FAO/INFOODS Advances in Food Composition and Database Management System

U. Ruth Charrondiere, PhD
INFOODS Coordinator
FAO, Rome

Outline

• INFOODS
• Achievements of FAO/INFOODS
• Food composition database management system (FCDBMS): Compilation Tool
• Future plans
• Conclusions

INFOODS

• Established in 1984
• Under UNU and FAO. Is also IUNS Task Force
• Coordination since 1999 in FAO
• Objective: to stimulate and coordinate efforts to improve the quality and availability of food analysis data worldwide

INFOODS achievements

• Standards and guidelines
• Capacity development
• Publications and Declarations
• Databases and tables
• Laboratory Quality Assurance
• Biodiversity
• International Food Data Conferences (IFDC)
• Tool development: FCDBMS
**Standards and guidelines**

- **Component identifiers** also called tagnames: Since 1989 over 800 tagnames published
- **Food nomenclature** (Truswell et al., 1991)
- **Interchange of food composition data** (Klensin 1992; FAO, 2004)
- **Guidelines on compilation** of food composition data (Rand et al., 1991)
- New **energy conversion factors** (FAO, 2003)
- **INFOODS Food matching guidelines** (2011)

**Capacity development**

- Involved in/ co-organized **over 20 international training courses**
- Organized **10 training courses**
- Published distance learning tool **Food composition Study Guide** in English, French and Spanish together with **12 PowerPoint presentations** summarizing the main points of the modules

**Food Composition Study Guide developed by FAO/INFOODS**

**Objectives**
- To reach a wider audience cost-effectively, which otherwise would never be served
- To assist learners to fill their specific knowledge gaps and assess their knowledge acquisition
- To assist learners to perform better when generating, managing or using food composition data
- To assist teachers to prepare lessons and test students

**Target Population**
- self-learners, FoodComp courses, universities: compilers and users and also analysts; teachers and students

**Publications and Declarations**

- **Food Composition Data: A User’s Perspective** (Rand et al., 1987)
- **Journal of Food Composition and Analysis (JFCA)** was the official INFOODS journal from 1987 to 2010
- **Indigenous Peoples’ food systems: the many dimensions of culture, diversity and environment for nutrition and health** (Kahlelein et al., 2009)
- Over 20 **scientific articles**
- **AFROFOODS declaration** (2010)
- **Bangkok Declaration** (2009) from the 8th International Food Data Conference

**Databases and tables**

- **Food Composition Database on Biodiversity**: first edition in 2010 with solely analytical data on 2400 foods, in July 2011 with 3600 foods

**Future plans**: To publish FCDB with analytical data
Regional Tables

Laboratory Quality Assurance
- Several proficiency testing (PT) were organized, especially in ASEANFOODS countries. More PTs are planned in SAARCFOODS countries
- Strengthening laboratory capacity in food composition (including accreditation) in the South Pacific in 2002-2004 through FAO

Food Biodiversity
- Two Nutritional Indicators for Biodiversity in English, French and Spanish:
  1. on food composition (FAO, 2008) ➔ yearly reporting (in 2010 over 3600 foods reported in FCDB, scientific literature etc)
  2. on food consumption (2010 and 2011) ➔ reporting every second year (in 2010 over 3000 foods reported in food consumption surveys on food biodiversity)
- Food Composition Database on Biodiversity: first edition in 2010 with 2400 foods, in July 2011 with 3600 foods

Differences in food composition due to different varieties

<table>
<thead>
<tr>
<th></th>
<th>Protein</th>
<th>Fibre</th>
<th>Iron</th>
<th>Vitamin C</th>
<th>Beta-Carotenes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>5.6-14.6</td>
<td>0.7-6.4</td>
<td>0.7-6.4</td>
<td>25-34</td>
<td>&lt;5.790</td>
</tr>
<tr>
<td>Cassava</td>
<td>0.7-6.4</td>
<td>0.9-1.5</td>
<td>0.9-2.5</td>
<td>0.3-2.7</td>
<td>6.4-36.9</td>
</tr>
<tr>
<td>Potato</td>
<td>1.6-2.9</td>
<td>1.2-2.3</td>
<td>0.3-2.7</td>
<td>6.4-36.9</td>
<td>1-7.7</td>
</tr>
<tr>
<td>Sweet potato</td>
<td>1.3-2.1</td>
<td>0.7-3.9</td>
<td>0.6-14</td>
<td>2.4-35</td>
<td>100-23100</td>
</tr>
<tr>
<td>Taro</td>
<td>3.1-3</td>
<td>2.1-3.8</td>
<td>0.6-3.6</td>
<td>0.13</td>
<td>5-2640</td>
</tr>
<tr>
<td>Eggplant</td>
<td>0.1-1.9</td>
<td>0-129</td>
<td>0-129</td>
<td>22-210</td>
<td>29 – 4320</td>
</tr>
<tr>
<td>Mango</td>
<td>0.3-1.0</td>
<td>1.4-3.3</td>
<td>0.4-2.8</td>
<td>22-100</td>
<td>6100 – 13720</td>
</tr>
<tr>
<td>GAC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apricot</td>
<td>0.8-1.4</td>
<td>1.7-2.5</td>
<td>0.3-6.9</td>
<td>3.5-16.5</td>
<td>200-6939 (beta carotene equivalent)</td>
</tr>
<tr>
<td>Banana</td>
<td>0.1-1.6</td>
<td>2.5-17.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Impact of food biodiversity on dietary adequacy

