Chemical Metrology and Food Measurements: A Perspective from SIM MWG-8

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Outline

- Introduction
- Comparisons related to food measurements
- Dissemination and training in food measurements
- Opportunities to ensure food measurements

Introduction

RMO in America (SIM)

Promote international cooperation on metrology issues and is committed to implementing a global measurement system that all users can trust.

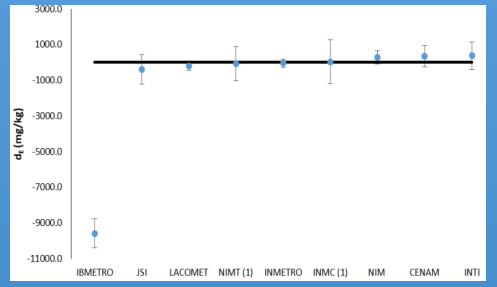
Promotes and supports an integrated measurement infrastructure in the Americas.

KCDB	SIM
Number of CIPM MRA participants	56
Number of CMCs	4484
Number of key comparisons	78
Number of supplementary comparisons	122

MWG-8 in CHEMISTRY (SIM)

The Chemical Metrology Working Group in SIM, MWG-8, supports SIM and its member NMIs/DIs in reaching the obligations requirements of CIPM-MRA in the field of metrology in chemistry and biology measurements

Organizes regional key and supplementary comparisons as well as pilot studies linked to the CCQM



Facilitates cooperation in preparing, reviewing, publishing and maintaining CMCs claims of member economies and DIs

KCDB SIM

Number of CIPM MRA participants	56
Number of CMCs	4484
Number of key comparisons	78
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Disseminates knowledge and facilitates technical cooperation through meetings, workshops, awareness seminars and training opportunities

Seeks harmonization among its members through sustainable networking

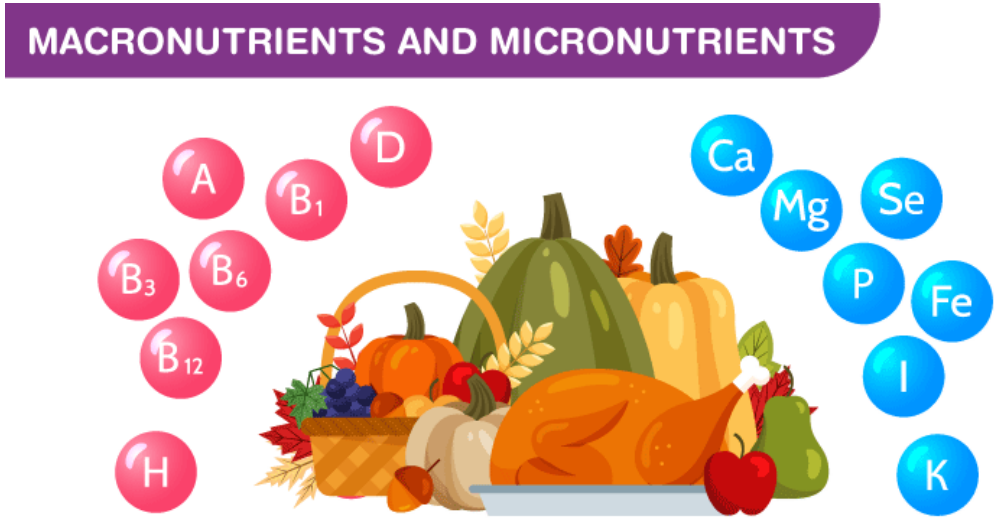
SIM comparisons related with food measurements

