NETWORK ON MICROBIOLOGICAL RISK ASSESSMENT (MRA)
27th meeting

10-11 June 2026
14:00-18:00 / 09:00-13:00 (CET)
Minutes agreed on xx July 2026

Location: EFSA - Parma (Board Room 00/M10A - 00/M10B) and Online (Teams platform)

Attendees:

- Network Participants:

Country	Organisation
Austria	Austrian Agency for Health and Food Safety
Belgium	Federal Public Service Health, Federal Agency for the Safety of the Food Chain
Bulgaria	The Stephan Angeloff Institute of Microbiology
Croatia	Croatian Agency for Agriculture and Food
Cyprus	State General Laboratory
Czechia	State Veterinary Administration
Denmark	National Food Institute
Estonia	Estonian University of Life Sciences
Finland	Finnish Food Authority
France	French Agency for Food, Environmental and Occupational Health & Safety (ANSES)
Germany	German Federal Institute for Risk Assessment (BfR)
Greece	Hellenic Food Authority (EFET)
Hungary	National Food Chain Safety Office
Ireland	Food Safety Authority of Ireland
Italy	Istituto Superiore di Sanità (ISS)
Lithuania	National Food and Veterinary Risk Assessment Institute
Luxembourg	Luxembourg Veterinary and Food Administration (ALVA)
Netherlands	Netherlands Food and Consumer Product Safety Authority (NVWA)
Norway	Norwegian Scientific Committee for Food Safety
Poland	National Institute of Public Health NIH- National Research Institute

Portugal	Autoridade de Seguranca Alimentar e Economica (ASAE)
Romania	Institute for Hygiene and Veterinary Public Health
Slovakia	Food Safety Authority - Ministry of Agriculture and Rural Development
Slovenia	MAFF: Administration for Food Safety, Veterinary Sector and Plant Protection
	National Institute of Public Health
Spain	University of Cordoba
Sweden	Swedish Food Agency

- Observers:
  Albania (Food Safety and Veterinary Institute), Kosovo* (Food and Veterinary Agenda); Montenegro (Diagnostic Veterinary Laboratory); North Macedonia (Food and Veterinary Agency); Serbia (Faculty of Veterinary Medicine, University of Belgrade); Türkiye (Ministry of Agriculture and Forestry, General Directorate of Food Control, Department of Risk Assessment).

- Hearing experts: Koen De Reu (Belgian Research Institute for Agriculture, Fisheries and Food — ILVO); Marie-Alice Fraiture (Sciensano, BE); Fran Gilis (KU Leuven, BE); Elisabeth Dohmann Chang (DTU, DK)

- EFSA:Beatriz Guerra, Michaela Hempen, Ernesto Liebana, Winy Messens, Pietro Stella, Frank Verdonck (BIOHAW Unit)

1. Welcome and apologies for absence

The Chair welcomed the participants from 25 Member States and Norway as well as observers from Albania, Kosovo*, Montenegro, North Macedonia, Serbia and Türkiye. Apologies were received from Switzerland.

2. Adoption of agenda

The agenda was adopted without changes.

3. Agreement of the minutes of the 26th Network meeting of the MRA Network held on 1-2 July 2025 in Parma

The minutes of the 26th Network meeting had been previously agreed by written procedure on 17 July 2025 and published on the EFSA website on 18 July 2025.[1]

4. FSAI Scientific Committee report 'Risk Ranking of Microbiological Hazards in Food' (IE)

[1] 26th meeting of the EFSA Network on Microbiological Risk Assessment | EFSA

The Food Safety Authority of Ireland presented the Scientific Committee's first national risk ranking exercise on microbiological hazards in food, based on Irish data from 2015–2019. Microbiological risk ranking was used to assess the relative public health impact of selected foodborne hazards and to support a risk-based national food safety system. The exercise followed the EFSA BIOHAZ conceptual risk ranking framework and included seven hazards: *Campylobacter* spp., *Listeria monocytogenes*, *Salmonella* spp., Shiga toxin-producing *Escherichia coli*, hepatitis A virus, hepatitis E virus and norovirus. The burden of disease was estimated using DALYs and a top-down surveillance approach, taking into account under-ascertainment and under-reporting. Source attribution to the food pathway was estimated through expert elicitation using a two-round Delphi approach. The results indicated that campylobacteriosis accounted for the highest estimated annual foodborne burden, followed by norovirus infection, listeriosis and STEC infection, although uncertainty remained for several hazards. The exercise provided a preliminary comparison of the burden of disease associated with selected foodborne microbiological hazards in Ireland and identified key data gaps which, if addressed, would help reduce uncertainty in future microbiological risk ranking exercises.

