

Joint Research Centre (JRC)

Selected Food Safety And Quality Activities of the JRC



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<http://irmm.jrc.ec.europa.eu/>

<http://www.jrc.ec.europa.eu/>

- I: Analytical methodology for Food Safety and Quality**
- II: Reference Materials**
- III: Possibilities for collaboration**

I: Analytical methodology for FS&Q

- **Member states gave food safety *mandate* to EU because**
 - food crosses borders
 - safe food is a basic human right
- **The EU takes a *science based* approach**
- **Our “*Unique Selling Point*”**
 - Scientific excellence combined with independence of national and commercial interests

How does our work fit into the JRC's structure?

- **Mission statements**
- **Involved parties in JRC**

- **Analytical method development, validation**
- **Proficiency testing of laboratories**
- **Creating and maintaining databases**
- **Reference materials**
- **Act as Community Reference Laboratories (CRLs)**
- **Workshops, training activities, dissemination of results**
- **International standardisation**
- **Strategic and guidance documents**
- **Frequent customer/stakeholder contact**
- **Underpinning and exploratory research**

- Community Reference Laboratories (CRLs) **support activities** of the European Commission in **policy areas** carrying a risk to citizens and consumers and requiring strict control measures.
- A CRL is a designated **analytical laboratory** which works closely with National Reference Laboratories (NRLs) in the Member States.
- The creation of Community Reference Laboratories (CRL's) should contribute to a high quality and **uniformity** of test results throughout the EU, in particular in those areas where a need for precise analytical and diagnostic results exists (regulatory limits).
- **In practice**, CRLs carry out validation, exchanges, evaluations, proficiency tests etc related to designated products and/or methods.
- **Legal basis**: Regulations (EC) No 882/2004 and 776/2006

JRC has been appointed CRL for

- **Mycotoxins**
- **Polycyclic Aromatic Hydrocarbons**
- **Heavy Metals**
- **Feed Additives**
- **Food Contact Materials**
- **GMO**

- **Consumers**
- **Sister DGs in Commission**
- **EFSA**
- **Official control authorities**
- **Standardisation bodies**
- **Scientific community**
- **Industry**

Natural toxins

Process contaminants

Allergens

Sustainable agriculture & authenticity

Melamine

BSE/TSE

Chocolate

GMO's

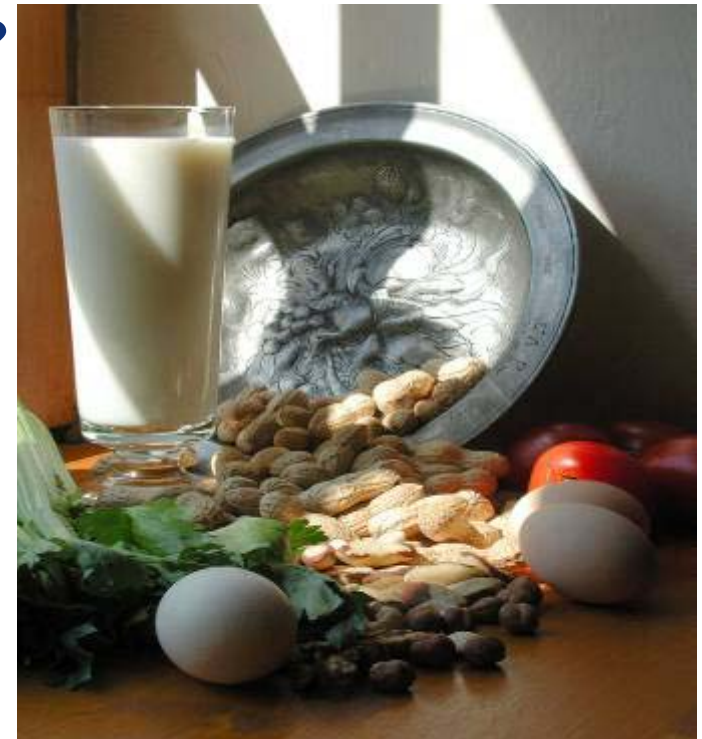
..... *but dynamic => flexibility*

The Issue

- Large - and growing! - number of people affected

The Questions to clarify

- What are the target analytes ?
- Does analytical detectability correlate with allergic reactions?
- Does the labelling of foods match their contents?



The Issue

- The recent crisis in China with milk powder

The Question to clarify

- Can we analyse the presence of melamine in a reliable way in EU?
- The JRC will organise a Proficiency Test .

The Issue

- Various (emerging) food scares, e.g. acrylamide, PAHs, mineral oil in sunflower oil

The Questions to clarify

- Are we looking at the right substances?
- Are the substances stable?
- What should the maximum residue levels be?
- Are established levels being exceeded?

Community Reference Laboratory for PAHs



The Issues

- No analytical methods to distinguish between **organic** and conventional food
 - Geographical origin** not easily verifiable
- => **But risk of fraud** : Need to keep the consumer confidence by verifying authenticity

The Question to clarify

- Can we distinguish analytically between food of different origin?

The Issue

- 5% presence of foreign fats in chocolate permitted
- Difficult to enforce

The question to clarify

- Can we detect if 5% limit is exceeded?

