EuroFIR quality framework to improve national food composition databanks.

Isabel Castanheira\(^{(1)}\), Mark Roe\(^{(2)}\), Gaida Lapitajs\(^{(3)}\), Maria Antónia Calhau\(^{(1)}\), Paul Finglas\(^{(2)}\)

\(^{(1)}\)INSA, \(^{(2)}\)IRMM, IFR

8th IFCD 1-3 October, 2009, Bangkok, Thailand

Outline

- Five years of work on Quality Management Systems
- EuroFIR Collaborations
- CEN Standard
- Recomendations from evaluators
- Audits Models
Why Harmonization

- Fiber, Same method ??
- Protein, Factor reported??
- VitaminB6, HPLC or Microbiological ??
- Zinc AAS or ICP-MS (LoD) ??
- Selenium Graphite or HPLC-ICP-MS ??

Artificial variations??
Sampling Plan ?

Compilation process: hazards identified and prevented ??

Laboratory?? poor or good performance ??

<table>
<thead>
<tr>
<th></th>
<th>Bread FCDB (1)</th>
<th>Bread FCDB (2)</th>
<th>Bread FCDB (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D. Fiber</td>
<td>4.0</td>
<td>8.2</td>
<td>5.6</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>8.0</td>
<td>6.2</td>
<td>9.3</td>
</tr>
<tr>
<td>Vit B1 (mg)</td>
<td>0.118</td>
<td>0.21</td>
<td>0.192</td>
</tr>
<tr>
<td>Vit B6 (mg)</td>
<td>0.058</td>
<td>0.074</td>
<td>0.117</td>
</tr>
<tr>
<td>Zinc (mg)</td>
<td>0.626</td>
<td>1.6</td>
<td>0.964</td>
</tr>
<tr>
<td>Selenium (µg)</td>
<td>2.56</td>
<td>3.7</td>
<td>3.2</td>
</tr>
</tbody>
</table>

2009

National values?

Evidence for risk factors and protective factors concerning CVD

Risk: Convincing
- Saturated fatty acids
- Trans-fatty acids
- Myristic & palmitic acid
- High sodium intake
- High alcohol intake
- Overweight & obesity
- Linoleic acid
- Fish and fish oils (EPA & DHA)
- Potassium
- Fruits (including berries) & vegetables
- Low to moderate alcohol intake
- Physical activity, regular

Dietary Composition

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholesterol</td>
<td>&lt; 300 mg/day</td>
<td>same</td>
</tr>
<tr>
<td>Sodium chloride (sodium)</td>
<td>&lt;5 g/day</td>
<td>&lt;6 g/day</td>
</tr>
<tr>
<td>Fruits &amp; vegetables</td>
<td>≥ 400 g per day</td>
<td></td>
</tr>
<tr>
<td>Total dietary fiber (non starch polysaccharides (NSP))</td>
<td>1-25 g, or 20g of NSP from whole grain cereals, fruits, and vegetables</td>
<td>27 to 40 total 16 to 24 NSP</td>
</tr>
</tbody>
</table>

8th International Food Data Conference
October 1-3, 2009
Bangkok, Thailand
Lessons from the past

<table>
<thead>
<tr>
<th>Projects</th>
<th>Achievements</th>
<th>EuroFIR tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFOODS</td>
<td>International Comparability</td>
<td>WP1.8 TG2</td>
</tr>
<tr>
<td>Enfant Project</td>
<td>Quality Assurance of Analytical Data</td>
<td>WP1.8 TG2</td>
</tr>
<tr>
<td>EUROFOODS</td>
<td>Recommendations for Data Interchange</td>
<td>WP1.8, 1</td>
</tr>
<tr>
<td>EPIC</td>
<td>Standardised tables</td>
<td>WP1.8 TG2</td>
</tr>
</tbody>
</table>

EuroFIR Approaches

- Multi-center studies
- Differences between Tables
- Quality Practices
- Prevention of potential errors
- Critical Control Points
- Standardized FCDBs
- Concept HACCP
- CEN-Standard
- Flowchart

8th International Food Data Conference
October 1-3, 2009
Bangkok, Thailand
Quality & Traceability in EuroFIR

Identification and comprehension of the data in the data sources

Attribution of quality index to original data

Coding original data before data entry

Checking original data entry

Physical storage of original data

Selection of original data to be further used to determine aggregated data

Validation of aggregated and compiled data
Development of a European Standard - Timeframes

Wulf Becker, 2009
CEN – Standard

- CEN-TC-387
  - SIS- Chair Swedish Organization for Standardization
- Organizations
  - EuroFIR partners representatives of National Standardization Organizations
  - GS1
  - Other members
- Aim
  - Establish a common European CEN-standard on food composition data enabling the unambiguous identification and description of food composition data and its quality in e.g. databases, for dissemination and interchange.

