

EuroFIR guideline for quality index attribution to original data from scientific literature or reports

Work in progress

Bangkok 8th IFDC

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Food composition data quality



First International Food Data Base
Conference

Sydney, Australia, 22–24 September
1993

‘Quality and accessibility of food
related data’



8th International Food Data Conference

October 1-3, 2009

Bangkok, Thailand

Why is food composition data quality an issue for compilers?

1. **Critical decisions** are based on food composition data at individual or national level
 - Compilers are responsible towards the users
2. **Efficient selection** of data among all available data
 - Daily activity of compilers
3. **Continuation of compilers activities**, priorities for new research?
 - Compilers have to advocate!



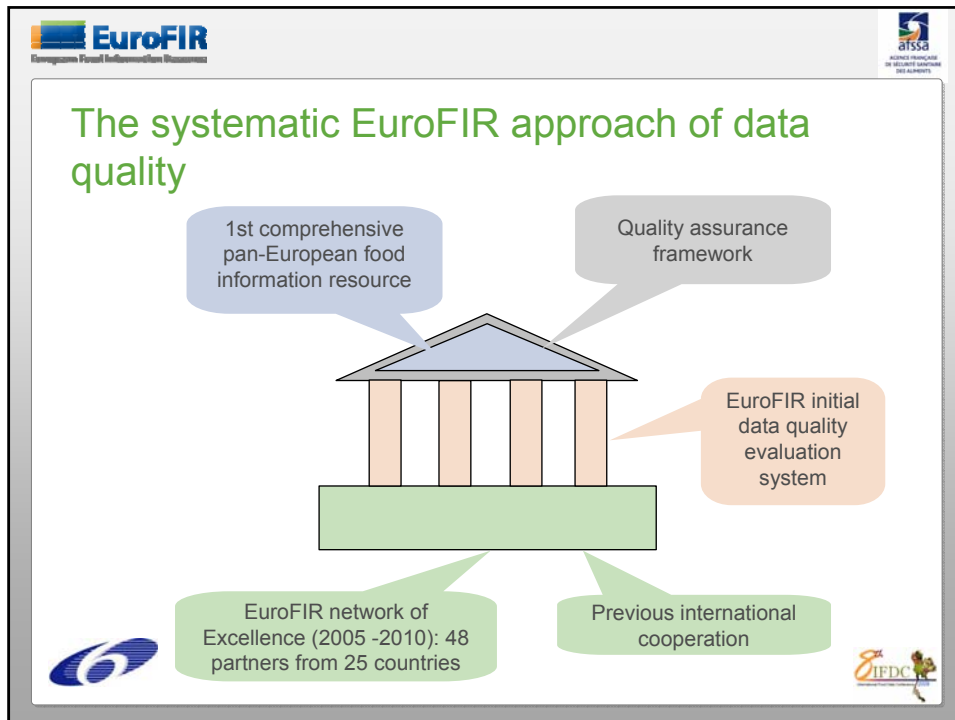
What is food composition data quality for compilers?

- **All types of foods, all nutrients** and some other properties
- As taken **from their original source** or aggregated?

How to assess food composition data quality ?

- **Documented** data
- **Reliable protocol (compared to current standards)**
 - ⇒ identification, maintenance, creation of these standards?
- **Common, validated sustainable system ?**
 - ⇒ assessment independent of local databank specifications







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QE scirep presentation: outline

- Materials and methods**
 - Integration of results from other EuroFIR works
 - Review of existing systems
 - Creation of QE scirep
 - Round robin test
- Results**
 - Comparison of existing systems
 - Results of round robin test and changes made
 - EuroFIR QE scirep description and scoring
- Discussion**






