Publishable Summary for 20NET02 Food-MetNet
Support for a European Metrology Network on Food Safety

Overview

Safe food is a prerequisite for good human health. National governments are critical for enabling and safeguarding the supply of safe food and to do this food safety authorities must manage food safety risks along the entire food chain. However, whilst food safety method development and proficiency testing are well established by European Union Reference Laboratory (EURLs) and National Reference Laboratories (NRLs), validation of the measurements involved is currently lacking. This lack of validation is impeding the majority of food safety sectors by promoting distrust in the accuracy of the measurements due to a lack of metrological traceability. To address these issues a European Metrology Network for Safe and Sustainable Food (EMN Food) involving the metrology community, reference laboratories and regulatory bodies will be set-up. The EMN Food will support the improvement of food safety measurements and help to ensure traceability by linking measurement results to the International System of Units (SI). This project will accelerate and support the set-up of the EMN Food and will establish and help to coordinate on-going dialogue between the metrology community and relevant stakeholders, in particular EURLs and NRLs. This dialogue will then be used by this project to (i) identify the metrological needs of these stakeholders, (ii) develop a sustainable knowledge-sharing programme and web-based platform for stakeholders and (iii) develop the roadmaps and strategic research agenda (SRA) needed for future food safety research.

Need

The Official Controls Regulation (EU) 2017/625 aims to create an integrated approach along the agri-food chain in order to (i) prevent, reduce or eliminate risks which may arise for human beings and animals; (ii) guarantee fair practices as regards trade in food and feed;(iii) ensure protection of consumers' interests. The legislation also stipulates the need for validated methods for NRLs and EURLs dealing with food safety. To this aim, reference laboratories need accurate, comparable and high-quality data. However, NRLs and EURLs are often faced with the challenge of measuring and analysing new food contaminants, novel food ingredients, emerging food risks and food fraud cases.

A large-scale European network collaboration between NMIs/DIs and NRLs and EURLs is urgently needed to support the provision of the necessary validated measurement techniques, calibration and measurement capabilities (CMCs) and certified reference materials (CRMs), which can be used to monitor food products along the entire food chain. There is also a need to address and provide information on specific concerns in food science in a coordinated approach to ensure traceability, reduce measurement uncertainties and improve the reproducibility of analysis of food matrices.

Further to this, a strategic plan regarding how and where NMIs/DIs should focus their resources (i.e. as no single NMI/DI currently has the ability to tackle all food safety priorities) is needed. Such a strategic plan or Strategic Research Agenda (SRA) is needed to help increase the relevance and impact of food safety research and to decrease the duplication of effort across Europe. Coordination at European level is vital for the success of the EMN Food and therefore this project is needed to help accelerate and support the set-up of the future EMN Food. This project will also ensure that the needs of key stakeholders are identified and addressed, and that relevant metrological data and training is made accessible to stakeholders in food safety metrology.

Objectives

This project's goal is to support and accelerate the realisation of the EMN Food, by establishing long-term dialogue between the metrology community and relevant stakeholders in food safety; in order to support the identification of stakeholder needs, the uptake of metrological research and the development of focussed roadmaps for future food safety research. This project has the following objectives:

