



ADVANCING GLOBAL FOOD METROLOGY: THE IMPACT OF CCQM OAWG FOOD SECTOR COMPARISONS

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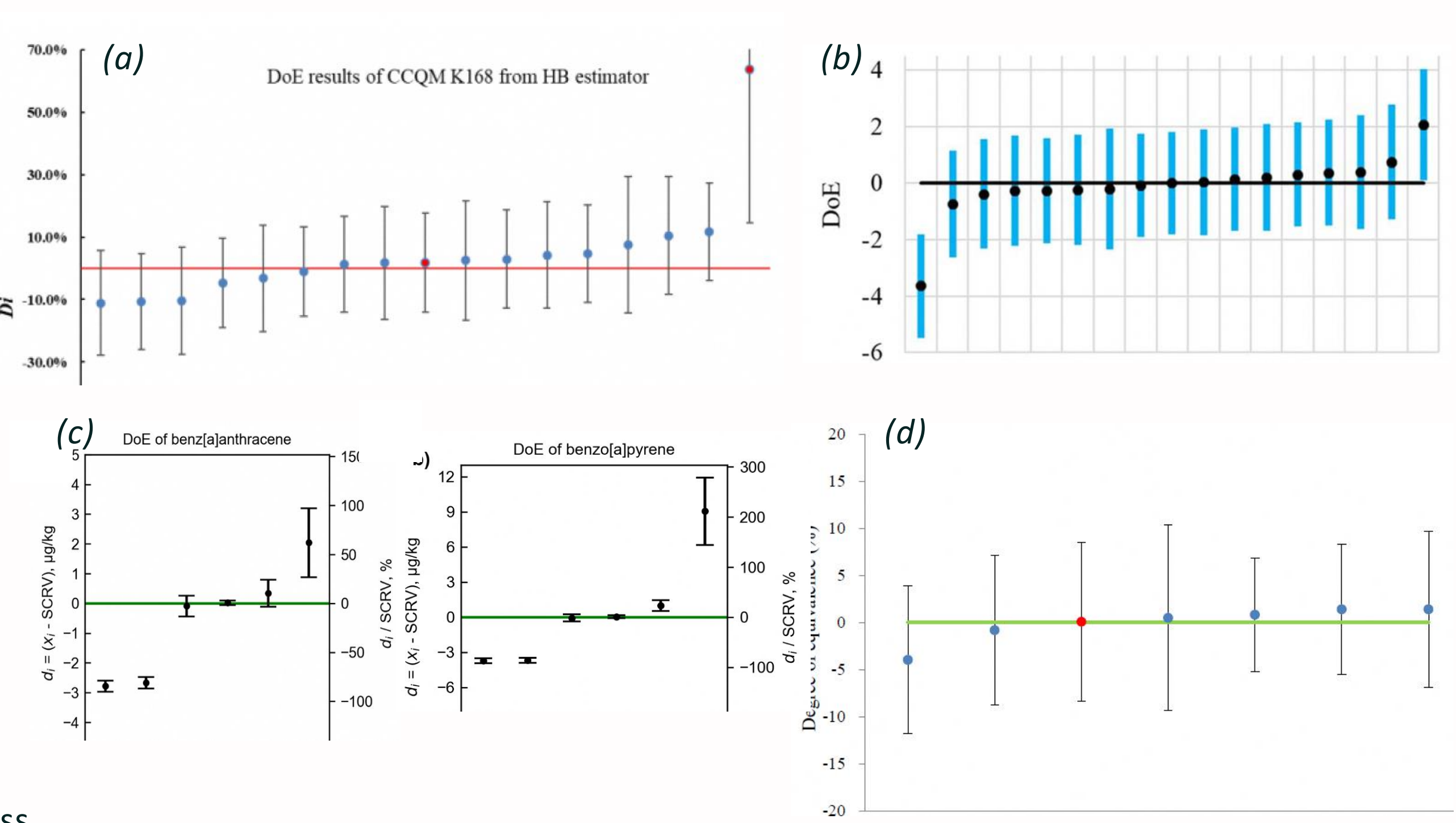
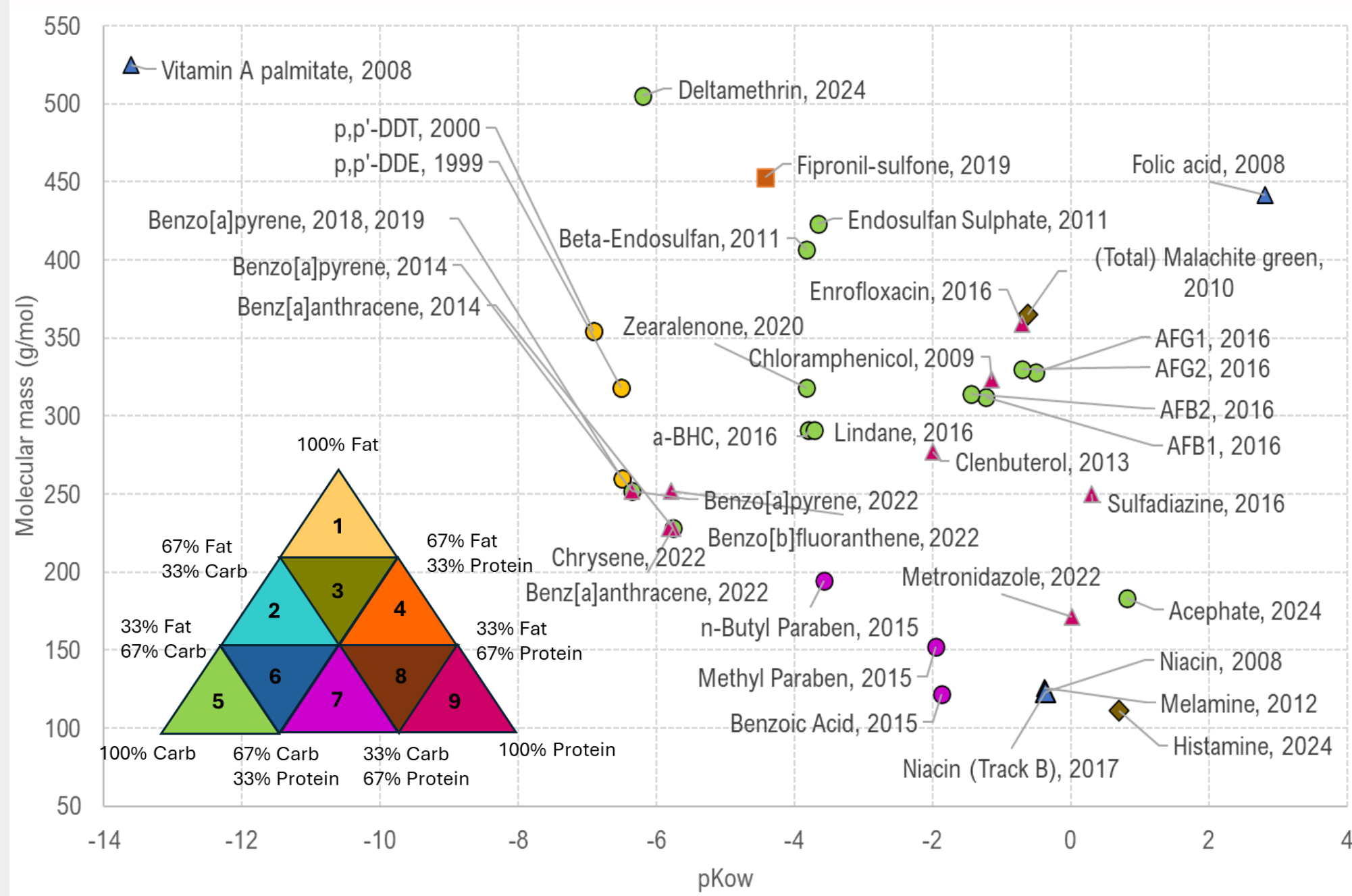
INTRODUCTION

For over two decades, food sector comparisons conducted by the CCQM OAWG have been crucial in progressing metrology globally. These comparisons have addressed critical measurement challenges in food safety and quality, supporting regulatory requirements and international trade. This poster describes the long-term impact of these comparisons, recent progress, and future directions in food metrology.

