Coordination across working groups and beyond: the CCQM Task Group on Food Measurements

Jeremy Melanson – NRC Canada

16 October, 2025

Specific activities to be undertaken by the Task Group:

- **To develop a document describing the CCQM strategy and work programme of 2021-2030 within the field of food safety and measurement**, based on the published CCQM 2021-2030 strategy, that can be used as publicly accessible reference to describe how the international metrology community is planning to meet measurement needs related to food and food safety;
- **To identify gaps in measurements needs related to food and food safety** not yet identified in the CCQM 2021-2030 strategy, and propose how the strategy could be updated to address these;
- **To identify unmet stakeholder engagement opportunities** and how these could be exploited to promote the benefits of metrology and NMI services or used to identify new measurement needs;
- **To liaise with other CCs and identify measurements related to food and food safety covered** by activities in these communities that could be incorporated into broader document covering food measurements issues and needs including those outside chemical and biological measurements.

CCQM Task Group on Food Measurement (CCQM-TG-FOOD)

Chair

Dr Jeremy Melanson
Director of R&D
National Research Council of Canada
Canada

Secretary

Dr Ralf Josephs
Bureau international des poids et mesures
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https://www.bipm.org/en/committees/cc/ccqm/wg/ccqm-tg-food/members

Members

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Dr Ki Hwan Choi
APMP Food Focus Group and APMP representative, KRISS

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Dr Patricia Grinberg
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CCQM-IAWG representative, NMISA

Dr Dmitriy Malinovskiy
CCQM-IRWG representative, LGC

Dr Chiara Portesi
CCQM-PAWG representative, INRIM

Dr Catherine Rimmer
CCQM-OAWG representative, NIST

Dr Andrea Mario Rossi
CCQM-SAWG and EURAMET/EMN for Safe and Sustainable Food representative, INRIM

Dr David Worton
CCQM-GAWG representative, NPL

CCQM WGs with a food safety/security component to their current strategy documents

Sector	CCQM OAWG	CCQM PAWG	CCQM NAWG	CCQM CAWG	CCQM SAWG	CCQM EAWG	CCQM IAWG	CCQM IRWG	CCQM GAWG
Food Safety	Toxins Contaminants Residues Authentication	Allergens Authentication	GMO-Foods Pathogens	Pathogens	Packaging materials		Heavy metal Contaminants Speciation	Food authentication	VOCs from packaging materials

New!

Other CCQM TGs:

- CCQM TG on nano- and microplastics
- CCQM-IAWG-SAWG TG on particle measurements

Interest from other CCs:

- CCT – humidity measurements in food
- CCPR – spectroscopic measurements for online monitoring of food processing
- CCM – density and pressure measurements for food
- CCIR – food sterilization by irradiation

Recent engagement activities

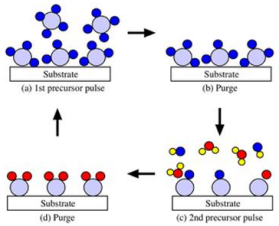
- **CCQM WG workshop on food measurements**
  - WG chairs or delegates presented 10 mins on the food components of their strategies, highlighting any recent or upcoming changes
  - Date: **Tuesday, 26 November 2024,** 12 pm – 2 pm (Paris time)

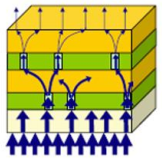
- **Stakeholder online workshop**
  - Dates: **February 10-13, 2025,** 12 pm – 2 pm (Paris time)
  - Day 1: Challenges in Assuring Authenticity and country-of-origin
  - Day 2: Challenges with novel/alternate foods
  - Day 3: Emerging contaminants
  - Day 4: Food measurements within other CCs

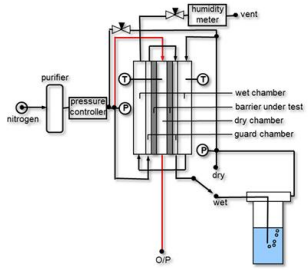
CCQM WG workshop on food measurements (Nov 24 2024)

GAWG

Metrology to underpin sustainable food packaging







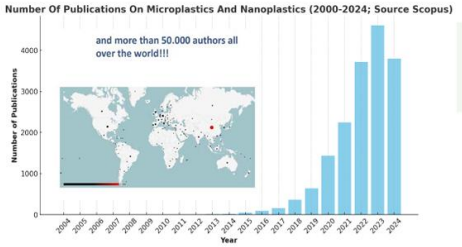
- Sputter deposition
- Atomic Layer deposition
- Single layer and composite barriers