1. To establish regular, constructive dialogue and liaison between the project and stakeholders in the fields of food safety metrology, including the main authorities such as the European Food Safety Authority (EFSA), EURLs and NRLs, the International Union of Pure and Applied Chemistry (IUPAC), and standardisation bodies. This will include not only fostering existing liaisons, but also promoting new collaborations and identifying and prioritising stakeholder' needs.
2. To develop a Strategic Research Agenda (SRA) for the future EMN Food and roadmaps to address outstanding metrological requirements along the food chain, taking feedback from stakeholders for Objective 1 into account. This will identify current and future challenges in food safety such as the collection of reliable and comparable data for risk assessment in a wide range of areas (i.e. nanomaterials in food and pathogens) and consider activity in existing infrastructures e.g. the Infrastructure for promoting Metrology in Food and Nutrition (METROFOOD-RI), the European Strategy Forum on Research Infrastructures (ESFRI) Roadmap 2018 – Health & Food.
3. To develop a web-based platform for stakeholders in the fields of food safety metrology. Feedback from stakeholders from Objective 1 will be taken into account. The platform will be used for knowledge transfer, promotion of metrology activities and will provide a discussion forum. To maximise the up-take of the web-based platform by the stakeholders it will also include easy access to European metrology capabilities and services, relevant food markers and regulatory requirements e.g. Regulations (EU) 2017/625, EU 178/2002 and EU 1169/2011 and provide a service desk for answering stakeholders' questions. The platform will be developed in a manner that allows it to be maintained by a future EMN Food.
4. To set up a sustainable knowledge-sharing programme for food safety stakeholders, in order to promote the dissemination and uptake of information, in particular with standards development organisations, food safety authorities and reference laboratory networks. This will include a range of activities regularly hosted by the project, such as the exchange of researchers between organisations, metrology workshops, stakeholder events and training courses.
5. To develop a plan for a joint and sustainable European metrology research infrastructure for food safety via a European Metrology Network. The plan will be completed within 12 months of the start of this project and will: (i) use coordination and smart specialisation of capabilities (ii) align with other running initiatives and projects, (iii) promote the development of emerging member states, and (iv) consider how to extend collaboration to third countries.

Results

The main goal of this project is to set up the EMN Food and to provide the necessary support to ensure the sustainability of the future EMN Food. Thus, the specific outputs of this project will be:

1. Stakeholder consultation:

The project is engaging with regulatory bodies, EURLs and NRLs dealing with the European food control system, industry, manufacturers and food retailers to identify their needs and synergies with the metrology community.

All partners have contributed to the stakeholder mapping and prioritisation of the identified stakeholders. Primary stakeholder contacts for each organisation were added to the stakeholder spreadsheet and from these 20 primary stakeholders were identified for engagement ahead of the formation of the EMN Food. Priority was given to the infrastructure METROFOOD-RI and EURAMET (with whom several meetings were organised). The positive interaction between METROFOOD-RI and the EMN Food has been discussed at the IMEKOFOOD conference in November 2022, where a specific workshop was organised. Other stakeholders include the EURLs, the Joint Research Centre in Geel, other NMIs, EURAMET Technical Committees such as TC-MC, TC-T, and TC-Flow and the Consultative Committee for Amount of Substance: Metrology in Chemistry and Biology (CCQM) of BIPM.

The project has begun discussions with the network project 20NET03 POLMO (on Pollution monitoring) in order to identify common area of interest. Several meetings have been organised between two consortiums and it is planned that 20NET03 POLMO consortium will be a stakeholder of the EMN Food.

A survey has been launched designed to understand and identify priority areas for future measurement support in the field of food safety and sustainability. These may be in the development of analytical methods to identify challenging analytes, interlaboratory studies to demonstrate comparability, provision of calibration materials and certified reference materials to improve standardisation, or training, but always with a focus on metrological

traceability. The survey has been circulated among stakeholders prioritized by the consortium during the project's monthly meetings.

2. The strategic research agenda (SRA):

The SRA has been drafted for the EMN Food based on the requirements identified and prioritised in the stakeholder consultation in Objective 1 and it will be published on the EMN website. The SRA includes an overview of current and future European trends for food safety and sustainability and of food safety and sustainability policies and strategies at EU level. Future revisions of the SRA will benefit from the lessons learned from the initial exercise. The SRA aims to identify current and future challenges in food safety and consider activity in existing EU Infrastructures (e.g. METROFOOD-RI, the Infrastructure for promoting Metrology in Food and Nutrition ESFRI Roadmap 2018 – Domain Health and Food).