OBJECTIVES

The CCQM OAWG members primarily support the food sector by providing food matrix reference materials, high-purity calibrators, and reference values for proficiency testing schemes. By improving measurement capabilities across diverse food matrices, the comparisons will enhance global food safety measurements, support more accurate nutritional labeling, and facilitate international trade by ensuring comparable results.

FOOD SECTOR CCQM OAWG COMPARISONS



Analytes in past CCQM food comparisons in the space of molecular mass and polarity, classified in different categories based on AOAC food triangle. Adapted from the OAWG strategy document. *The mycotoxin comparison in maize (CCQM-K168, 2020), veterinary drug residue in pig muscle (CCQM-K180, 2022), polycyclic aromatic hydrocarbons (PAHs) in protein matrix (EURAMET.QM-S15, 2022), and fipronil sulfone in chicken egg (APMP.QM-S16, 2019) have significantly advanced measurement capabilities for complex food matrices.*

Degrees of Equivalence (DoE) for (a) CCQM-K168: trans-zeaxanthin in maize powder (b) CCQM-K180: metronidazole in porcine muscle* (c) EURAMET.QM-S15: ben[a]anthracene and benzo[a]pyrene in protein matrix and (d) APMP.QM-S16: fipronil sulfone in chicken egg. Dots represent the DoE; bars represent their approximate 95% expanded uncertainties.

*The report for CCQM-K180 is in Draft A stage, the DoE is pending for approval.

NEW METROLOGY NEEDS

Climate change impacts on food safety and nutrition, increasing crop pathogens and toxins.
New food safety threats include marine toxins, novel mycotoxins, emerging pesticides, antimicrobial resistance.

Environment contaminants (e.g. PFAS in food, chlorate in infant formula)

HORIZON SCANNING AND FEEDBACK

Increasing prevalence of ultra-processed foods and needs for rapid screening methods

Challenges related to novel foods and alternative proteins, altered nutritional content, insufficient information on novel species, potential toxins, allergenicity.