<table>
<thead>
<tr>
<th></th>
<th>Protein content (g/100 g)</th>
<th>Cassava intake in Congo g/d/p</th>
<th>Part of the RDI for protein covered by cassava intake, in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>3.24</td>
<td>286</td>
<td>26.6</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.95</td>
<td>286</td>
<td>6.0</td>
</tr>
<tr>
<td>Maximum</td>
<td>6.42</td>
<td>286</td>
<td>40.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Vitamin A intake in Philippines in mcg RE/d/p</th>
<th>Vitamin A intake through banana in mcg RE/d/p</th>
<th>RDI for vitamin A covered by banana intake, in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banana</td>
<td>26</td>
<td>93</td>
<td>4</td>
</tr>
<tr>
<td>Lap</td>
<td>360</td>
<td>93</td>
<td>56</td>
</tr>
<tr>
<td>Ulva</td>
<td>8508</td>
<td>93</td>
<td>1318.7</td>
</tr>
<tr>
<td>USDA</td>
<td>8508</td>
<td>93</td>
<td>219.8</td>
</tr>
<tr>
<td>Location</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
International Food Data Conferences (IFDC)

- 1st IFDC: Quality and Accessibility of Food-Related Data. Sydney, Australia, 1993
- 3rd IFDC: Back to Basics. Rome, Italy, 1999
- 4th IFDC: Bratislava, Slovakia, 2001
- 5th IFDC: Washington DC, USA, 2003
- 6th IFDC: Food Composition Data and the Nutrition Dilemma. Pretoria, South Africa, 2005
- 7th IFDC: Food Composition and Biodiversity. São Paulo, Brazil, 2007
- 8th IFDC: Food composition data - key for health and trade. Bangkok, Thailand, 2009
- 9th IFDC: Food Composition and Sustainable Diets. Norwich, UK. 14-17 September 2011

Tool development: FCDBMS

- FCDBMS is needed to compile a FCDB
- FCDBMS exist:
  - for national/regional programmes
  - commercial products for different uses (e.g. labelling)
  - for certain projects
- No FCDBMS exists for international use as yet
- BUT especially developing countries do not have the financial means to develop their own FCDBMS software

Compilation tool was developed by FAO/INFOODS to fill this gap

Compilation tool - objectives

- to give compilers a product to compile and manage their food composition database according to international standards
- to be simple in use while allowing comprehensive documentation
- to provide a flexible tool so that users can adapt it to their needs
- to be used with Food Composition Study Guide to practice calculation, documentation and compilation

Future Plans of INFOODS

- Prepare new guidelines
  - conversion of nutrient data
  - selecting appropriate food composition sources
  - on analytical methods
  - set of nutrient retention factors per region
- Publish new regional food composition tables
- Compile databases
  - on food biodiversity with analytical values (continue)
  - any foods with analytical values
  - density
  - on laboratories indicating which nutrients they analyze together with methods and quality assurance
- Analyze foods worldwide
- Capacity development
- Improve INFOODS’ communication strategy

Compilation tool - structure

- 125 nutrients (macro and micronutrients, AA, FA)
- based on INFOODS interchange (2003) elements (for value documentation, method, bibliography, sampling)
- uses INFOODS tags (component names)
- uses Greenfield and Southgate (2003) terminology (archival, reference and user database)
- includes nutrient retention factors from McCance and Widdowson’s (6th edition), Bognar (2002) and Bergstrom (1994) – can be replaced by any other factors
- 3 recipe calculation systems (recipe, ingredient and mixed method)

Conclusions (1)

Compilation Tool

- meets an immediate need
  - is a simple, cheap, flexible and useful tool for global use according to international standards allowing compilation with full documentation
  - is intended for compilers without FCDBMS and learners of Study Guide
  - BUT use of spreadsheets are more prone to errors as compared to relational databases and users must know Excel

Future development: transfer to SQL or Access relational databases and disseminate it through FAO/INFOODS free of charge
Conclusions (2)

Food composition programmes need
- Motivated people trained in food composition
- Standard procedures and tools in line with international guidelines
- Integrated in international network
- Steering committee between users, stakeholders and compilers
- Government support
- Funding for data generation, compilation and dissemination

Conclusions (3)

- INFOODS has provided standards and tools for each country to compile a FCDB and to get the necessary knowledge on food composition
- INFOODS has proven to be an excellent network to improve the quality and availability of food composition data but communicates poorly
- INFOODS could do even better if more funds would become available
- Other donor support needs to be explored as traditional supporters provided less funds over time (e.g. UNU, FAO, INF)

Future Plans of INFOODS

- Prepare new guidelines
  - conversion of nutrient data
  - selecting appropriate food composition sources
  - on analytical methods
  - set of nutrient retention factors per region
- Publish new regional food composition tables
- Compile databases
  - on food biodiversity with analytical values (continue)
  - on any foods with analytical values
  - density
  - on laboratories indicating which nutrients they analyze together with methods and quality assurance
- Analyze foods worldwide
- Capacity development
  - Improve INFOODS' communication strategy

For more information

INFOODS website
Subscribe to INFOODS mailing list
Thank you for your attention