3. A web-based platform:

A freely accessible online platform will be developed to increase knowledge transfer and support the dissemination of metrology activities in food safety. The web-based platform will be specifically designed for use by stakeholders such as EURLs, NRLs, standards development organisations and food safety authorities. The web-based platform is intended to provide a means for food safety stakeholders to easily find reference measurement services, reference materials, measurement comparisons, project results, food-related activities and will include a web forum. The web-based platform will have a service area for answering stakeholders' questions and will be developed in a manner that allows it being maintained by the EMN Food. An EMN website has been set up for the EMN Food and it has been regularly updated with the new members' information. The implementation of the web-based platform has been started as well. Based on a mock-up developed in the consortium, a subcontractor has been commissioned.

4. Knowledge-Sharing Programme:

To support the EMN Food, within which a range of activities (e.g. the exchange of researchers between organisations, metrology workshops, stakeholder events and training courses) will be organised, this project will set up a sustainable knowledge-sharing programme for food safety. The knowledge-sharing programme activities will be advertised on the web-based platform. A training course on the measurements in mycotoxins analysis has been organised. The EMN Food has also contributed to several initiatives related to the World Metrology Day 2023 "Measurements supporting the global food system."

A video presenting the EMN Food is under production at METAS and will be ready for the release in November 2023.

The consortium has been working on a questionnaire which will focus on the stakeholder needs. With support from all partners, based on the results obtained from this stakeholder questionnaire, a training course is organised on the activity related to standardized measurements of micro and nanoparticles and characterization of MPs and NPs in food.

An interaction with the EURL-POPs (Halogenated persistent organic pollutants) has been initiated in July 2023.

5. Plan for the EMN-Food:

A plan for a joint and sustainable European metrology infrastructure for food safety via an EMN has been developed during the first year of the project. The proposal for an EMN for Safe and Sustainable Food (EMN Food) has been submitted to EURAMET, describing the strategy for involving primary stakeholders in the network and the future plans for guaranteeing the sustainability of the EMN once established and on a long-time scale.

The General Assembly (GA) of EURAMET approved the establishment of the EMN Food. The EMN was officially put in place after the signature of the Memorandum of Understanding (MoU) by 3 NMIs. So far, 15 institutes have signed the MoU and actions will be undertaken in due course for promoting the network and has it signed by other potential members and partners.

In parallel, the Rules of Procedures document has been drafted, together with a communication plan, a strategic agenda and a strategic research agenda.

Also, the EMN Food has been presented to several EURAMET technical committees and to the key scientific community, through the participation to specific meetings and national and international conferences.

Two working groups within the consortium have been organised for prioritising the stakeholders and to draft a survey for clearly focusing their need on the field of food safety and food sustainability.

Regular meetings have been settled involving the consortium and the EMN partners for identifying possible areas of collaboration and initiatives for submitting scientific proposals and get the EMN funded and economically sustainable.

A draft spreadsheet has been prepared to identify key sources of information for research results in the field of food safety, including relevant food markers for the knowledge-sharing programme. Further to this the project has started to collate together the metrology capabilities and services (CMCs, CRMs and methods) in Europe related to food safety. A pivot table has been created from the information to allow easy sorting of the information on each individual CMC and group of CMCs according to requirement individually adjustable by the user. Similarly, a pivot table has been prepared for the food matrix reference materials available on the European market. The excel-based spreadsheet provides information on matrices, measurands and provider that can be sorted according to requirement individually adjustable by the user.

The plan will encourage smart specialisation of capabilities (e.g. CRMs, CMCs, reference measurement procedures) for the benefit of regulatory bodies to support both on-going and new standardisation activities.

Impact

By supporting the set-up and the development of the EMN Food, this project aims to positively impact societal needs related to food safety controls. It will do this by enabling the development of new metrological capabilities in food measurements that are targeted to the needs of stakeholders and by facilitating their use and uptake by European stakeholders such as EURLs, NRLs, regulatory bodies, food safety agencies, existing infrastructures (e.g. METROFOOD-RI), other research institutions and industry. Indeed, the project already has 30 stakeholders such as standardisation bodies (CEN-CENELEC), European reference laboratories (EURL for Halogenated POPs), Industries (Federation of Hellenic Food Industries) and NMI outside Europe (NIST).