1. Materials and methods

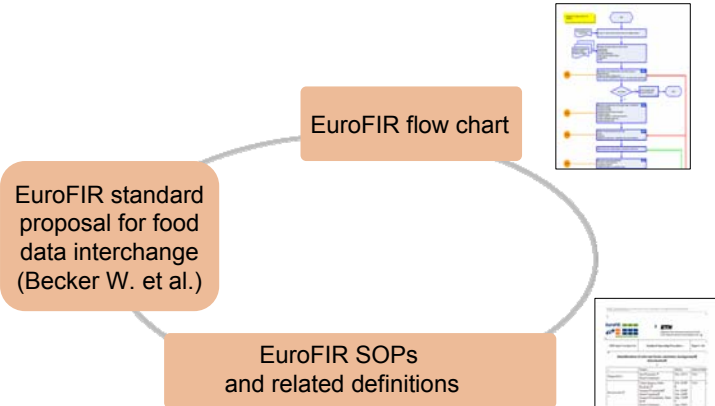
A EuroFIR dedicated task group supported by active partners:

- Denmark, DFI, Jayne Ireland, Anders Moeller
- France, AFSSA, Marine Oseredczuk
- Italy, CSPO, Simonetta Salvini
- Portugal, INSA, Maria-Antonia Calhau, Isabel Castanheira
- Switzerland, ETH Zürich, Paolo Colombani
- UK, IFR, Paul Finglas, Mark Roe
- The EuroFIR compiler network











1.1. integration of results from other EuroFIR works





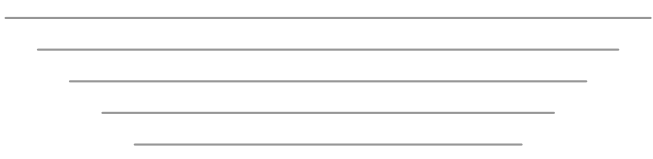


The diagram illustrates the integration of three key EuroFIR documents: the EuroFIR flow chart, the EuroFIR standard proposal for food data interchange (Becker W. et al.), and the EuroFIR SOPs and related definitions. These three elements are arranged in a circular flow, indicating their interconnected nature in the project's methodology.





1.2. Four existing food data evaluation systems


- **USDA**
 - Exler, 1983, USDA Iron table
 - Holden, 2005, USDA flavonoids
- **BASIS** BioActive Substances in Food Plants Information System
 - project funded as a Concerted Action under the EU FAIR programme (CT98-4419) from 1999 to 2001
 - <http://www.polytec.dk/eBasis/Default.asp>
- **AFSSA** (French Food Safety Agency)
- **CSPO** (Centre for the Study and Prevention of Cancer, Italy)









1.3. Creation of QE scirep: global structure

CATEGORY			
1. Criterion	Yes	No	NA
2. Criterion			
3. Criterion			
CATEGORY SCORE			
CATEGORY			
1. Criterion	Yes	No	NA
2. Criterion			
3. Criterion			
CATEGORY SCORE			

 E.g.: Food description
 Questions to be answered using information given in the source:
 E.g.: Was part of plant or part of animal clearly indicated?
 Possible answers
 Score per category to be interchanged, leading to a quality index










1.3. Creation of QE scirep

- Different categories for assessment and different criteria are necessary depending on the method of production of the data to be assessed.
- QE scirep: Quality Evaluation system for analytical results (scientific reports)
QE other
- Key for selection between QE scirep and QE other?



See Final Report on Guidelines for Quality Index Attribution to Complementary Data for EuroFIR Data Interchange, 2009 (Paolo Colombani et al., ETHZ)






1.4. Round robin test of a preliminary version of QE scirep

<p style="text-align: center;"><i>How ?</i></p> <ul style="list-style-type: none"> • 11 representatives from the compilers network • 7 scientific publications • Excel template listing value documentation fields, quality assessment categories and criteria to standardise presentation of results 	<p style="text-align: center;"><i>Why ?</i></p> <ul style="list-style-type: none"> • Stimulate feedbacks from compilers • Assess if compilers give similar answers (= have the same understanding of the criteria) • Correct and improve QE scirep
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2. Results

2.1. Similarities and discrepancies in existing food data evaluation systems


- Multi or single component system?
 - e.g.: CSPO for carotenoids
 - e.g.: several expert systems for USDA (vitamins K, B12...)
- All foods?
 - e.g.: BASIS only for plant foods
- Number and name of categories?
 - e.g.: Food description is not a category for assessment in itself for USDA and CSPO systems, but it is for AFSSA system





Scoring system and maximum score
... See Eurofir deliverable: Report comparing USDA data quality assessment system(s) to existing European systems, 2008, Simonetta Salvini (CSPO) et al.