5. Focal Point TMA on RTE plant-based dairy, meat and fish (IE)

This presentation summarises the key findings of a study funded by the EFSA Focal Point under the Tailor-Made Activities (TMA) initiative. The study addressed the increasing availability and consumption of ready-to-eat (RTE) plant-based dairy, meat and fish substitutes, for which data on microbiological safety remain limited. A retail prevalence survey was conducted across 15 Member States, analysing approximately 1,500 samples collected from retail and other outlets. Samples were tested at the end or near the end of shelf life for a range of microbiological hazards, including *Listeria monocytogenes*, *Salmonella* spp., STEC and spore-forming bacteria, alongside physico-chemical parameters such as pH and water activity. The results showed that the microbiological quality was satisfactory for the majority of samples, with only sporadic detection of pathogens at low levels and no detection of *Salmonella* spp. However, a large proportion of products exhibited physico-chemical characteristics that could support microbial growth, highlighting potential risks if contamination occurs. The study also identified knowledge gaps and past outbreak events associated with plant-based products, as well as the lack of harmonised monitoring guidelines. The findings support the need for targeted guidance for food business operators and regulators, in particular regarding hygiene practices, control of spore-forming bacteria, and shelf-life determination under realistic storage conditions.

6. Safety and quality of plant-based alternatives in Estonia, TemTA52 project results (EE)

This presentation provided an overview of the TemTA52 project on the safety and quality of plant-based alternatives in Estonia, focusing on ready-to-eat products available at retail level. The project aims to assess the microbiological and chemical safety of plant-based foods and to support the development of guidance for food business operators. A total of 300 samples, mainly meat alternatives but also dairy and fish substitutes, were analysed using microbiological, molecular and physicochemical methods. The results indicated that most analysed products exhibited satisfactory microbiological quality at the end of shelf life. *Listeria monocytogenes* and *Salmonella* spp. were detected only sporadically, while low levels of *Escherichia coli* were found in a small proportion of samples. Spore-forming bacteria such as *Bacillus* spp. and *Clostridium* spp. were frequently detected at low levels, reflecting their environmental origin and persistence. In addition, a wide range of microorganisms, including opportunistic and potentially pathogenic species not traditionally considered foodborne hazards, were identified. These findings suggest that plant-based products may harbour emerging microbiological risks that are not fully covered by current hazard identification approaches. Chemical analyses highlighted the presence of mycotoxins in a proportion of the tested samples and the occurrence of lipid oxidation products, indicating potential quality and safety concerns, particularly for products with extended shelf life. Overall, the study highlights the need for improved guidance on microbiological and chemical safety criteria for plant-based alternatives, including appropriate limit values and consideration of shelf-life conditions, in order to support risk management and official control activities.

7. 'PRIOR': Anses Risk ranking tool of biological & chemical hazards in foods (FR)

Anses presented the PrioR tool, a multi-criteria methodology developed for the ranking of biological and chemical hazards, as well as food–hazard pairs, in terms of their risk to public health. The approach builds on previous work and applies a structured decision-support framework to prioritise hazards based on both the severity of adverse health effects and the probability of their occurrence. The methodology consists of a stepwise process including the identification of hazards and relevant food–hazard pairs, the definition of ranking criteria, and the aggregation and weighting of these criteria. Biological hazards were selected through a multi-stage filtering process based on foodborne transmission, regulatory relevance, data availability and epidemiological importance, resulting in a refined list for assessment. Food–hazard pairs were further screened using evidence on exposure routes, contamination data, outbreak information and expert judgement. The ranking relies on two main macro-criteria: incidence, representing the probability of occurrence of foodborne illness, and severity, expressed through indicators such as years of life lost and years lived with disability. For food–hazard pairs, incidence is estimated using a bottom-up approach integrating parameters such as prevalence, concentration, growth during storage, effects of preparation and consumption patterns under defined high-risk scenarios. The aggregation of criteria is performed using a multi-criteria decision analysis approach based on the ELECTRE III method, allowing the incorporation of thresholds, weighting of criteria, and risk manager preferences. The tool also includes a qualitative confidence score reflecting the level of uncertainty associated with the underlying data. Overall, the PrioR tool supports risk

managers in prioritising hazards and food–hazard combinations, guiding monitoring and control plans, informing regulatory decisions, and identifying research priorities. Further developments aim to extend the approach across additional food sectors and update the datasets used for ranking.