FUTURE OAWG FOOD SECTOR COMPARISONS

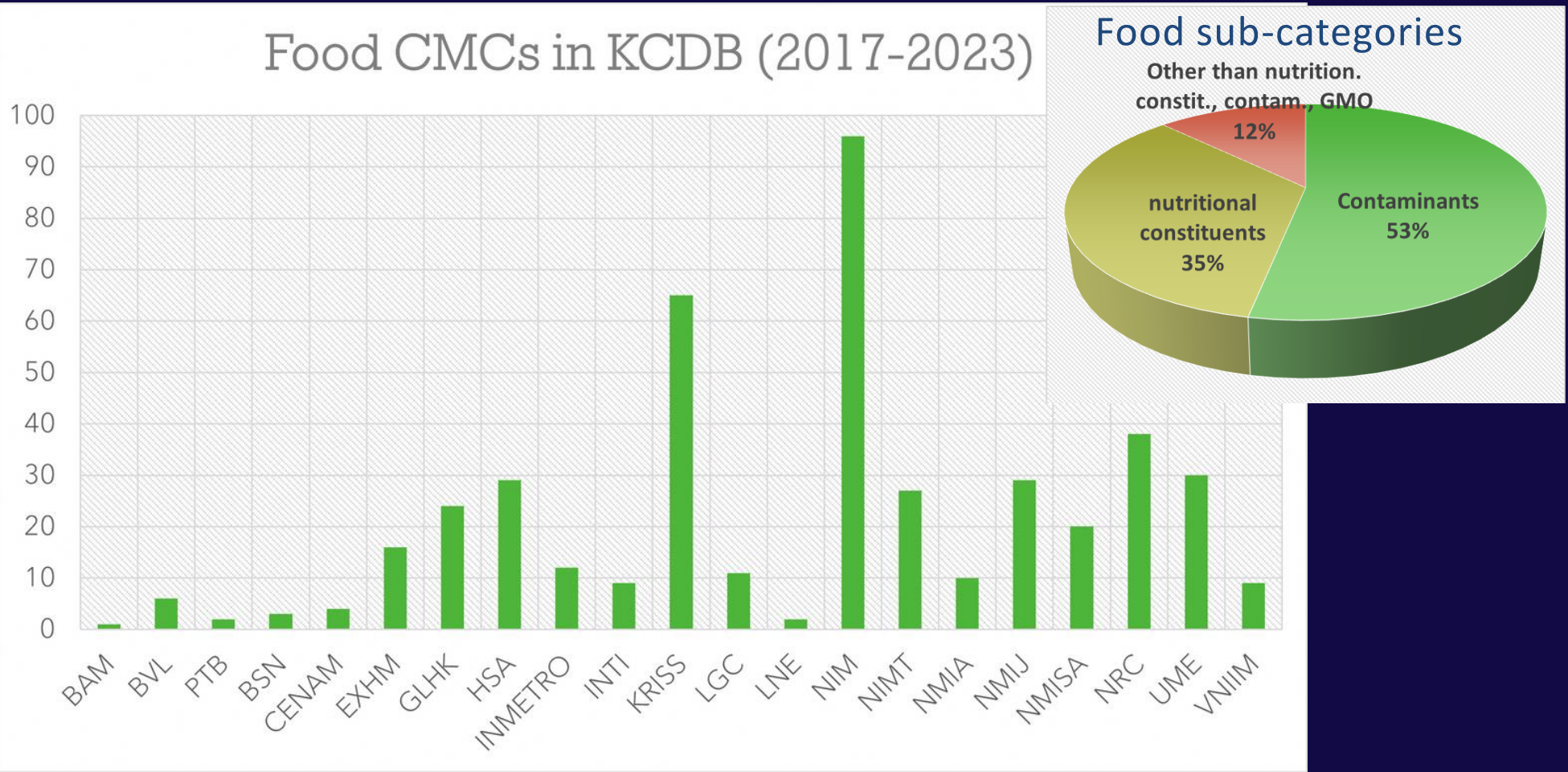
To address these needs, future OAWG food sector comparisons will

- incorporate a wider range of food matrices,
- explore multi-analyte approaches,
- advance sample preparation techniques,
- explore non-targeted analysis approaches, and
- address measurement challenges related to emerging contaminants and nutrients of concern.