Two publications describing the EMN Food have also been produced and the project has been presented at the CEN 352 – Nanotechnologies annual meeting in September 2022, at RAFA conference in September 2022, at the IMEKO conference in August/September 2021 and November 2022, at the annual meeting of the EURAMET TC-MC Sub Committee Bio and Organic Analysis (SCBOA) and at the plenary session of the EURAMET TC-MC, at the Nucleic Acid Working Group ant and the Organic Analysis WG at CCQM (BIPM),

The consortium has organised a training course on the Measurement Reliability in Mycotoxin Analysis which was held at TUBITAK-UME in November 2022 and gathered a scientific and industrial community audience of more than 200 participants.

By establishing the EMN Food, this project will promote European collaboration and the provision of better measurement services (e.g. for EURLs and NRLs) and will enable a faster response to stakeholder needs by better directing food safety research. The sustainable infrastructure provided by the EMN Food should also address the issue where metrological food safety needs cannot be covered by a single institute or an individual country. Currently there is disparity between the scope of measurements needed to ensure traceability, reduce measurement uncertainties and improve the reproducibility of analysis of food matrices (e.g. contaminants, nanoparticles or pathogens in food matrices) versus the total resources available within the European metrology landscape. Therefore, collaboration at a Pan-European level via the EMN Food is vital.

This project and the EMN Food will support the best allocation of research funds and thereby better value for research by identifying and prioritising measurement gaps and challenges (via roadmaps and an SRA), working together with food safety stakeholders, and focusing on their direct and new emerging needs. This will help to define the role of metrology in the European food sector and the EMN Food intends to do this by building upon the work of the European Commission's Joint Research Centre's (JRC) Unit for 'Food and Feed Compliance'.

Better access to more reliable and accurate knowledge for food safety measurements will allow food testing laboratories to more confidently and effectively compare their measurement results and provide accreditation within a shorter time frame. This is particularly important for the analysis of new food contaminants, novel food ingredients and newly emerging food risks, where new measurements methods may be required as well as input into new documentary standards. This project and the EMN Food are expected to help strengthen the

links between metrology and food safety regulatory bodies and promote the involvement of metrology experts in the preparation of future regulations at an early stage.

In the longer-term, this project and the future EMN Food should help to increase food safety for the world's growing global population and to contribute to reducing food borne diseases, thereby contributing to the UN's Sustainable Development Goal of Zero Hunger https://www.un.org/sustainabledevelopment/hunger/.

List of publications

1. Nives Ogrinc, Andrea Mario Rossi, Francesca Durbiano, Roland Becker, Mojca Milavec, Alexandra Bogožalec Košir, Elias Kakoulides, Hayrettin Ozer, Fatma Akçadag, Heidi Goenaga-Infante, Milena Quaglia, Silvia Mallia, Gisela Umbricht, Gavin O'Connor, Bernd Guettler, Support for a European metrology network on food safety Food-MetNet, Measurement: Sensors, vol 18, pp 100285, https://doi.org/10.1016/j.measen.2021.100285

2. Consolato Schiavone, Chiara Portesi PFAS: A Review of the State of the Art, from Legislation to Analytical Approaches and Toxicological Aspects for Assessing Contamination in Food and Environment and Related Risks Appl. Sci. 2023, 13(11), 6696; https://doi.org/10.3390/app13116696

This list is also available here: https://www.euramet.org/repository/research-publications-repository-link/

Project start date and duration:	1st of June 2021, 36 months	
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Internal Funded Partners: 1. INRIM, Italy 2. BAM, Germany 3. IAPR, Greece 4. JSI, Slovenia 5. LGC, United Kingdom 6. NIB, Slovenia 7. TUBITAK, Türkiye	External Funded Partners:	Unfunded Partners: 8. METAS, Switzerland 9. PTB, Germany