Links to the two opinions:

Note AST relative au développement et à la mise en place d'un outil de priorisation des risques biologiques et chimiques liés aux aliments. Partie 1 : Identification et renseignement des critères relatifs aux dangers biologiques et chimiques

Avis révisé relatif au développement et à la mise en place d'un outil de priorisation des risques biologiques et chimiques liés aux aliments. Partie 2 : Identification et renseignement des critères relatifs aux couples aliment-danger biologique et chimique de la filière « viandes bovines »

8. Molecular source attribution of Listeria monocytogenes in Austria: a litmus test based on confirmed outbreaks (AT)

This presentation introduced an approach for molecular source attribution of *Listeria monocytogenes* in Austria, using whole genome sequencing data and machine learning methods to link human cases to potential food and environmental sources. The work builds on a national surveillance system combining human and non-human isolates collected through official control programmes and food business operator monitoring, with a focus on ready-to-eat products as high-risk foods. A large national dataset comprising over 13,000 isolates was compiled and organised into training and validation datasets, including both non-human and human isolates. The data showed that the majority of isolates originated from meat products, followed by milk, fish and environmental sources, reflecting consumption patterns and surveillance priorities in Austria. A support vector machine (SVM) classifier was developed to predict the most likely source category of isolates based on genomic data. Genetic information was encoded using a core genome multilocus sequence typing (cgMLST) approach and transformed into a high-dimensional feature space. The model was trained and evaluated using cross-validation and independent validation datasets. The results showed good classification performance for major food categories, particularly for meat and milk, while lower accuracy was observed for environmental and veterinary categories. Overall model performance ranged between approximately 75% and 83% depending on the validation dataset. When applied to human isolates, the model most frequently attributed cases to meat sources, followed by environmental sources, with smaller contributions from other food categories. A "litmus test" based on confirmed outbreak data indicated an overall outbreak association performance between approximately 60% and 90%, depending on the dataset and evaluation criteria. Overall, the study demonstrates the potential of combining genomic surveillance data with machine learning approaches for source attribution of foodborne pathogens. The model was considered robust and reflective of

national consumption patterns, with potential for further extension to additional pathogens and applications in risk assessment and surveillance.

9. Shelf-Life and Food Safety of Eggs in Norway (NO)

This presentation described an assessment of the shelf life of table eggs under Norwegian production and storage conditions conducted to support possible adaptations to current regulatory requirements, noting that the EU/EEA 28-day best-before limit is stricter than the previously applied Norwegian practice of approximately 35 days despite the very low prevalence of *Salmonella* in laying hens due to strict control programmes. The assessment evaluated the relevance of EFSA's 2014 conclusions to Norwegian conditions, including microbial growth, enzymatic activity, storage conditions and consumer behaviour, and found that while the general assumptions are applicable, important differences exist, particularly the low prevalence of *Salmonella Enteritidis* in Norway. The evaluation indicated that contamination of the egg interior is unlikely due to the protective properties of the eggshell and membranes and existing control measures, and even if contamination occurs, the antimicrobial properties and high pH of the albumen combined with low storage temperatures limit microbial survival and growth. Overall, it was concluded that raw eggs stored at temperatures up to 12 °C do not pose a health risk before day 35, supporting the longer shelf-life applied in Norway and suggesting that microbial risks remain low under these conditions.

10. MICMEATOOL: "Changing temperature/time hot water combinations and alternatives for the disinfection of knives and other cutting tools in slaughterhouses and meat processing plants" & follow-up advice from the FASFC's scientific committee (BE)

This presentation addressed the effectiveness of current and alternative methods for the disinfection of knives and other cutting tools in slaughterhouses and meat processing plants, in the context of EU legislation recommending hot water at ≥ 82 °C without specifying a contact time. The study highlighted practical challenges associated with this approach, including high energy consumption, protein coagulation leading to reduced cleaning efficacy, and operational difficulties in maintaining temperature, particularly in cold environments. Within the MICMEATOOL project, a research approach combining surveys, laboratory experiments and on-site validation was used to assess both current practices and potential alternatives. Survey results showed that most slaughterhouses rely on hot water at ≥ 82 °C with short contact times, typically between 0.5 and 10 seconds, while microbiological testing demonstrated variable contamination levels on cutting tools during production. Laboratory experiments indicated that microbial reduction is strongly influenced by contact time, with short exposures to 82 °C achieving limited reductions, and that certain alternative methods, including lower-temperature hot water or chemical treatments, may achieve comparable effects under specific conditions.