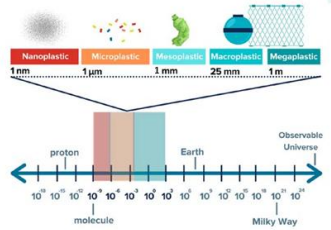
SAWG

Microplastics: State of the art

Background

Micro and nanoplastics contaminations in food and the environment are growing fast and there are concerns about the potential consequences for the environment and human health. **To have reliable and comparable data are mandatory for the society, to meet regulatory requirements and, in particular, for the decision-makers.**





Microplastics (MPs) = "**small solid particles composed of synthetic polymers that are non-degradable and less than 1mm in size**"

CEN ISO/TR 21960:2020* (ISO)

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Stakeholder workshop February 10-13, 2025 : Day 1 - Challenges in Assuring Authenticity and country-of-origin

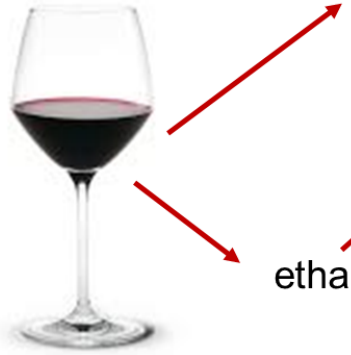
Introduction	**Jeremy Melanson, NRC (Canada)**
IRMS	Luana Bontempo, Fondazione Edmund Mach (Italy)
NMR authentication of honey	Ian Burton, NRC (Canada)
DNA and Next Gen Sequencing	Rosalee S. Hellberg, Chapman University (United States of America)
Panel discussion **Facilitator: Dmitriy Malinovskiy, LGC (United Kingdom)**	

Key outcomes:

- Definite need for authentic food matrix reference materials for isotope ratio measurements, NMR measurements and gene sequencing.
- Requirement for distributed, open-source database model for food authentication data.
- Potential for directed AI training using validated information sources for food authentication.

Isotope Ratio Measurements in Food (CCQM-IRWG)

Food Authenticity

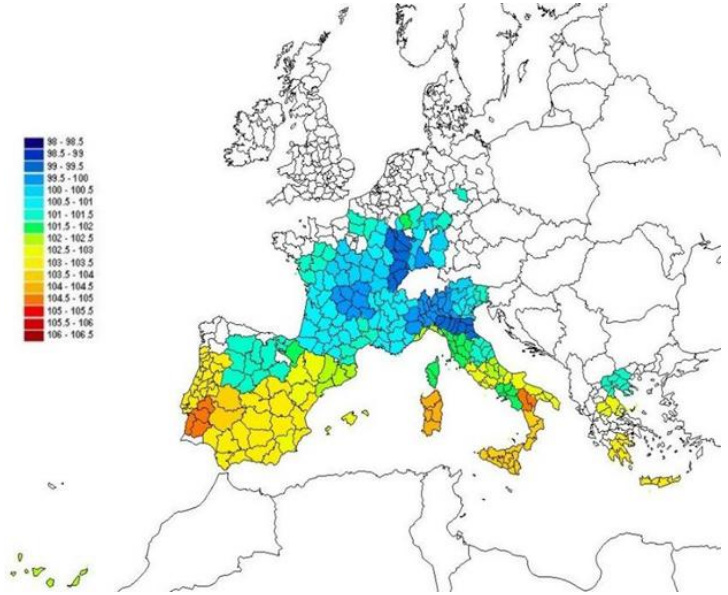


$^{18}O/^{16}O$ water = **-2.0 ‰**

$^{13}C/^{12}C$ alcohol = **-26.2 ‰**

ethanol

$(D/H)_I$ alcohol = **96 µmol/mol**



Year	Method	product	Method	Isotope Ratio	Fraud
2001	OIV 17/2001	wine, must	IRMS	$^{13}C/^{12}C$	sugar addition (cane)
2003	EU Reg. 2676/90, 440/03	wine, must	IRMS	$^{13}C/^{12}C$	sugar addition (cane)
2003	OIV MA-F-AS314-03	wine	IRMS	$^{13}C/^{12}C$	technogenic CO_2