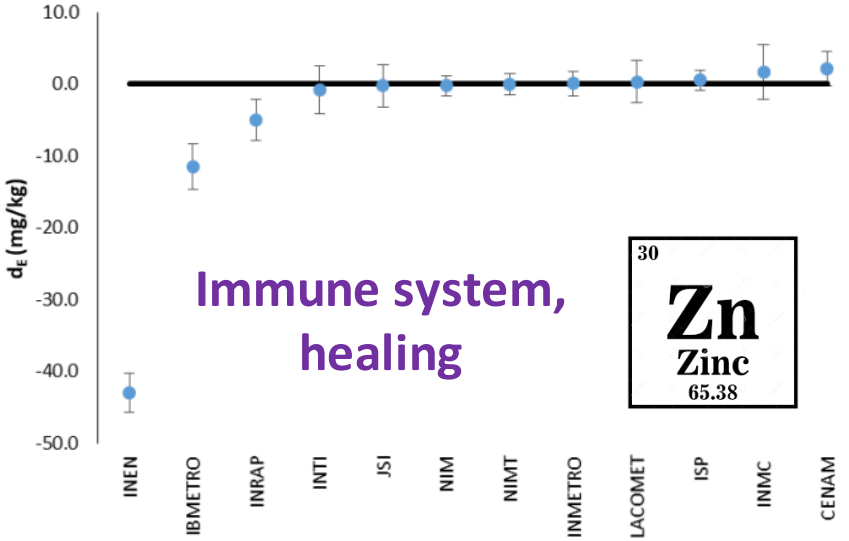
SIM comparisons (in progress and finished)

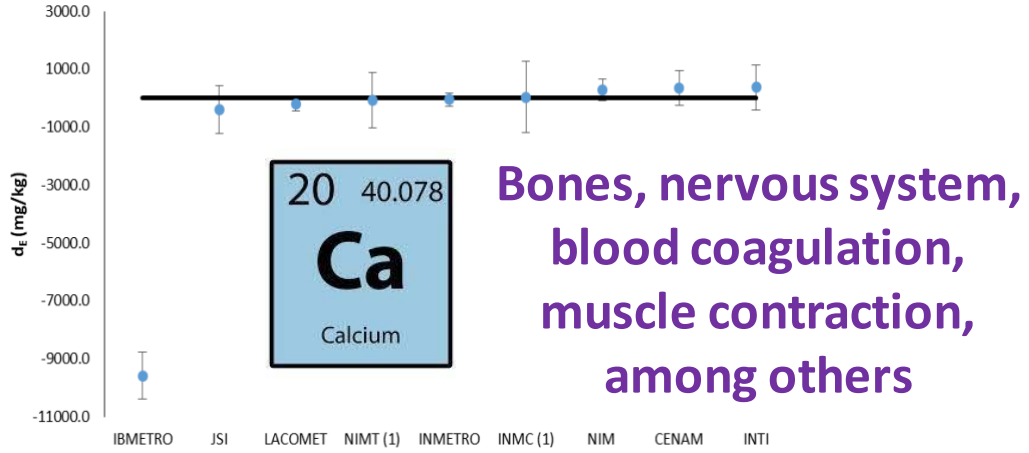
K-comparisons ensure comparability between different economies and serve as fundamental evidence to enhance safety and health in SIM countries

