TECHNICAL REPORT

European Food Safety Authority
Supporting Publications

APPROVED: 24 November 2022

doi:10.2903/sp.efsa.2022.EN-7687

Annual report of the Scientific Network on Microbiological Risk Assessment 2022

European Food Safety Authority (EFSA)

Abstract

Among the tasks of EFSA, according to its founding regulation (Regulation (EC) No 178/2002), there is the establishment of a system of Networks of organisations operating in the fields within EFSA's mission, the objective being to facilitate a scientific cooperation framework by the coordination of activities, the exchange of information, the development and implementation of joint projects, the exchange of expertise and best practices. The Scientific Network on Microbiological Risk Assessment (MRA Network) had its first meeting in 2007. Currently, 25 European Union Member States and two observer countries (Switzerland and Norway) are participating in the MRA Network. The 22nd meeting was held on 18-19 October 2022 as a hybrid-meeting in Parma and online. A wide range of activities related to microbial risk assessment were presented including impact of *Vibrio* infections, activities on *Campylobacter* in broilers, *Salmonella* and *Listeria monocytogenes*, transfer of anisakid allergens to meat, risk assessment of monkey pox transmission through food and risk-based classification of food establishments as well as an invited presentation on ionophor resistance in poultry. Activities of the EFSA BIOHAZ panel and the BIOHAW Unit were presented.

Key words: meeting, microbiological risk assessment, MRA, network

Requestor: EFSA

Question number: EFSA-Q-2021-00663

Correspondence: biohaw@efsa.europa.eu

Acknowledgements: EFSA wishes to thank the members of the Scientific Network on Microbiological Risk Assessment: Austrian Agency for Health and Food Safety (Austria), Federal Agency for the Safety of the Food Chain and University of Gent (Belgium), The Stephan Angeloff Institute of Microbiology (Bulgaria), Croatian Agency for Agriculture and Food (Croatia), State General Laboratory (Cyprus), National Institute of Public Health (Czechia), National Food Institute (Denmark), Estonian University of Life Sciences (Estonia), Finnish Food Safety Authority (Finland), French Agency for Food, Environmental and Occupational Health & Safety (France), Federal Institute for Risk Assessment (Germany), Hellenic Food Authority (Greece), National Food Chain Safety Office (Hungary), Food Safety Authority of Ireland (Ireland), Istituto Zooprofilattico di Abrruzzo e Molise "G. Caporale" (Italy), National Food and Veterinary Risk Assessment Institute (Lithuania), Ministry for Agriculture, Fisheries and Animal Rights (Malta), Netherlands Food and Consumer Product Safety Authority (the Netherlands), National Institute of Public Health - National Institute of Hygiene (Poland), Autoridade de Seguranca Alimentare e Economica (Portugal), Institute for Hygiene and Veterinary Public Health (Romania), Food Safety Authority- Ministry of Agriculture and Rural Development (Slovak Republic), National Institute of Public Health (Slovenia), University of Cordoba (Spain), Swedish Food Agency (Sweden), Norwegian Scientific Committee for Food Safety (Norway), and the Federal Food Safety and Veterinary Office (Switzerland), for the preparatory work on this output.

Suggested citation: EFSA (European Food Safety Authority), 2022. Annual report of the Scientific Network on Microbiological Risk Assessment 2022. EFSA supporting publication 2022:EN-7687. 10 pp. doi:10.2903/sp.efsa.2022.EN-7687

ISSN: 2397-8325

Table of contents

1. Introduction

1.1. Background and Terms of Reference as provided by the requestor

Art. 23 (g) of the EFSA Founding Regulation[1] stipulates that EFSA shall establish a system of Networks of organisations operating in the fields within its mission and be responsible for their operation. Furthermore, Art. 23 (e) and Art. 33 provide for the collection, collation, analysis and reporting on scientific and technical data in the fields within the Authority's mission. The aim of such network, as defined in Art. 36, is to facilitate a scientific cooperation framework by the coordination of activities, the exchange of information, the development and implementation of joint projects, and the exchange of expertise and best practices.

To implement the above provisions of the founding regulation various Networks were established.

In 2006 the Network on Microbiological Risk Assessment (MRA) and the Network on bovine spongiform encephalopathies and other transmissible spongiform encephalopathies (BSE-TSE) convened for the first time, strengthening since then the scientific cooperation on issues of concern, anticipating and reducing the duplication of activities and hence avoiding divergence of opinions.

In 2010, the Management Board adopted a Decision[2] governing the establishment and operation of EFSA Networks. Such Decision was revised by the Management Boards in 2021[3]. The mandate of the Scientific Network on MRA expired in December 2020. By written decision of EFSA's management board (MB), the mandate was renewed for the period 2021-2023. According to the decision of the MB, the aim of the networks is to support EFSA and the Member States (MS) in carrying out the Authority's mission in accordance with the established standards of scientific excellence, transparency and responsiveness foreseen in the General Food Law Regulation. These include, *inter alia,* facilitating the development of a scientific cooperation framework by the coordination of activities, the exchange of information, the development and implementation of joint projects and the exchange of expertise and best practices in the fields within the Authority's mission.

The main overall goals of the Scientific Network on MRA are: to improve dialogue and exchange of information among participants; to build mutual understanding of risk assessment principles; to enhance knowledge on and confidence in the scientific assessments carried out in the EU; to provide increased transparency in the current process among Member States and EFSA; to raise the harmonisation level of the risk assessments developed in the EU.