Stakeholder workshop February 10-13, 2025 Days 2 to 4

Day 2 - Challenges in novel foods	Catherine Rimmer, NIST (United States of America)
Novel proteins in foods - functional ingredients and meat alternatives	Clare Mills, GiantLeaps, University of Surrey (United Kingdom)
Novel Plant Proteins	Walter Nelson, Keygene (United States of America)
Measuring Mayhem: When Allergen Quantification goes nuts	Bert Popping, FOCOS (Germany)
Panel discussion Facilitator: Jeremy Melanson, NRC (Canada)	

Day 3 – Challenges with emerging contaminants	Maria Fernandes-Whaley, NMISA (South Africa)
Pathogens	Janaina Cavalcante, INMETRO (Brazil)
Emerging Toxins and residues	Michael Sulyok, iBAM Bioanalytics and Agro-Metabolomics, BOKU Univ. (Austria)
PFAS in food and food contact materials	Alexandra Jaus / Marina Zbinden, ScreenFood4Safety, METAS (Switzerland)
Panel discussion Facilitator: Catherine Rimmer, NIST (United States of America)	

Day 4 – Food measurement challenges within other CCs	Ralf Josephs, BIPM
Dose measurements and standards relevant for food irradiation (CCRI)	Christina Ankjaergaard / Arne Miller, Technical University of Denmark, DTU (Denmark)
Infrared sensing platform for analysis of proteins in feeds and foods (CCPR)	Achim Kohler, Photonfood, Norwegian University of Life Sciences (Norway)
Developing traceable density and pressure measurement methods for emerging requirements in the food industry (CCM)	Stuart Davidson, NPL (United Kingdom)
Panel discussion Facilitator: Jeremy Melanson, NRC (Canada)	

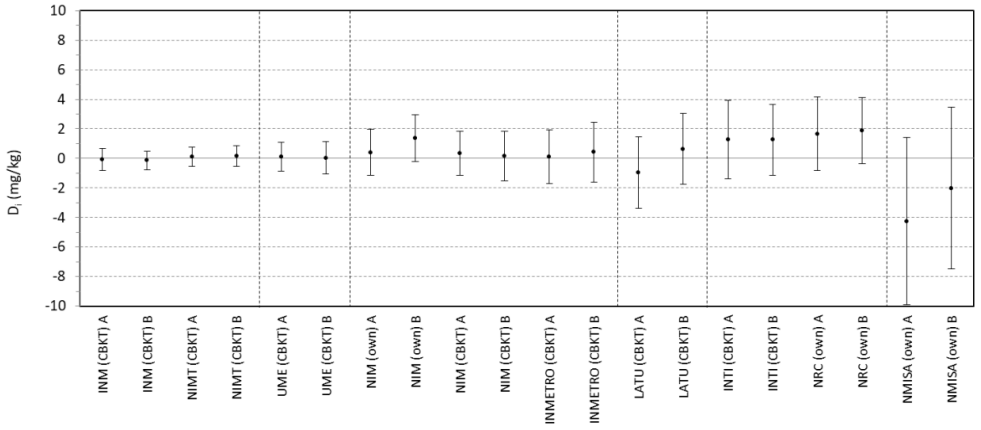
Coordination across NMIs: typical NMI activities related to food

- Specialized research and testing
- Reference laboratory function, support to network of testing labs
- Development of reference methods (CODEX, AOAC, etc)
- Provision of certified reference materials for traceability (primary calibrators) and method validation (matrix materials)

BIPM CBKT: Mycotoxin Metrology (started 2016)

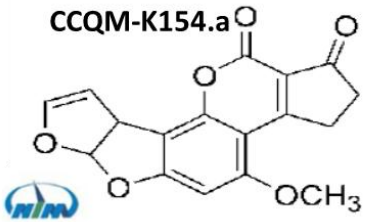
- **Allows emerging NMIs to build capacity and more established NMIs to verify their calibration solution CRM values prior to launch – saving valuable resources**

CCQM-K154.c Model 2 – Organic Solvent Calibration Solution Gravimetric preparation and value assignment of deoxynivalenol (DON)

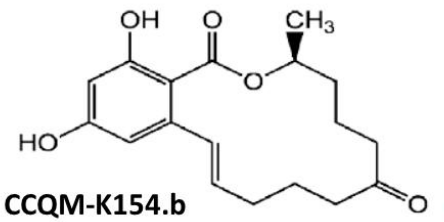


Aflatoxin B_1 (AfB_1)

CCQM-K154.a

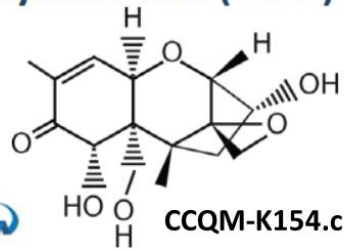


Zearalenone (ZEN)