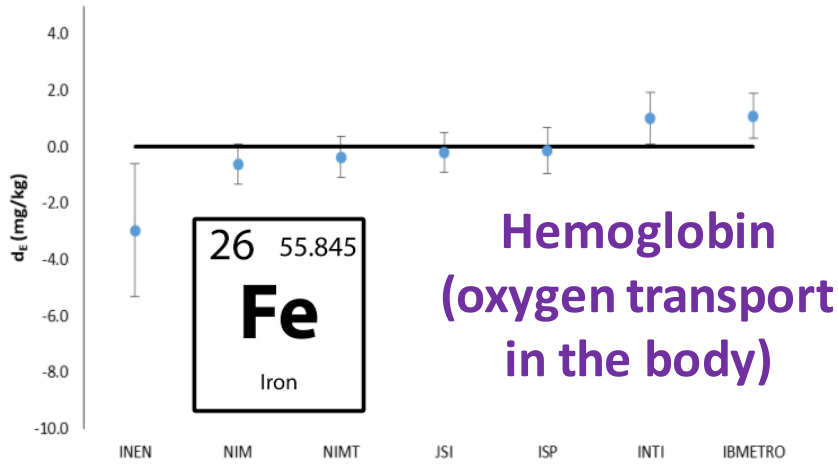
Field	Pilot Lab	Name	Measurement Capability	Status	Number participants
OA	CENAM/INMETRO	SIM.QM-S17	Ethanol in Water	Draft B (set to OQWG)	13
	NRC	**SIM.QM-S10**	**Trace Elements in Skim Milk Powder**	**KCDB (Published on)**	**12**
	LATU	**SIM.QM-S11&P25**	**Trace of As, Cd, P and Na in Mate**	**Draft A (presented to IAWG)**	**16**
IA	NRC	SIM.QM-S12	Elements in Natural Water	Draft A (presented to IAWG)	21
	CENAM/INMETRO	SIM.QM-S13	Elements in Cu Concentrate & Ore	Running intercomparison	11
	INMETRO	SIM.QM-S16	Metals in Water	Registered (IAWG)	To be define
GA	CENAM-KRISS	SIM.QM-S5	Natural Gas	Draft A (waiting aproval GAWG)	7
	CENAM-KRISS	SIM.QM-S6	Automotive Emissions	Draft A (available April 2023)	5
	INMETRO	SIM.QM-S9	Biogas	Draft B (available April 2023)	4
	CENAM	SIM.QM-S14	Carbon Dioxide in Nitrogen	Draft A (available March 2023)	4
	CENAM	SIM.QM-S15	Methane in Air	Draft B (available March 2023)	4
NA	CENAM	SIM.QM.Pilot study	SARS-CoV-2 DNA Copy number quantification	Draft A (Report prepared)	4

SIM comparisons (Published example)









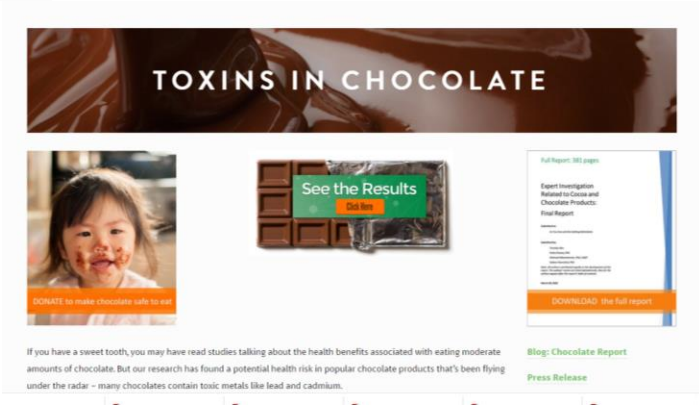
SIM comparisons (in progress)

Chocolate (final Product)

Global chocolate consumption:
~7 500 million kg/year
Global chocolate industry worth:
~ USD $130 billion