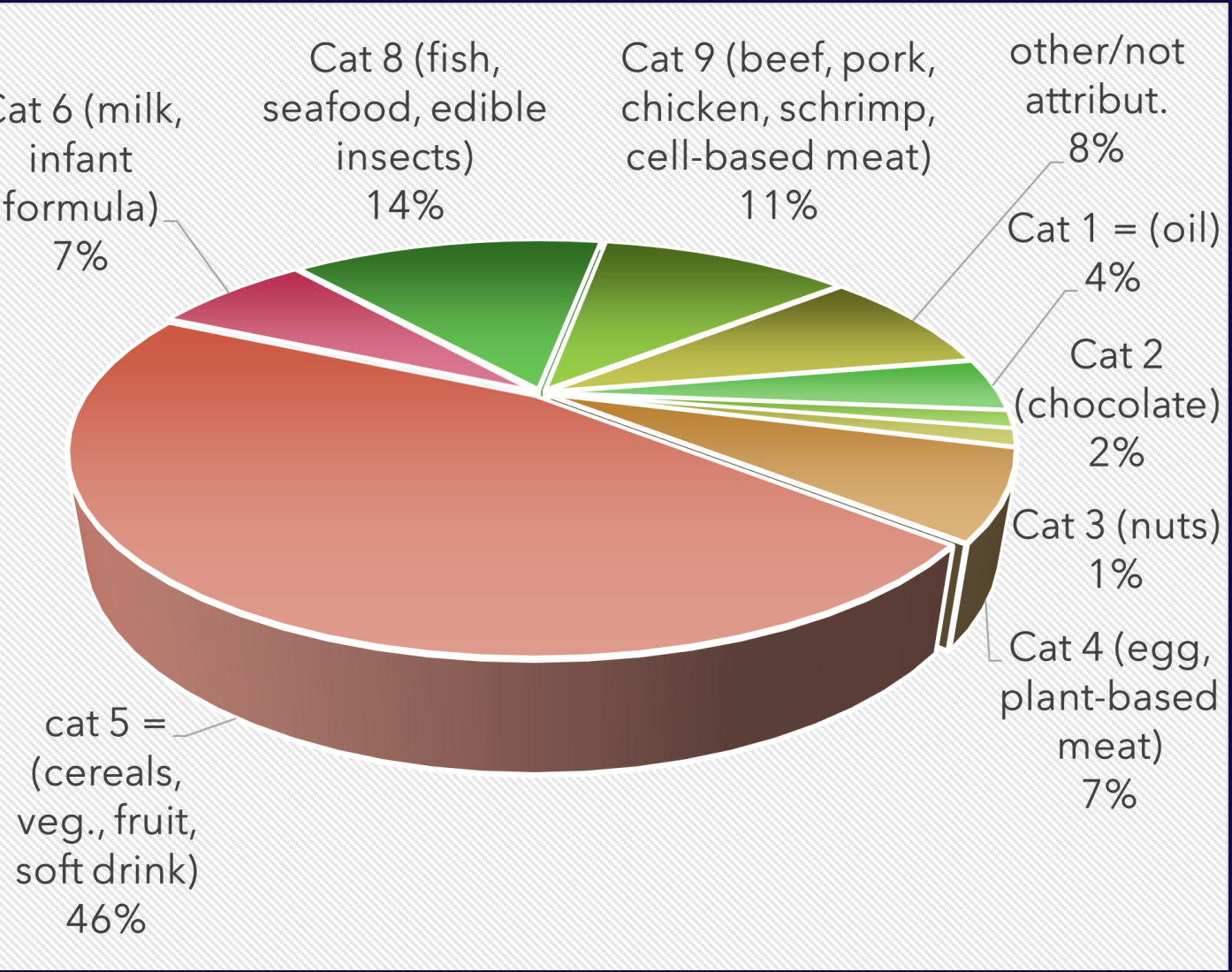
ACKNOWLEDGEMENT

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We would also like to express our sincere thanks to all the participating institutes contributing to the comparison studies CCQM-K168, CCQM-K180, EURAMET.QM-S15 and APMP.QM-S16.

