



## *Improving methodologies to prevent food frauds:* Cooperation between laboratories and validation of techniques

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## The Consumer expects that food

- is fresh, however able to be stored for long period
- looks and tastes good, but is as natural as possible
- is not expensive (affordable/cheap)
- represents what is labelled
- is safe





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## Food control and measurements

- a huge number of measurements are performed daily to control food and other consumer goods
- important decisions are taken based on those measurements
- modern techniques are used, not always available to all laboratories
- robustness of 'omics' methods still to be confirmed
- need for harmonised implementation of policies



## Food and feed safety and quality control

### *Requires:*

- appropriate sampling
- fit-for-the-purpose analytical methods (microbiological, chemical, physical-chemical, biotechnological, rheological, sensorial....)
- rapid screening methods
- precise and specific methods
- quality assurance tools
- accredited laboratories



## Control laboratories and quality assurance

It is internationally recognised that a laboratory must take appropriate quality assurance measures:

- using validated methods of analysis
- using internal quality procedures
- participating in proficiency testing schemes
- becoming accredited to an international standard



## Validated methods



- need for reliable analytical methods
- methods to determine compliance with labelling and regulations
- validation determines reliability of methods
- essential component in quality assurance
- international requirements in all areas of analysis

## Validation procedures

- inter-laboratory validation: 'full' validation = collaborative study (trial), ideally at international level
- single laboratory validation: 'in-house' validation



## In-house validation

- ensures the validity of the method prior to the costly exercise of a formal collaborative trial
- ensures that validated methods are used correctly when used by analysts prior to undertaking a study
- provides evidence of the reliability of analytical methods if
  - criteria from a full validation study are not available
  - conduct of full validation study is not feasible (difficult matrix/analyte) or affordable (economic reasons)



## Method performance characteristics

- demonstrate that the method is fit for the intended purpose
- are experimentally derived
- serve to assess the suitability of the method



## Suitability of a method

- Applicability
- Selectivity
- Calibration
- Trueness
- Precision
- Recovery
- Range
- Limit of quantification
- Limit of detection
- Sensitivity
- Ruggedness
- Fitness for the purpose



## Collaborative trial validation

- ultimate method validation based on internationally agreed protocols
- requires suitable test materials
- requires a minimum of 5 test materials and participation of at least 8 laboratories reporting valid data
- objective assessment whether a method is fit for the purpose
- labour intensive and costly exercise



## Method validation protocols and measurement uncertainty guidelines

- number of guidelines developed by various organisations such as ISO, AOAC International, NMKL, EURACHEM, IUPAC...
- internationally accepted guidelines for in-house validation and collaborative trial validation
- ISO guidelines "Guide to the Expression of Uncertainty in Measurements" interpreted by EURACHEM



## Introduction of a new method in the laboratory

Familiarisation with the method depends on the validation of the method and competence of the laboratory:

- laboratory uses a fully validated method
- laboratory uses a fully validated method, but different matrix or new instrument
- laboratory uses a well-established but not fully validated method
- laboratory uses a method that is published in the scientific literature
  - with only some analytical characteristics
  - no characteristics given
- laboratory uses a method developed in-house



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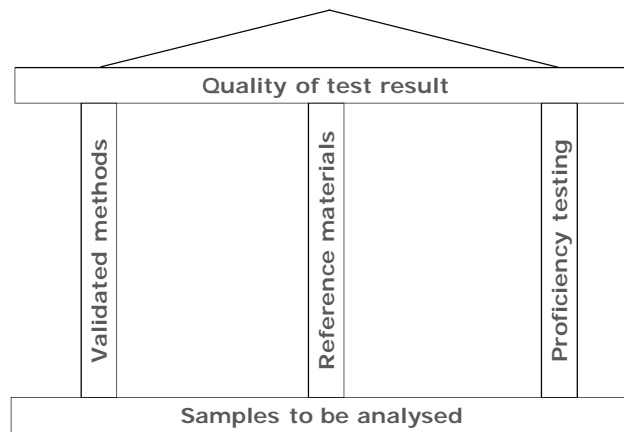
## Other quality assurance tools

- reference materials
  - test materials for proficiency testing
  - certified reference materials
    - ✓ analyte for calibration of instrumentation
    - ✓ matrix reference materials to check full performance of method in the laboratory
- proficiency tests



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## Quality assurance tools for quality of test results



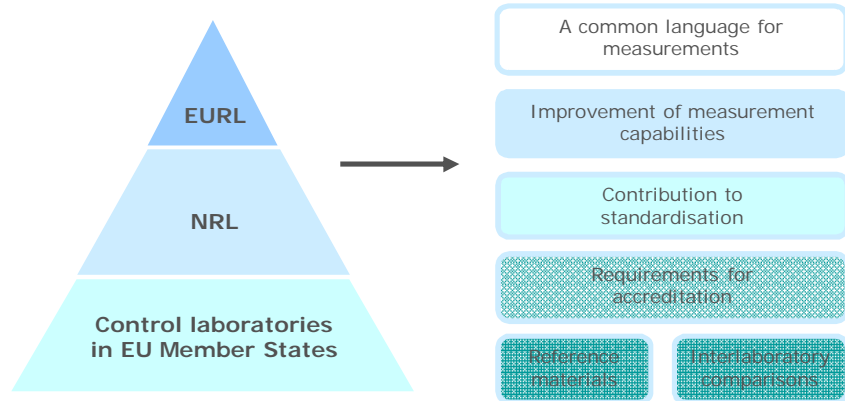
## Need for cooperation of laboratories

- exchange of best practices
- partners in collaborative trials to achieve
  - interlaboratory (fully) validated methods
  - certified reference materials
- Share burden of
  - method development
  - production of reference materials
  - provision of proficiency tests





## Importance of networking: EURLs/NRLs



## Conclusions



## Need for fit-for-purpose food control

- food is complex and requires mostly sophisticated measurement processes
- food control needs to be affordable and not to hamper trade, there is a need for rapid but accurate screening methods
- food safety control needs to follow recommendations (levels) from risk assessment
- food quality control requires multi-methods and pro-active approaches to cope with fraudulent practices – looking for the "unknowns"



## Requirements to obtain robust and reliable data

- validated and harmonised protocols for sampling and measurements
- multi-methods for multi-analytes
- certified reference materials & material and databanks
- collaboration of analytical laboratories, proficiency testing providers and reference materials producers



## Method validation and cooperation are important

- to ensure reliable data and therefore
  - to ensure consumer's confidence
  - to facilitate trade
- to have confidence in measurements avoiding disputes between Member States and other countries
- to have confidence in risk (hazard) assessment results
- to reduce costs providing efficiency and preventing duplication of measurements



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for your attention**

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