However, no alternative method matched the effectiveness of longer exposure (e.g. 10 seconds) to 82 °C. On-site validation confirmed that some alternative treatments can provide equivalent reductions to short-duration hot water treatments, although overall sanitation effects remain limited and tools may remain contaminated. The follow-up evaluation by the FASFC Scientific Committee emphasised the need for case-specific assessment, as well as the lack of standardised protocols and sufficient data to support broad implementation of alternative methods. Recommendations included improving cleaning prior to disinfection, optimising contact time, establishing clear reference conditions, and generating robust sector-level data to allow comparison of alternative approaches with existing practices.

11. Anses scientific opinion on the microbiological risk assessment of raw milk cheeses Part 2 (FR)

This presentation provided an overview of the ANSES quantitative microbiological risk assessment (QMRA) of raw milk cheeses, developed following requests from risk managers to better understand and control the occurrence of severe foodborne illnesses associated with these products. A two-step approach was applied, starting with a risk ranking of pathogen–cheese combinations and followed by a detailed QMRA on selected high-priority pairs, focusing on hazards such as STEC, *Listeria monocytogenes* and *Salmonella* across different cheese types and milk sources. The model introduced several methodological innovations, including a multi-agent, time-explicit farm-to-consumer framework that integrates subtype-specific virulence data and simulates interactions between farms, processing steps and consumer practices over time. Control measures were selected based on quantitative evidence, weight of evidence and applicability, covering farm hygiene, processing practices and consumer behaviour. The results indicated that raw milk cheeses contribute to a measurable burden of foodborne disease, with risks varying by pathogen, cheese type and population group, and highlighted that different stages of the production chain offer opportunities for risk reduction depending on the hazard considered. Targeted measures, such as improving farm hygiene, enhancing acidification during processing, testing strategies and adapting consumer practices, were identified as effective interventions. Overall, the approach demonstrated how advanced, scenario-based QMRA modelling can support risk managers by providing actionable, prioritised control options and a clearer understanding of trade-offs between interventions.

12. Risk assessment *Salmonella* regarding laying hens and human salmonellosis cases in NL (NL)

This presentation sheds some light on the current Dutch Salmonella Enteritidis situation. In NL, an increase in SE infections is seen both in laying hens and in humans since 2023 up to at least December 2025. This increase started with an outbreak (1 outbreak strain) caused by Dutch table eggs, but since then many different SE strains are seen both in

laying hens and in humans. A risk assessment / risk factor analysis is being conducted to pin point factors affecting the circulation of these strains and to study the relationship between SE strains isolated from laying hens and from humans. The results show that most of the SE strains present in laying hens flocks can be genomically linked to patients. Furthermore, on some farms SE strains circulate for a longer time (between flocks, between farm houses, up to at least 4 years), but still new introductions in flocks/farms occur. Feed constituting of dried egg shells did probably play a role in the outbreak of 2023, unclear is whether feed still may play a role (no epidemiolocal data available). Flocks positive for the target-serovars (SE/ST) are not culled in the Netherlands, and flocks are kept to produce eggs for the food industry, which seems to be economically viable due to a good egg price (also since 2023). Many data are gathered (a.o. from databases/sources available to the Dutch Food Safety Authority) to outline the situation in the Dutch egg sector (2020-2024), but it seems that the problem is multi-factorial and may need a farm-based epidemiological study. In the meantime, to reduce human exposure, the monitoring frequency within the SNCP of laying hens has been increased twice (Jan 2024, Oct 2025) and is now up to every 4 weeks or 8 weeks (depending on the age of the flock), and a booster vaccination during the laying period is mandatory (since Oct 2025). However, these measures only apply to farms participating in IKB Ei (a quality mark and assurance system for the egg chain; 80-90% of farms participate).

The study will be published Q4 2026 (in Dutch).

13. Occurrence of *Bacillus cereus* and other microbial-associated hazards in commercial fermentation products: Evidence from a pilot survey (BE)

Microbial fermentation products are widely used in the food and feed chain. These products include food enzymes, food and feed additives, and food supplements. Manufacturers are responsible for ensuring the quality and safety of these products. However, post-market monitoring ranges from limited to non-existent. Consequently, in-house pilot monitoring studies have been conducted to assess the presence of biological impurities in commercial microbial fermentation products. The results revealed several unexpected biological impurities. These included viable Bacillus cereus strains, some carrying virulence genes and producing associated toxins, as well as other microbial hazards such as full-length antimicrobial resistance (AMR) genes and viable genetically modified microorganisms (GMMs) carrying AMR genes.