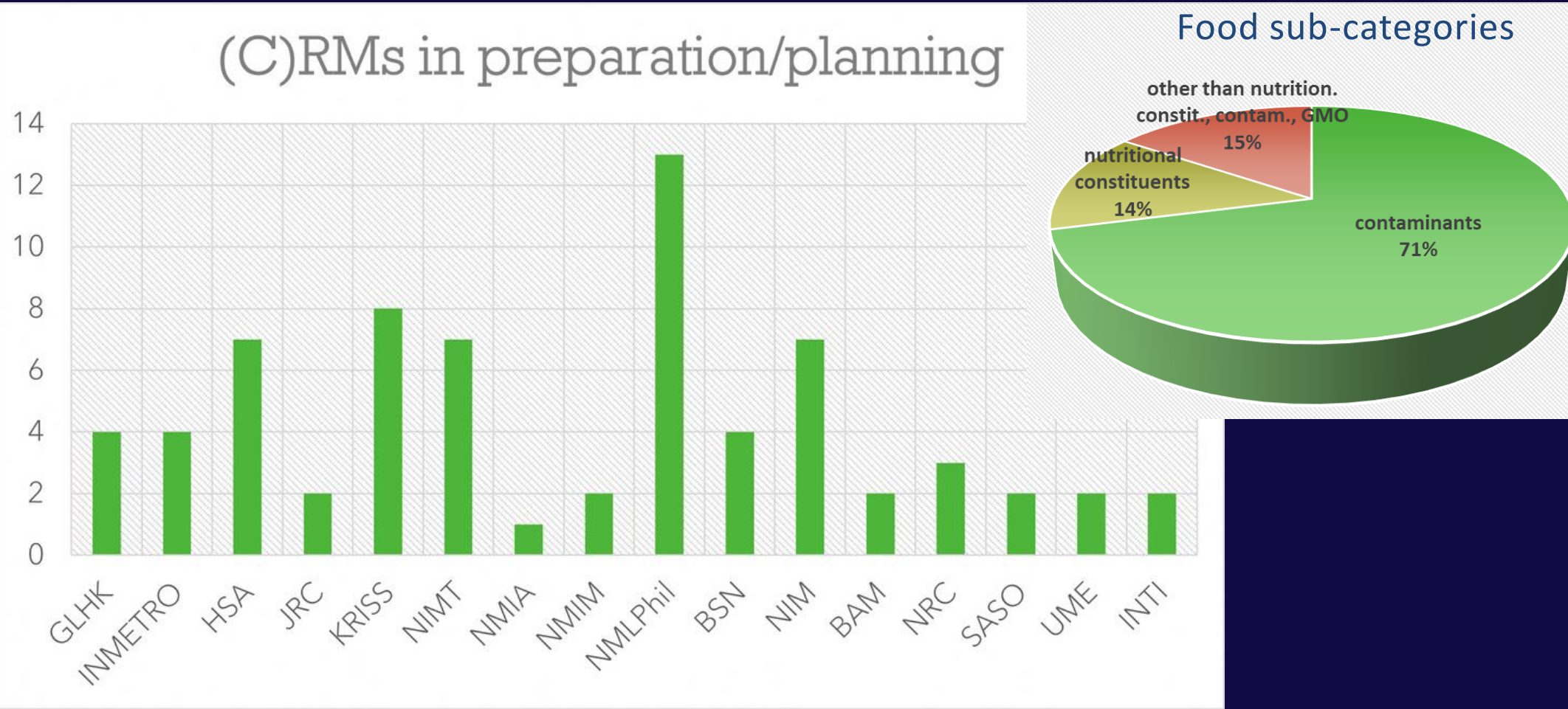
FOOD CRMs SURVEY (2024 – 2027)