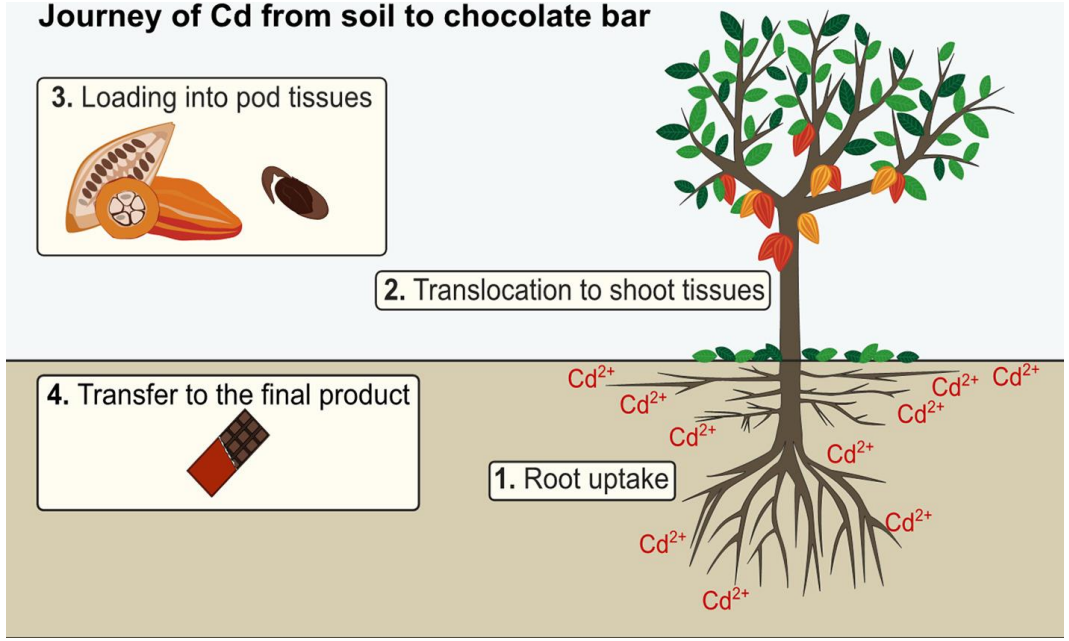
Cacao (primary ingredient in chocolate making)

Global Production:
~ 5000 million kg/year



Field	Pilot Labs	Comparison type	Measurement Capability	Status
IA	NRC & CENAM	Supplementary	Cd and Pb in Cacao powder	• Presented at SIM MWG8 (September 2022) • Presented at IAWG (2023)

SIM comparisons (in progress)



Science of the Total Environment (2021) 781, 146779

Regulatory frameworks	Cd	Pb
EU Regulations (488/2014) cocoa powder	**0.60 mg/kg**	--
FAO/ WHO food standards programme (Codex alimentarius commission)	under revision	
California Proposition 65	4.1 µg/day	0.5 µg/day
US FDA guidance for industry		0.1 mg/kg

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Dissemination projects and training

Dissemination projects and training

Capacity Building and Knowledge Transfer Programme

Safe Food and Feed – Mycotoxin calibrant reference materials

- Developing Capabilities
- Transfer of knowledge
- Applying knowledge
- Demostration Competence
- Providing Services

