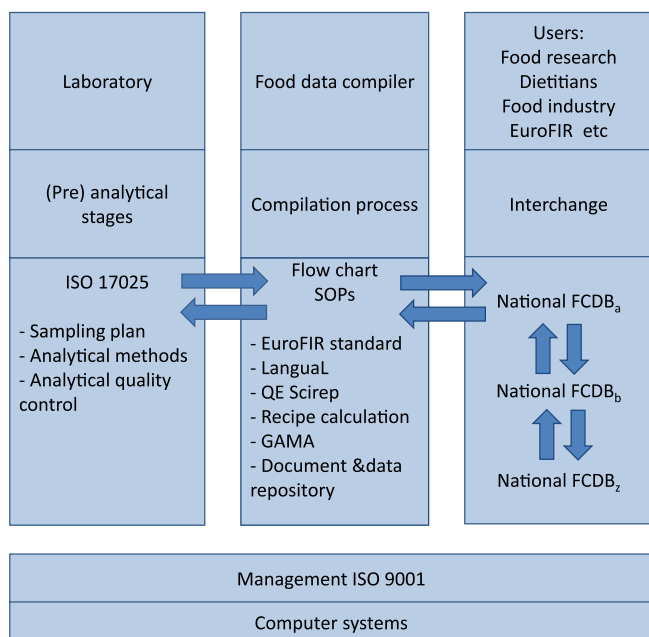

Fig. 1. Overview of EuroFIR quality framework.

2.1. Analyses

Quality assurance of laboratories involved in the production of food compositional data is considered essential. Whenever possible, compiler organizations should work with accredited laboratories using certified analytical methods (Greenfield & Southgate, 2003). Food data compilers, who often do not have an analytical background, need to contact and/or select laboratories, to decide upon analytical methods used or proposed and to interpret analytical data produced. EuroFIR provides links between analysts and compilers with the production of tools, such as Guidelines for the Assessment of Methods of Analyses (GAMA), quality criteria for sample handling, analytical method and analytical performance in the quality evaluation of analytical values (QE-SCIREP) and defining indexing terms to encode analytical methods for value documentation purposes.

2.2. Compilation

The EuroFIR quality approach for the compilation of food composition data used the Hazard Analyses and Critical Control Points (HACCP) approach. The HACCP approach includes the description of work processes; identification of hazards and risks that these hazards occur; determining Critical Control Points (CCPs); establishing critical limit(s) and a system to monitor the control of CCPs; identification of preventive and corrective measures; and description of working processes in Standard Operating Procedures (SOP). All elements of the compilation process were described on a generic level to allow each compiler organization to use the same framework, regardless of individual procedures or levels of quality assurance. Individual compiler organizations can then decide if the generic description is fit for use or needs to be amended before applying to national processes. A generic flow chart of the compilation process was produced, describing hazards and CCPs with preventive and corrective measures. Generic SOPs were written for the CCPs. Links to the production of analytical data and software used, were identified. The work is described in more detail in previous publications (Castanheira et al., 2007, 2009; Westenbrink, Oseredczuk, Castanheira, & Roe, 2009).

2.3. Computer

Most organizations host FCDBs as part of their organization wide IT systems, including technical support and security, following the organizations quality assurance procedures for software and hardware. DBMS for food composition data can be sophisticated database systems with a range of data management tools and functions including calculation modules and quality control procedures or can be relatively simple data structures with limited functionality. Data security and sustainability is very important, therefore assuring secure and stable hardware and software is considered essential in the overall quality approach for a FCDB organization. FoodCASE DBMS (http://www.foodcase.ethz.ch/index_EN) was developed by University of Zurich in collaboration with EuroFIR, and is compatible with the EuroFIR Technical Standard (Becker et al., 2008).

3. Basic recommendations of the EuroFIR quality framework

To further standardize the EuroFIR quality approach, new or existing procedures/tools were developed or adopted for data interchange, food description, component identification, value documentation, recipe calculation and quality evaluation of data points.