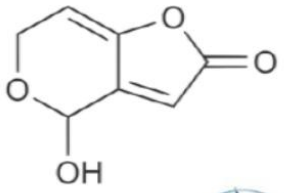
CCQM-K154.b

Deoxynivalenol (DON)



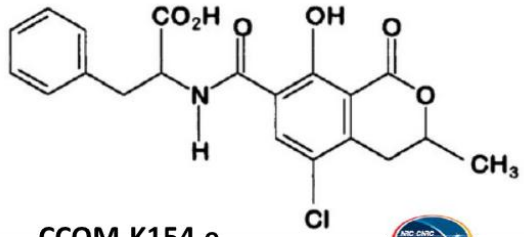
CCQM-K154.c

Patulin (PAT)



CCQM-K154.d

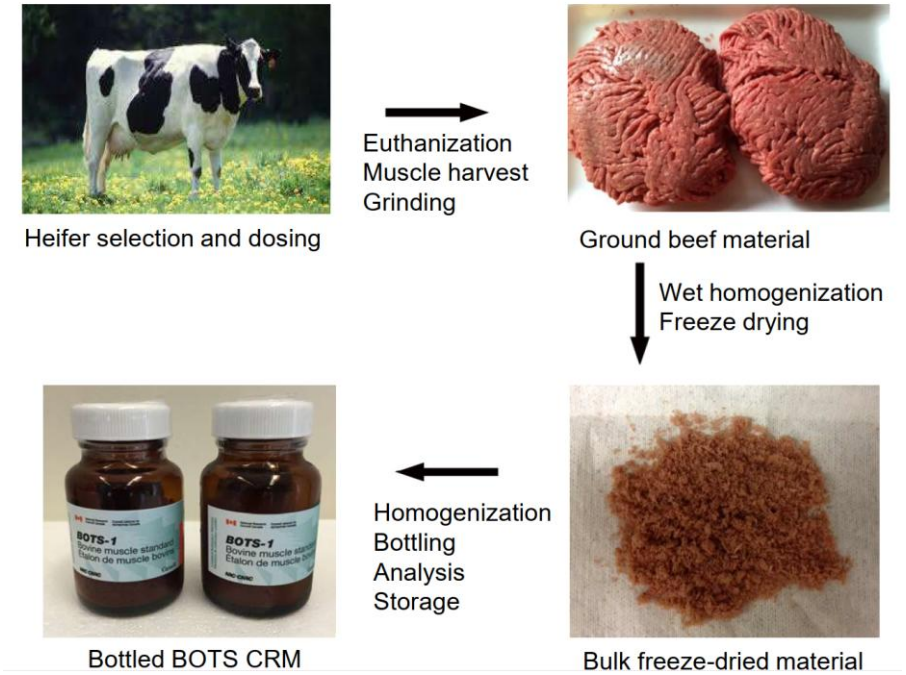
Ochratoxin A (OTA)

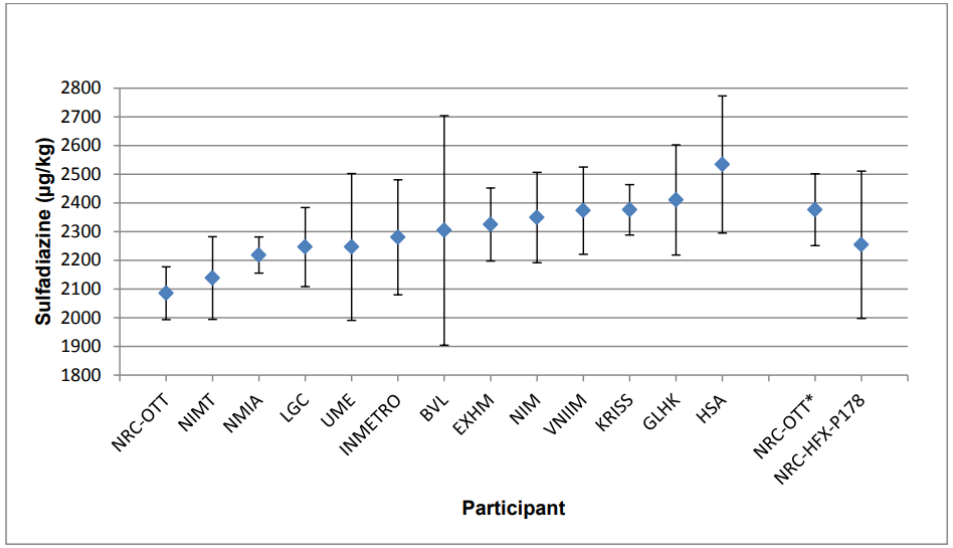


CCQM-K154.e

(2024)