Standardisation work – progress

- SIS TK505 committee "Food data" established 2007
  - Members representing SIS Swedish Standards Institute, NFA, Swedish food manufacturers, retailers, consumers, dieticians
- CEN/TC387 "Food composition data" Project Committe established April 2008
  - Led by SIS Swedish Standards Institute
  - Members from 9 national standardisation bodies
    - SE, F, DK, FIN, I, NL, P, B, UK (+ A, CY, D, NO observers)
  - Programme of work adopted
  - 2 plenary meetings + conference calls
  - Draft standard outline June 2009
  - First working draft August 2009

Wulf Becker, 2009
CEN Standard Achievements

- Establishment of CEN project committee an important milestone
  - standard is a technical specification

- Liaison with GS1 initiative will enhance coverage and uptake of future standard

- Controlled vocabularies (thesauri) as informative annex
  - provide more flexibility (at international level)
  - require agreement among parties on which to use in data interchange
  - can be changed to normative in future

- More involvement in standardisation work appreciated

---

Training

- Initial Training to ensure that members can competently perform designated tasks with high level of confidence.

- Ongoing training sessions and periodic short courses to share experiences and to learn from each others

- Professional Development encouragement to participate in professional societies, conferences related with food science and human nutrition.
Measurement Uncertainty

- Metrological approach to express the dispersion of the results
- Uncertainty sources
  - Method of analysis
  - Sampling
- Types of Uncertainty
  - Standard uncertainty
  - Overall uncertainty
- Reporting uncertainty
  - \( U = K \) combined uncertainty

Recommendation for Laboratories

IMEKO TC 23– EuroFIR Collaboration

IMEKO -TC 23 Food and Nutrition Metrology

Promote Metrology in Food Composition Databanks
Traceability to SI units
Use of Reference Materials
Sources of Uncertainty (variations in analytical process)
Metrology in Clinical Nutrition

Relationship between Glaucoma and Selenium Levels in Plasma and Aqueous Humor
- Selenium intake estimated from FCDBs
- Selenium in plasma and Aqueous humor determined by HPLC-ICP-MS

Conclusion
- limited nutritional data was collected, it was impossible to determine the subjects’ long-term dietary intake of selenium
- Metrology is necessary to evaluate qualitative issues
- suggest selenium-related pathology

Br. J. Ophthalmol. published online 12 Jun 2008;

Compiler Certification
- Formal certification, e.g. ISO 9001 ideal but not realistic within timescale
- Certification Plan based on consensus
- Informal standard based on generic compilation process best option
- SOPs supporting individual organisation’s compilation procedure
- Records of management systems related to process e.g. training records, sub-contractor details, analytical quality control records
Quality System Implementation

- **Principle**
  
  QMS should fit both EuroFIR and compiler organization quality management requirements.

---

**EuroFIR Quality System Structure**

- **Top of Quality System**
  - Quality Policy

- **Quality Requirements**
  - CEN _Standard; Flowchart Compilation Process; Language; Data Quality System value documentation

- **Quality Practices**
  - Responsibilities
  - SOPs
  - Training

- **Specific Aims**
  - Datasets Bioactives
  - Ethnic
  - Traditional

- **Specific activities**
  - Basic tasks
  - Supervision
  - Writing
  - Revising
  - Initial
  - Ongoing

---

8th International Food Data Conference
October 1-3, 2009
Bangkok, Thailand
Pilot Audits

- Co-operative audit conducted between EuroFIR partners and overseas for mutual benefits
- A horizontal audit: a detailed assessment of each requirements applied to total activities
- Vertical audits: a systematic evaluation of all requirements associated to each activity

Benefits of Quality

- Food Composition Databank
  - "Combining quality systems and food composition activities endows FCDB with flexibility, consistency and transparency, and facilitates their monitoring and assessment.

- Analytical Process
  - "Without a defined quality assurance programme all analytical results must be suspected"

- Compilation
  - "Implementation of good scientific practice provide basis for transparency and confidence that data is comparable across different databases"
Conclusions

QMS are a contribution to reduce FCDBs artificial differences

Acknowledgements

EuroFIR is funded by European Commission’s Research Directorate General under the “Food Quality and Safety Programme FOOD-CT-2005-513944” of Sixth Framework Programme for Research and Technological Development