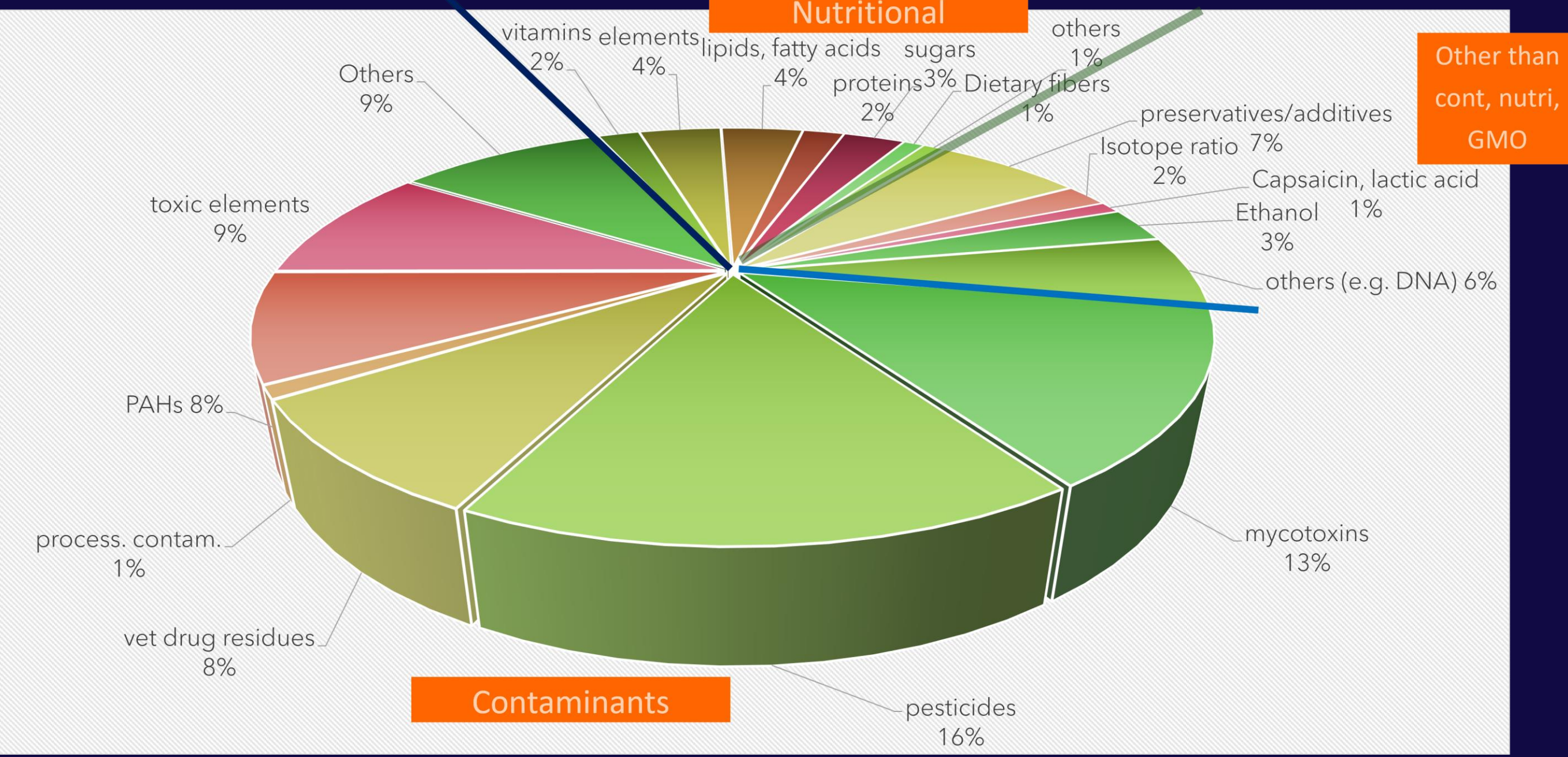
Number of food CRMs by different institutes extracted from KCDB (2017 – 2023). From KCDB CRMs, there were a total of ~ 440 food CRMs.



Number of planned C(RM)s categorized in different food sector based on the AOAC food triangle.



Number of CRM, RM, RM for proficiency testing planned by 16 metrology institutes in 2024 – 2027 (total of ~ 70). Extracted from the food CRMs survey circulated in April and September 2024.



Number of planned C(RM)s categorized in different analyte "classes".

PLANNED COMPARISONS

Year	Core Key Comparison (Track A) Matrix Materials
2025	Analyte in mixed composition food
2026	Non-polar analyte in food
2027	High MW analyte in clinical matrix
2028	Analyte in abiotic matrix
2029	Polar analyte in high protein food
2030	Analyte in clinical matrix

Adapted from the OAWG strategy document.



Fat-soluble vitamins in infant formula, avermectins in infant formula



Contaminants in novel food like edible insects



Perfluorinated alkyl substances (PFAS) in meat

CONCLUSION

The CCQM OAWG's food sector comparisons have significantly advanced global food metrology, enhancing measurement capabilities for complex matrices and addressing critical food safety challenges. While existing strong focus on three key compound classes (mycotoxins, pesticides, veterinary drug residues) critical to food safety persists, future work will also focus on emerging topics awaiting the OAWG's attention, including environmental contaminants, climate change impacts on food safety and nutrition, novel foods and alternative proteins. By aligning comparisons with evolving needs through stakeholder engagement and implementing a tiered approach with Track A, C, and D studies, the OAWG ensures comprehensive coverage of both established and emerging food safety challenges, continuing its crucial role in advancing global food metrology.

REFERENCES

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- Final Reports for CCQM-K168, EURAMET.QM-S15, APMP.QM-S16. <https://www.bipm.org/en/committees/cc/ccqm/key-comparisons>