2. Results


2.1. Similarities and discrepancies in existing food data evaluation systems


- Types of assessors?

BASIS	AFSSA
- an international group (different organisations)	a national team
experts in plant analysis.	general knowledge of compilers
- Scoring system and maximum score

See EuroFIR deliverable: Report comparing USDA data quality assessment system(s) to existing European systems, 2008, Simonetta Salvini (CSPO) et al.







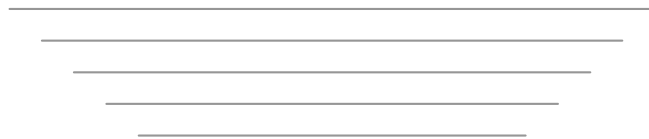
2.2. Results of round robin test on the preliminary version of QE scirep


Discrepancies in scoring revealed:


- Ambiguity in some technical guidelines
 - e. g.: samples unit size and primary sample units
- Clarification of vocabularies!
- Some criteria were not always relevant to all situations
 - e. g.: seasonality, geographic location, types of sales outlet are not systematically of equal importance
- Add “if relevant...”
- Ambiguous description of protocols by authors leads to variable interpretations















2.3. QE scirep description


- 7 categories assessed:


Food descr.



Component ID


Sampling plan



Number of analytical samples



Sample handling


Analytical method


Analytical quality control


- Quality index assigned to each category 1-5 (1= low quality, 5 = high quality)





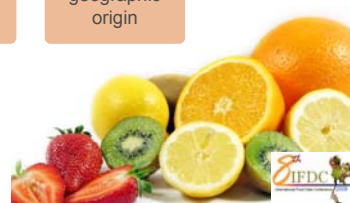


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2.3. QE scirep description Quality of Food Description (1st category)

- Is the **food group** known?
 - e.g. beverage, savoury snack, pasta dish
- Was the **food source** of the food or main ingredient provided?
 - e.g. scientific name, cultivar/variety, genus/species

part of plant or part of animal	analysed portion (edible part)	heat treatment	cooking method
treatment applied	preservation method	packing medium	geographic origin
month or season of production	moisture content		


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2.3. QE scirep description Quality of Food Description (1st category) SCORING

- Initial proposal:




$$\frac{\text{number of 'yes' criteria} \times 5}{\text{Total number of applicable criteria}}$$


→


Score rounded to nearest integer

e.g.: among 12 criteria

- 8 'yes' criteria
- 1 'no' criteria
- 3 'not applicable'
- = $(8 * 5) / 10 = 4$





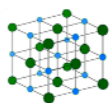
2.3. QE scirep description

Quality of component identification (2nd category)


- Is the **component** described unambiguously?


See EuroFIR component thesaurus


See EuroFIR analytical method guideline
- Is the **unit** unequivocal (unmistakable)?
- Is the **matrix unit** unequivocal?
 - e.g. mg/100g edible portion, g/kg dry weight




Yes	
Yes	At least 1 No
Yes	
5	1










2.3. QE scirep description

Quality of sampling plan (3rd category)

- Did sampling **represent consumption in the country where the study was conducted?**
- Is the **number of primary samples > 9?**
 - Primary sample = Collection of one or more units from a population (e.g. packets of cornflakes, bottles of wine)





More than one season, if relevant?



More than one geographic location, if relevant?

Most important sales outlets, if relevant?

More than one brand, cultivar or subspecies if relevant?






2.3. QE scirep description

Quality of sampling plan (3rd category)

SCORING





$$\frac{\text{number of 'yes' criteria} \times 5}{\text{Total number of applicable criteria}}$$



➔

Score rounded to nearest integer

Scoring method similar to category 'Food description'

- Important to consider relevance of criteria in relation to food and component

2.3. QE scirep description

Number of analytical samples (4th category)



- Number of analytical samples



Definition of 'analytical sample': amount or volume of test sample taken, from the primary or laboratory sample, for analysis

Score	
1 or unknown	1
2 to 4	2 to 4
≥ 5	5

- Important because analysis of >1 sample allows measurement of variation

- Do not confuse analytical sample with:
 - Primary sample (evaluated with sampling plan)
 - Replicate analyses (evaluated with analytical quality control)

2.3. QE scirep description

Quality of sample handling (5th category)

Score = 1
If necessary (see EuroFIR analytical guideline) but not performed

• Were appropriate **stabilization treatments** applied (if relevant)?