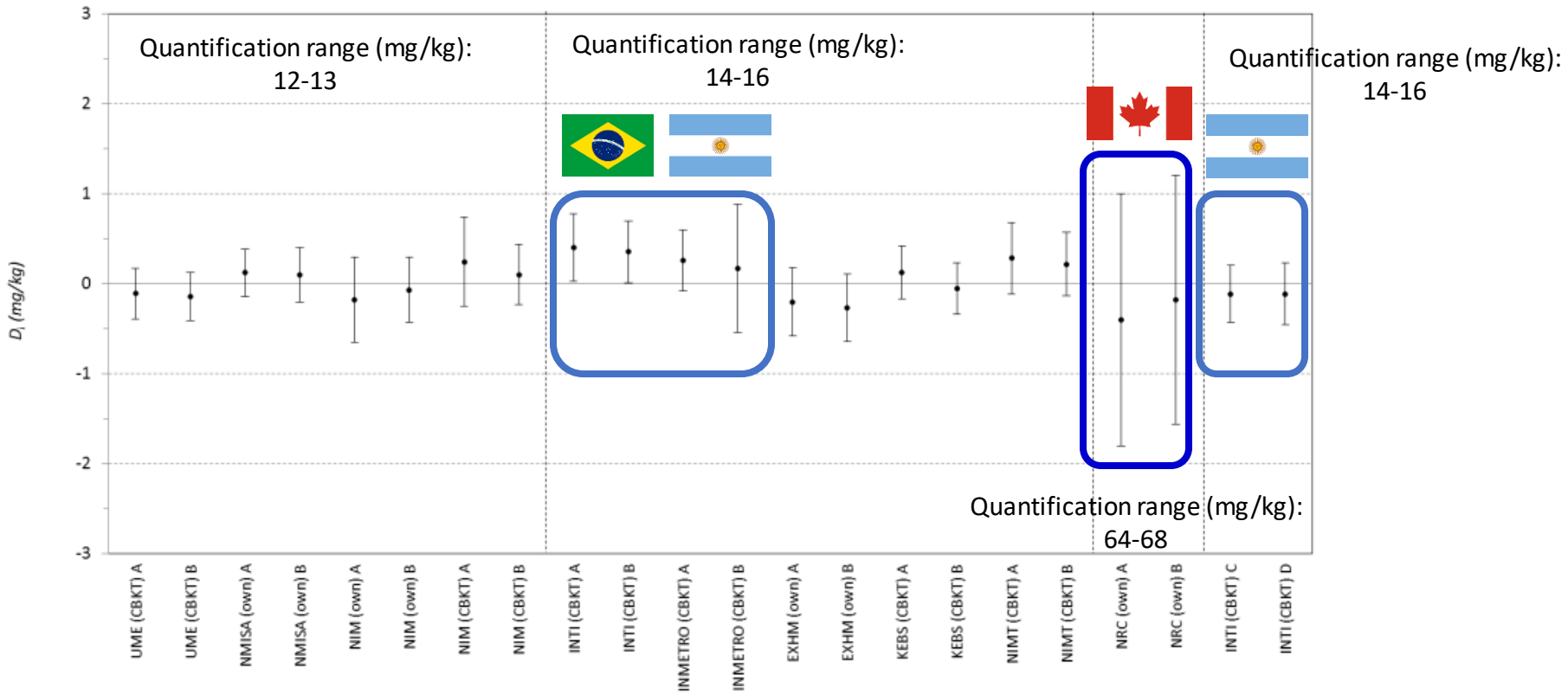
Dissemination projects and training

Capacity Building and Knowledge Transfer Programme

Safe Food and Feed – Mycotoxin calibrant reference materials

Demostration Competence

trans-zearalenone (trans-ZEN) in acetonitrile (ACN)



Absolute values for the degree of equivalence for CCQM-K154.a/K154.a.1

(Metrologia, 2020, vol. 57, no 1A, p. 08019)

