EuroFIR's food databank systems for nutrients and bioactives

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The objective of the EuroFIR project is to increase the Internet availability of European national food composition databases and specialised collections, including the EuroFIR BASIS database of bioactive components. Database compilers will upgrade data with food and component descriptions, documenting the compositional values and adding new data following agreed priorities. Prototype EuroFIR databank systems have used both distributed and centralised retrieval. In the preferred approach, database owners provide an interface to the EuroFIR system using an XML data exchange format. Users will have online access to a wide range of European data, linking foods and nutrients through harmonised data description and associated nutrient value information.

Introduction

Food composition databases are well established in Europe (Church, 2005), but in general they have been compiled at a national level, with their specifications and content determined by the requirements for data in their country of origin. The resulting incompatibilities become apparent whenever there is the need to use data from several databases, for example in multinational projects such as the European Prospective Investigation in Cancer and Nutrition, EPIC (Deharveng, Charrondière, Slimani, Riboli, & Southgate, 1999; Slimani, Charrondière, van Staveren, & Riboli, 2000).

International work to harmonise food composition data started in 1984 with the establishment of INFOODS[1] (International Network of Food Data Systems) under the auspices of the United Nations University (Scrimshaw, 1997). The work included food component identification (Klensin, Feskanich, Lin, Truswell, & Southgate, 1989) and data interchange (Klensin, 1992). In Europe, the COST Action 99 Eurofoods project developed recommendations for data management and interchange (Schlotke et al., 2000). A modified subset of these recommendations was used by the 10 countries participating in the EPIC project (Charrondière et al., 2002; Vignat et al., 2003), providing the first practical test of data interchange guidelines.

Further work on data harmonisation and its application in European food composition databases is being undertaken by the European Food Information Resource Network of Excellence (EuroFIR) project. This is a 5-year project funded under the European Commission's "Food Quality and Safety Priority" of the Sixth Framework Programme for Research and Technological Development. The project started in January 2006 with 40 partners, consisting of universities, research institutes and small-to-medium sized enterprises (SMEs) from 21 European countries.

The number of European national databases available online on the Internet is increasing; one of the reasons is the strong influence of the EuroFIR project. Since no national database gives a comprehensive coverage of foods and their nutrients and other components, this improved availability is certain to increase the use of data internationally. It becomes of paramount importance that the information delivered to the user is expressed in a way that is

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[1] http://www.fao.org/infoods/index_en.stm.

comparable, from whichever source databases the data are taken.

European food composition data on the Internet

Information on food composition available over the Internet may be provided at several levels, namely:

1. searchable online databases,
2. static food composition data, e.g. fixed food table layouts, and
3. offline information, e.g. describing the printed food table publications.

For a number of European countries, food composition information is not yet available on the Internet and this is hampering the application of food composition data in a number of fields.

Several European countries including Belgium, Denmark, Finland, Germany, Israel and Sweden have searchable food composition databases online. Other countries with static data such as France, Switzerland, Iceland, Norway and UK are progressing towards an online database. Further countries have offline information available and it is a high priority within the EuroFIR project to upgrade these and also the countries without an Internet presence to have searchable online data available as soon as possible.

Data description

Food composition data must be adequately documented so that the user can properly understand them, evaluate them and decide on the appropriateness of the data to the user's requirements. The food and component must be described and a quality assessment of the compositional value should be provided.

One of the aims of the EuroFIR project is to develop a standard to be used as the framework in Europe for compiling and disseminating food composition data that are comparable and unambiguous with respect to the identity and description of foods, components and compositional values. The standard will provide the specifications of data content and description necessary to achieve this, as well as describing procedures for both the management and interchange of the data.

Food description and classification

In order for data to be retrieved from different sources and compared, databases must use a common system for describing their foods. The EuroFIR food databank systems will use the LanguaL food description language[2] (Møller & Ireland, 2000) to link between data in the various European food composition databases. The LanguaL food description also has potential for matching composition data to food consumption records to facilitate the calculation of nutrient intakes.

LanguaL provides an international framework for food description using a system of controlled vocabularies. These vocabularies currently index 14 facets, which describe different aspects of a food such as its source organism (for example, 'cow' or 'goat' for milk), its cooking method, its preservation method and its packing medium. The LanguaL descriptors assigned to food records enable related foods to be retrieved, from both within and between databases. Thus, the LanguaL indexing of databases participating in EuroFIR is a top priority for the project.

An alternative approach to organising food records is to classify them using a food grouping system. The systems have main groups for foods such as *meat and meat products*. These may be divided hierarchically into sub-groups, for example *beef*, *chicken*, *offal*, etc., and possibly further into more detailed sub-categories. However, each national food grouping system differs and therefore a EuroFIR food classification system for food composition data is being developed.

The EuroFIR system will be based on common features of the national systems, many of which were brought together in two European systems. The European Food Grouping (EFG) consists of 33 main food groups and was proposed by the COST Action 99 Eurofoods and EFCOSUM projects for the linking of food consumption data. The Eurocode 2 system[3] is a much more detailed hierarchical system originally designed for the reporting of food consumption data, which was revised and documented within the COST Action 99 Eurofoods project.

Linking databases with LanguaL

Several European food composition databases are both online and LanguaL indexed, enabling them to be linked through food description. The published databases of Denmark, Finland and Sweden are available, together with a prototype for France, and those of Iceland and Norway are under development. The USDA Standard Reference database[4] is also searchable. The testing of linking has also included the EuroFIR BASIS database[5] of information on bioactive components in food plants (with coverage to be extended to other food products) and the Informall database[6] on information on food allergens. A test search on the term *Avocado* from the LanguaL *Food source* facet retrieved food records from several of the available databases (Fig. 1). The user is then able to select foods from the list and display the compositional data or other information available for them (Fig. 2).

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[2] http://www.langual.org/.

[3] http://www.eurofir.org/eurocode.
[4] http://www.ars.usda.gov/ba/bhnrc/ndl.
[5] http://www.polytec.dk/eBasis/.
[6] http://foodallergens.ifr.ac.uk/.