Leveraging CCQM studies to obtain certification data for matrix reference materials – CCQM-K141 Veterinary Drug Residues in Bovine Tissue





Substance	Molecular formula	Mass fraction µg/kg	Mass fraction reconstituted*, µg/kg
chlorpromazine	$C_{17}H_{19}ClN_2S$	441 ± 80	147 ± 27
ciprofloxacin	$C_{17}H_{18}FN_3O_3$	47 ± 4.4	16 ± 1.5
clenbuterol	$C_{12}H_{18}Cl_2N_2O$	3.3 ± 1.4	1.1 ± 0.5
dexamethasone	$C_{22}H_{29}FO_5$	9.5 ± 0.8	3.2 ± 0.3
enrofloxacin	$C_{19}H_{22}FN_3O_3$	57 ± 3.6	19 ± 1.2
meloxicam	$C_{14}H_{13}N_3O_4S_2$	3.0 ± 0.4	1.0 ± 0.1
ractopamine	$C_{18}H_{23}NO_3$	12.4 ± 1.2	4.1 ± 0.4
sulfadiazine	$C_{10}H_{10}N_4O_2S$	2290 ± 130	763 ± 42

Cooperation between NMIs on Reference Materials

Accreditation and Quality Assurance (2018) 23:371–377
https://doi.org/10.1007/s00769-018-1349-1

INTERNATIONAL BODIES

Cooperation in publicly funded reference material production

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Introduction

The meeting was organised by the European Commission's Joint Research Centre and held at the JRC-Geel site on 22–23 February 2018. It was a follow-up of a similar meeting held in 2009. The objective of the meeting was to exchange information about ongoing publicly funded reference material (RM) production, identify areas of interest for future specific RMs, including certified reference material (CRM) developments, investigate potential areas of collaboration, and to identify areas which may be of a lower importance in the future for a specific RM producer. The benefit of exchanging such information is to avoid duplication of efforts in RM production, make better use of public funds by potentially matching competencies, and to address problems that are common to publicly funded RM producers. Attendees included representatives of the following organisations: Bundesanstalt für Materialforschung und –prüfung (BAM), Germany; IAEA Environment Laboratories, Monaco; the Joint Research Centre (JRC), Belgium (formerly IRMM); the Korea Research Institute of Standards and Science (KRISS), South Korea; LGC, UK, the National Institute of Standards and Technology (NIST), USA; the National Measurement Institute of Australia (NMIA), Australia; the National Metrology Institute of South Africa (NMISA), South Africa; and the National Research Council Canada (NRCC), Canada. National Metrology Institute of Japan (NMIJ), Japan, and National Institute of Metrology (NIM), China, were invited but declined or were unable to attend. The remaining nine attendees participated physically or via videoconference. The full group of eleven RM producers corresponds to the major publicly funded RM producers according to the activity reports of the International Standards Organisation's committee on reference materials (ISO-REMCO).

In preparation for the meeting, each participating organisation provided a list of current and planned projects. During the meeting itself, each institution presented its main fields of activity and offered additional information on its RM programme as required. Discussions not only addressed detailed technical questions but also dealt with questions on policy and legal status.

Additional meetings like this can help to assist in the overall prioritisation of RM production internationally. This meeting report discusses the drivers and approaches taken by publicly funded RM producers and analyses the areas of RM development currently being covered. A view of current areas of activity of the publicly funded RM producers is provided, and a summary of some future trends is given.

Definitions

In the following text, the terms RM and CRM will be used extensively to describe the main product(s) of RM producers, together with relevant RM documentation, e.g. RM reports and certificates that accompany CRMs [1]. The

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3 LGC, Teddington, UK
4 National Metrology Institute of South Africa (NMISA), Pretoria, South Africa
5 National Measurement Institute of Australia (NMIA), Lindfield, Australia
6 National Research Council Canada (NRCC), Halifax, Canada
7 Bundesanstalt für Materialforschung und –prüfung (BAM), Berlin, Germany
8 International Atomic Energy Agency (IAEA) Environment Laboratories, Monaco City, Monaco
9 Korea Institute of Standards and Science (KRISS), Daejeon, South Korea