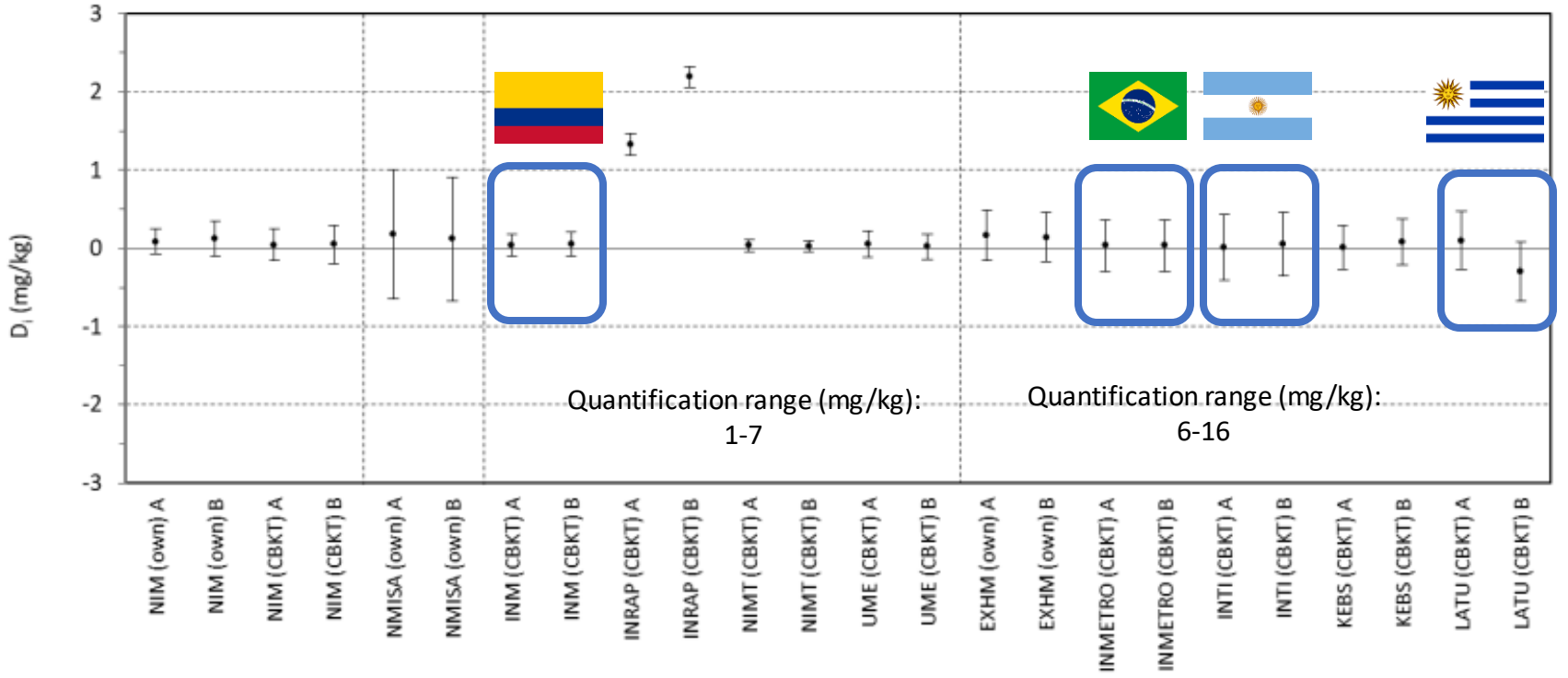
Dissemination projects and training

Capacity Building and Knowledge Transfer Programme

Safe Food and Feed – Mycotoxin calibrant reference materials

Demostration Competence

Aflatoxin B1 (AfB1) in acetonitrile (ACN)



Absolute values for the degree of equivalence for CCQM-K154.b

(Metrologia, 2022, vol. 59, no 1A, p. 08002)

Dissemination projects and training

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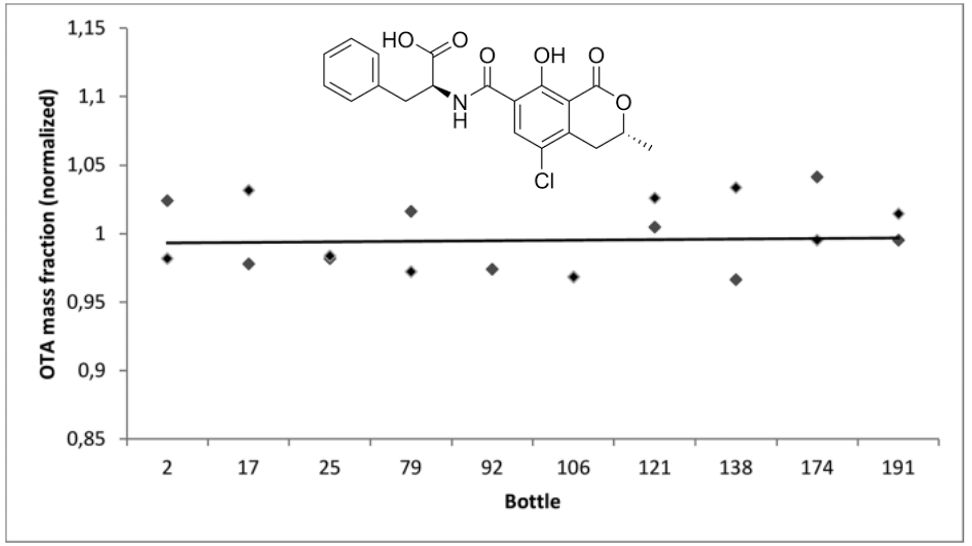
Providing Services