The Issue

-Commonly occurring toxins (RASFF)

The Questions to clarify

- Can we enforce EU legislation?
- What should the maximum residue levels be?
- Are established levels being exceeded?
- Harmonised approach

Community Reference Laboratory



- Food and feed *matrices* are extremely complex
- The number of *compounds* to be measured in food and feed is extremely high
- The number of *products* to be controlled is extremely high
- *Urgency* of demands (if food crisis)

Harmonised, validated methodology across EU allows

- MEMBER STATE AUTHORITIES to decide if a product fulfils safety and quality requirements
- DG SANCO and DG AGRI to establish max. limits when drafting legislation
- EFSA to evaluate intake of contaminants and additives
- INDUSTRY and FOOD AUTHORITIES to save money – because enough to measure *once*
- Easier communication between SCIENTISTS

And, in turn, facilitates higher consumer trust because reliable, agreed results => more clarity ☺

II: Reference Materials

Certified Reference Materials for quantitative GM analysis

- Development, production & distribution of GM CRMs
- Underpinning metrological research: "how far the light shines" for GM measurements (performance limits, measurement uncertainty, metrological traceability)
- International metrology & standardisation of bioanalytical methods (CIPM-CCQM, ISO)



- **Research:** quantification procedures – CRM concepts - technologies
- Knowledge transfer (**ENGL, CEN, ISO, accreditors, etc.**)
 - + Guidance documents (**MU, etc.**)
 - + ERM Application Notes on correct GM quantification etc.

**Accredited for GMO CRM production (ISO Guide 34)
= sole RMP world-wide
and GMO quantification (ISO/IEC 17025)**

RM applications:

Method development

Method validation

evaluation of trueness

uncertainty estimation

Calibration

Proof of method performance

lab-internal quality control ('charting')

operator or equipment qualification

Proficiency testing

training and verification of competence

(external benchmarking)



From IRMM also:

User support

- training workshops
- application notes
- consultations

Expert advice

- for research networks & projects
- standardisation & metrology bodies
- accreditation
- regulators

**Worldwide first
CRM set for DNA
copy number ratio
quantification:**

**CRM ERM-AD413
for real-time PCR
calibration**

GM event MON 810

**CRM ERM-BF413
'maize powder' for
quality control**

Certified for GM mass fraction:

ERM-BF410	RoundupReady® soybean
ERM-BF411	Bt-176 maize
ERM-BF412	Bt-11 maize
ERM-BF413	MON 810 maize
ERM-BF414	GA21 maize
ERM-BF415	NK603 maize
ERM-BF416	MON 863 maize
ERM-BF417	MON 863 x MON 810 maize
ERM-BF418	1507 maize
ERM-BF419	H7-1 sugar beet
ERM-BF420	3272 maize
ERM-BF421	EH92-527 potato
ERM-BF422	281-24-336 x 3006-210-23 cotton seed
ERM-BF423	MIR604 maize
ERM-BF424	59122 maize
ERM-BF425	356043 soybean
ERM-BF426	305423 soybean

17 sets of GMO CRMs = 68 different CRMs

❖ **How to estimate measurement uncertainty for real-time PCR procedures?**

⇒ **Guidance document on www.irmm.jrc.be**

❖ **How to use CRMs for GMO quantification in food and feed?**
(for mass fractions or DNA fractions)

⇒ **2 ERM Application notes on www.irmm.jrc.be**
in 22 languages

RM Certificates and full Certification Reports are freely available via the web catalogue

III: Possibilities for Collaboration

- **National Detached Experts**
- **Post-doc's, Ph.D's:** 4 calls in 2008 and seeking 70 grantholders in 2009
- **Training:** <http://irmm.jrc.ec.europa.eu/html/training/index.htm> **and** <http://irmm.jrc.ec.europa.eu/html/training/trainmic/index.htm>
- **Job opportunities:** http://irmm.jrc.ec.europa.eu/html/job_opportunities/index.htm

Scientific publications:

<http://irmm.jrc.ec.europa.eu/html/publications/index.htm>

Newsletters:

<http://irmm.jrc.ec.europa.eu/html/publications/subscription/index.htm>

Events: <http://irmm.jrc.ec.europa.eu/html/events/index.htm>

Collaborative trials (Proficiency testing, Inter-laboratory validation studies):

http://irmm.jrc.ec.europa.eu/html/interlaboratory_comparisons/index.htm

Reference Materials:

http://irmm.jrc.ec.europa.eu/html/reference_materials_catalogue/user_support/index.htm

Metrology support programme, Status Report on Bulgaria:

http://irmm.jrc.ec.europa.eu/html/enlargement/bulgaria_status_report.pdf

Call for Collaborators for stability studies and certification projects:

http://irmm.jrc.ec.europa.eu/html/calls/call_for_collaborators/index.htm

Joint participation in FP 7 projects

- **Harmonised, reliable analytical methodology in the area of food safety and quality is the *foundation* upon which risk assessment and law enforcement is built.**
- **The tasks that still remain to be carried out are extensive, and transgress national borders => collaboration is crucial.**



High Performance Liquid chromatographs coupled to different types of detectors:

Spectrophotometric: UV or PDA (photodiode array)

Fluorimetric

Electrochemical: amperometric

Evaporative light scattering

Refractive index

Mass spectrometry: quadrupole, triple quadrupole, ion trap, quadrupole-time-of-flight

Thin Layer Chromatography with

UV and

Fluorescence detection

Gas chromatography coupled to:

FID

Mass spectrometry (MSD)

Gel Permeation Chromatography (GPC)

Polymerase Chain Reaction (PCR) techniques

Real-time PCR

Classical PCR

2D-gel electrophoresis

Spot Picker system

Immunoblotting platform

Fluorescence based scanner

Fluorescence based image analyser

Densitometer

Refractometer

Electron Spin Resonance spectroscopy system (EPR)

Climatic Chamber

Electronic nose

UV/Vis spectrophotometer

Kjeldahl Nitrogen Analyser

Microplate readers