Adequate sample handling depends on:

- food
- analyte
- storage duration



Score = 1
If necessary but not performed



• Were samples **homogenized**?

- Could be 'not applicable' to some foods e.g. beverages

Score = 5

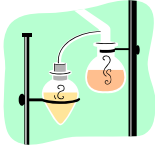
- if 2 'yes'
- or if 1 'yes and 1 'NA'

2.3. QE scirep description



Quality of analytical method (6th category)





- Is the analytical method appropriate?
 - Take into account food matrix

- Are key method steps appropriate?
 - Extraction, separation, identification, detection, quantification,
 - Other key steps

See EuroFIR analytical method guidelines,

2.3. QE scirep description


Quality of analytical quality control (7th category)

SCORING


- Were **analytical portion replicates** tested?
 - e.g. duplicate or triplicate
- Was **laboratory accredited** for method or was **method validated by performance testing**?



See EuroFIR analytical method guidelines

- Was appropriate **reference material** or standard reference material used (if available)



Yes	No	
Yes	No	Yes
Yes	No	
5	1	≥ 3









2.3. QE scirep description

FINAL QI DETERMINATION

- Summation of individual scores assigned to the seven categories
- Overall Quality Index is a number that will range
 - from 7 (low quality)
 - to 35 (high quality).





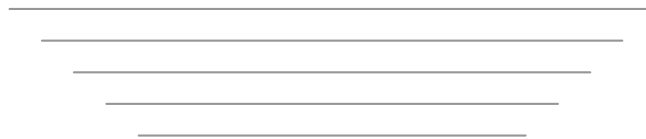
 



3. Discussion

- QE scirep has to be flexible enough to be used for all foods and nutrients
 - Be **general** !
- QE scirep has to provide useful guidance to standardise assessment
 - Be **precise** !

See EuroFIR analytical method guidelines



 



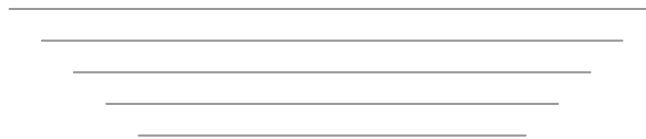
3. Discussion

- Number of categories determined to ensure comparability:
 - Be **consistent with existing systems** !
 - USDA / QE scirep : 5/7 categories in common
 - BASIS / QE scirep : 4/7 categories in common
- Scoring:
 - Be **relevant** ! Consider **possible future automation** !
 - Scoring for QE scirep done using different methods depending on the category considered
 - 35 : Possibility of recalculation (weighting) => 100
 - Minimum per category is 1 and not 0 => quality of an interchanged data should not be 0)

3. Discussion

- QE scirep defines the qualitative and quantitative characteristics of protocols for data generation that allow maximum data quality.
- Transmit **high expectations** !
- e.g.: categories analytical method, analytical quality control.
- Where pragmatic decisions are necessary, reach **consensus within the European network of compilers**
- e.g.: number of primary samples (>9)



3. Discussion

- QE scirep should be generic and designed to be applicable to countries with different systems and processes, and possibly different requirements.
- **Compilers may add a category or a criterion for their internal purpose !**
- E.g.: USDA system is an expert system that is perfectly adapted to one organization's needs and characteristics. 'Region' in USDA system clearly refers to number of American states.
- QE scirep currently assesses only representativeness of the sampling plan for the country where the study was conducted
- Compiler may have to assess comparability with foods as consumed in their own country and create other another category for that



Conclusion

A learning process...

- Compatibility with QE other
- Confidence codes attribution system to be determined, integrating scores from QE other and scores from QE scirep



Conclusion

April 2010: EuroFIR deliverable
Overall final report on
EuroFIR Quality Management System
including laboratory data
and other complementary data