Mycotoxin CRM of Zearalenone (ZEN)
ZEN mainly affects corn, wheat and derived products. Picture (INTI)



Homogeneity study of candidate CRM of Ochratoxin A (OTA) in roasted coffee (INMETRO)

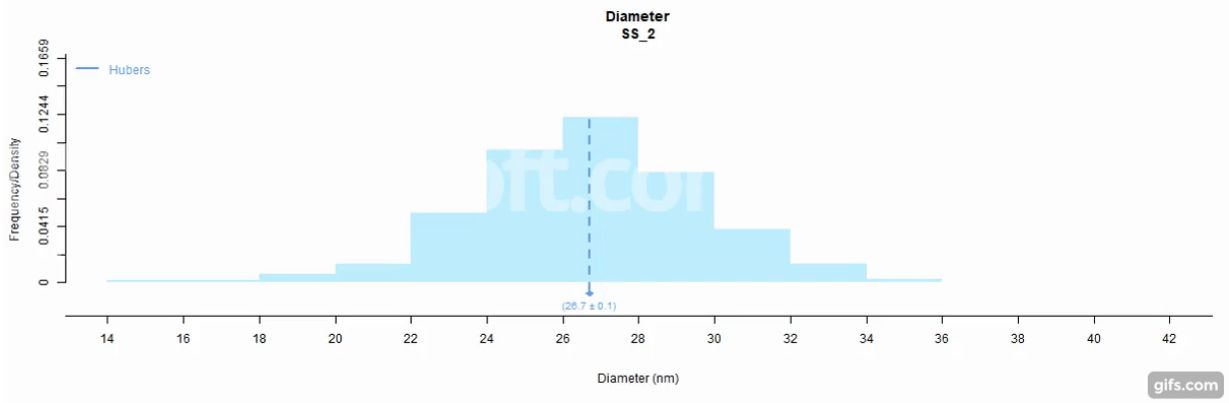
Journal of AOAC International, 2019, vol. 102, no 6, p. 1725-1731

Dissemination projects and training

Other metrological dissemination activities, as well as trainings and workshops that the SIM has either participated in or plans to organize in the near future

Workshop "Making an impact on water quality for public health & safety:

- ✓ Held from March 6 to 9, 2023, in Kuala Lumpur, Malaysia
- ✓ Participation of 3 representatives from SIM NMIs



NanoWorkshop

- ✓ Confirmed participants (8 participants):

  Costa Rica (LACOMET), Mexico (CENAM), Brazil (INMETRO), Argentina (INTI), Uruguay (LATU), Colombia (INM Colombia), Chile (CODELCO) and Peru (INDECOPI).

- ✓ Workshop would be an activity attached to the 2024 or 2025 annual meeting of the SIM MWG-8 Chemistry.

Opportunities to ensure food measurements

Opportunities to ensure food measurements

Stakeholder Actions to Address Challenge Areas

Microbiological Contaminants: Build metrological infrastructure for the confident identification and traceable enumeration of *E. coli* in various food products

Allergens & Authenticity: Construct a network to collect authentic samples and improve product authentication measurements by handheld field devices

Inorganic Contaminants: Develop a new certified reference material to meet legislative mandates for toxic elements (e.g., cadmium) in cocoa raw materials from Central and South America

Pesticide Residues: Construct an international database of pesticide measurement data and regulatory requirements with a goal to harmonize global pesticide methods

Non-Pesticide Organic Contaminants: Build metrological infrastructure for the confident identification and traceable quantitation of perfluoroalkyl substances (PFAS) in water and foods

Opportunities for National Metrology Institutes and Reference Material Producers to Ensure Global Food Safety, Special Publication (NIST SP), NIST, https://doi.org/10.6028/NIST.SP.1252

Thanks for your attention!

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