14. The impact of *Salmonella* biofilm formation on gut colonization in chronic carrier pigs (BE)

This presentation explored the role of *Salmonella* biofilm formation in chronic infections of pigs, with a particular focus on its contribution to gut colonization. A collection of natural isolates representing different serovars, including *S.* Typhimurium, its monophasic variant and *S.* Derby, was screened for biofilm formation capacity, and selected strains were further genetically modified to compare biofilm-competent and biofilm-deficient variants. Experiments were conducted using the M-SPIME in vitro model, simulating the porcine gastrointestinal environment, in both static and dynamic

configurations. Results from the static set-up showed only a minimal overall effect of biofilm formation on bacterial density, while the introduction of microbiota produced expected competitive interactions. However, results from the dynamic model indicated that biofilm formation may facilitate *Salmonella* colonization of the ileal mucus layer, although without major changes in overall microbiome composition or chemical environment. Additional findings suggested that specific biofilm components, such as cellulose, may act as anti-virulence factors. Overall, the study indicates that while biofilm formation plays a limited role under certain conditions, it may contribute specifically to intestinal colonization processes and thus potentially to chronic carrier status in pigs.

15. RAKIP model repository update (FI)

This presentation briefly showcased the RAKIP (Risk Assessment Modelling and Knowledge Integration Platform) model repository from FSKX Cloud Platform FSKXCloud, hosted by BfR, where published curated models for risk assessment can be browsed, and (for registered users) run online. Models can also be searched from EFSA Knowledge Junction EFSAKJ in Zenodo which links them to RAKIP. Some recent Bayesian models from FI were listed. All models are documented in FSKX format, containing model codes and all necessary metadata for using the models.

16. CarbaCamp: Assessment of phenotypic carbapenem susceptibility and genomic epidemiology of *Campylobacter* from animal, food and human domains - results from an EFSA Grant (EFSA, DTU)

This presentation provided an overview of the CarbaCamp collaborative project, which investigates carbapenem susceptibility in *Campylobacter* across animal and human sources using phenotypic testing and genomic analyses. Preliminary results indicate substantial diversity in the dataset and differences in susceptibility patterns between carbapenem compounds, with some agents showing more consistent behaviour than others. While no clear evidence of specific resistance determinants was identified, the findings suggest that observed variability may largely reflect intrinsic characteristics of the organism. Overall, the work highlights ongoing efforts to improve methods for monitoring and interpreting carbapenem susceptibility in *Campylobacter*, with further analyses needed to clarify underlying mechanisms and support future surveillance.

17. Update on BIOHAZ Panel activities

The EFSA BIOHAZ Team presented ongoing and completed activities.

Ongoing activities:

- Scientific opinion on the implementation of point 2 of Annex V of Regulation (EU) 2025/40 on Packaging and Packaging Waste (EFSA-Q-2025-00456)
- Scientific opinion on Food Safety Culture and its microbiological food safety impact in the EU (EFSA-Q-2025-00553 and EFSA-Q-2025-00554)
- Scientific opinion on the health risks posed by microplastics in food, water and air (EFSA-Q-2025-00702)
- Scientific opinion on the microbiological status of fishery products following the stiffening process with focus on smoked salmon (EFSA-Q-2026-00032)
- Scientific opinion(s) on the current status of the occurrence and spread of carbapenemase-producing Enterobacterales in the food chain in the EU/EFTA (following to part 1 EFSA-Q-2024-00149)

Completed activities:

- Risk of infection of dairy cattle in the EU with highly pathogenic avian influenza virus affecting dairy cows in the United States of America (H5N1, Eurasian lineage goose/Guangdong clade 2.3.4.4b. genotype B3.13) Published: 18 December 2025 (adoption by AHAW Panel, collaboration AHAW-BIOHAZ)
- Microbiological safety of ungulates meat intended to be frozen and defrosting of frozen ungulates meat Published: 27 January 2026
- Guidance document on the submission of data for the evaluation of the safety and efficacy of substances for the removal of microbial surface contamination of foods of animal origin intended for human consumption Published: 21 January 2026 (adoption by FCM, contribution by BIOHAZ)
- Update of the list of QPS-recommended biological agents intentionally added to food or feeds as notified to EFSA Published: 22 January 2026
- Update of the list of qualified presumption of safety (QPS) recommended microbiological agents intentionally added to food or feed as notified to EFSA 23: Suitability of taxonomic units notified to EFSA until September 2025 Published: 22 January 2026
- Occurrence and spread of carbapenemase-producing Enterobacterales (CPE) in the food chain in the EU/EFTA. Part 1: 2025 update Published: 12 March 2025
- Guidance on the characterisation of microorganisms in support of the risk assessment of products used in the food chain Published: 4 November 2025 (adoption by Scientific Committee, contribution by BIOHAZ)

Any Other Business

The next MRA network meeting is planned for spring/summer 2027 in Parma.