- First meeting of **Publicly Funded Reference Material Producers** was held in Geel, Belgium in February 2018
- Since then the group has met virtually, likely lost momentum during the pandemic
- Goals are to find areas to collaborate and reduce duplication of efforts, sharing long term plans as appropriate, with food RMs a top priority for most NMIs
- The group also serves as the unofficial steering committee for the International Biological and Environmental Reference Materials Symposium, last held in Halifax, Canada in June 2025

Collaborations on specific reference materials

Anal Bioanal Chem (2017) 409:95–106
DOI 10.1007/s00216-016-0004-0

PAPER IN FOREFRONT

A mussel tissue certified reference material for multiple phycotoxins. Part 4: certification

Pearse McCarron[1] · Elliott Wright[1] · Håkan Emteborg[2] · Michael A. Quilliam[1]

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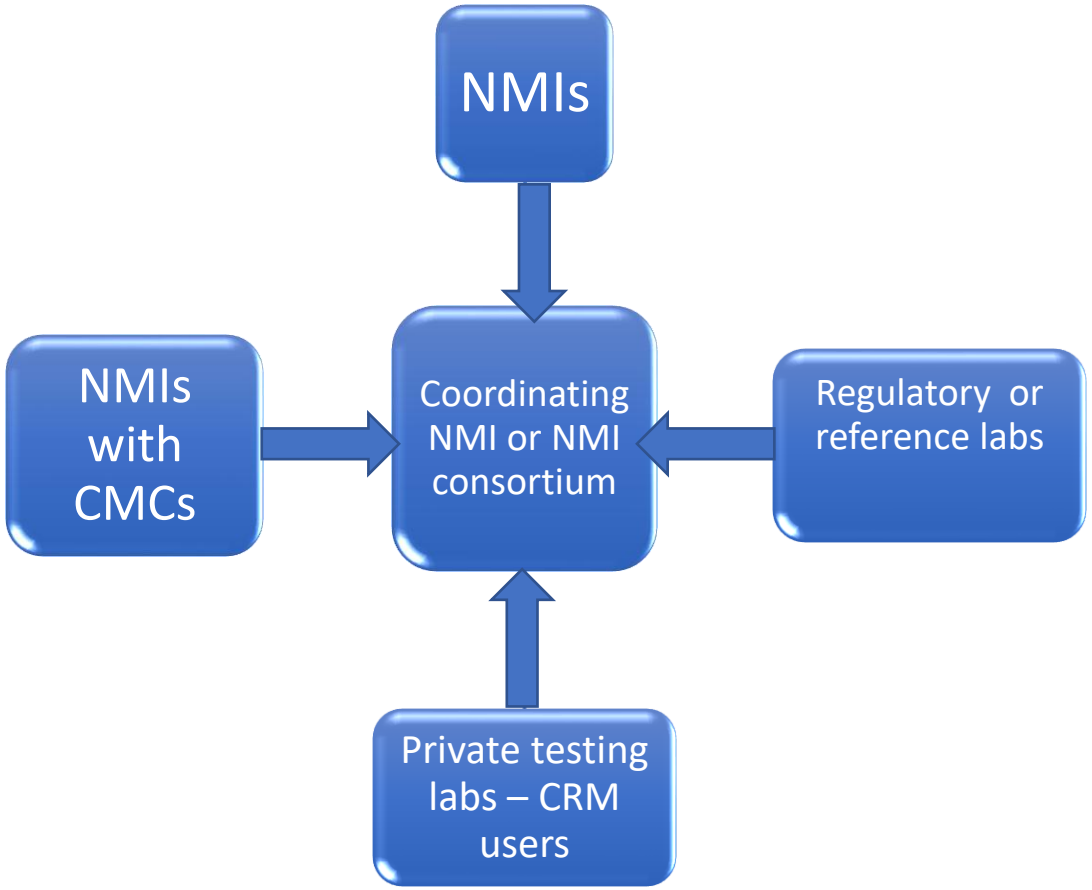
2 European Commission, Joint Research Centre, Directorate F – Health, Consumers, and Reference Materials, Retieseweg 111, 2440 Geel, Belgium

Future of certified reference material development?

- Data provided from multiple sources, leveraging digital tools and AI for automated data analysis and coordination



Next steps for Food Measurements TG

- Next meeting planned for Thursday, Oct 23rd
- Complete draft by Jan 1, 2026
- Final report delivered to CCQM chair by April 2026 meeting, in time for CGPM 2026 in November

Thank you

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