The Scientific Network on MRA strengthens the scientific cooperation in the remit of microbiological risk assessment. It aims at anticipating and reducing the duplication of activities and hence avoiding divergence of opinions. The Network is a privileged environment to share data and methodologies facilitating harmonisation of assessment practices and to assist in anticipating emerging risks in the EU.

The specific objectives of the Scientific Network on MRA are:

a. identifying common themes and areas for mutual collaboration;
b. identifying and avoiding duplication of efforts;
c. identifying experts in specific areas and on special issues;
d. sharing of data availability and quality;
e. strengthening cooperation amongst risk assessors and risk managers;
f. exchanging information between EFSA, Member States and other stakeholders;

[1] Regulation (EC) No 178/2002 of the European Parliament and the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety. OJ L 31, 1.2.2002, p. 1–24.

[2] MB 18 03 10 – item 7 doc 6 Management Board Decision concerning the establishment and operation of European Networks of scientific organisations operating in the fields within the Authority's mission. Available online: https://www.efsa.europa.eu/sites/default/files/corporate_publications/files/networksoperation.pdf

[3] Decision of the Management Board concerning the establishment and operation of European Networks of scientific organisations operating in the fields within the Authority's mission (mb210623-a4). Available online: https://www.efsa.europa.eu/sites/default/files/event/management-board-210624/18-establishment-operations-networks-11.mb210624-a4.pdf

g. strengthening communication and collaboration between EFSA and the EU Member States and among risk assessors, risk managers and stakeholders, including national Advisory Forum and Focal Points members;
h. focusing attention on and streamlining of common research needs;
i. identifying potential emerging risks when addressing current issues.

2. Annual MRA Network meeting on 18-19 October 2022 by hybrid-meeting in Parma and online

2.1. Impact of food associated *Vibrio*-infections in Germany

The participant from Germany presented the background and the current state of knowledge on the occurrence of food-borne *Vibrio* infections in Germany. Furthermore, the possible impact of climate change on this type of infection was discussed.

2.2. Risk-based control of *Campylobacter* spp. in broiler farms and slaughtered flocks to mitigate risk of human campylobacteriosis – A One Health approach

The participant from Denmark showed the practical application of the concepts of: intersectoral surveillance data integration, risk-based control, and One Health; within the Danish Action Plan against *Campylobacter* spp. in broilers and humans. The relative impact of high-risk flocks (originating from high-risk farms) and of flocks cross-contaminated at the slaughterhouse, on the risk of human campylobacteriosis was discussed (Foddai et al., 2022a,b)

Thus, the presentation gave a "proof of concept" for applying data-driven and risk-based control actions along the poultry meat chain, so that the risk of disease in humans can be mitigated accordingly.

2.3. 3 months survey compared to baseline study 2008 (*Campylobacter*)

The participant from Austria provided results from a baseline study on *Campylobacter* in broilers. Neck skin samples in broiler slaughterhouses were taken on a regular basis to verify compliance with Regulation (EU) 2017/1495, the process hygiene criteria for broiler carcasses according to the microbiological criteria (Reg (EU) 2073/2005). In a 3 months survey parallel sampling was performed. The results are compared with the results from the baseline study in 2008, which were published in EFSA Journal 2010; 8(03):1503.

2.4. Environmental monitoring of *Listeria monocytogenes* in wet and open food processing

The participant from Belgian presented results from the *Listeria* monitoring study. Listeria monocytogenes is an ongoing food safety pathogen. Their persistence in the food processing environment is considered to be an important source of food contamination. This highlights the importance of preventing introduction and persistence in food processing environments. Therefore, environmental sampling is needed to control the pathogen. Drawing risk-based sampling plans, accurate sampling techniques, sampling moments and some practical experiences in wet and open food processing will be discussed.

2.5. Transfer of anisakid allergens to meat by use of fishmeal in feed

The participant from Belgian gave a presentation on anisakid allergens. Several anisakid allergens are known to be highly resistant, and in this way may be transmitted to meat by use of fishmeal as a feed component in livestock. This may expose consumers to anisakid allergens not only in fish, but also in meat. To confirm this hypothesis, a controlled chicken feeding trial using Anisakidae-contaminated feed was conducted. MS/MS-data analysis revealed peptides from 6 different anisakid allergens in the meat and/or blood from the chickens that were fed with Anisakidae-contaminated feed (Saelens et al., 2023).

2.6. Mould in Fruits, Vegetables, Roots and Tubers

The participant from Sweden presented on moulds, which cause a large majority of spoilage. Some moulds can form toxins, mycotoxins, while others are pure spoilage organisms. Several mould species from toxin-producing and spoilage genera can be found in a specific crop. If, and how much, toxin is formed is influenced by the species and strains of moulds that are present, the type of product they have infected, and external conditions. This presentation provided mycotoxin content data for citrus fruits, stone fruits, peppers, potatoes, and tomatoes.[4]

2.7. Presence of *Salmonella* Napoli in Switzerland – Analysis Campaign

The participant from Switzerland gave a talk on *Salmonella* Napoli. In recent years there has been an increase in the number of infections with Salmonella Napoli in Switzerland. However, the source of the infection is still unknown. Therefore, several laboratories in different Swiss cantons have carried out a relatively large-scale analysis campaign in 2021 (mainly foodstuffs but also bathing water and waste water) to try to provide some leads on the source and causes of the infection.

2313 samples were analysed and only one waste water sample was positive for Salmonella Napoli. Interestingly this serovar was not detected in the foodstuffs (2062 samples) or in the bathing water (131 samples). The source of the infection is still unknown.

2.8. Prevalence and serotype diversity of *Salmonella* enterica in Estonian meat production chain

The participant from Estonia presented on *Salmonella* enterica subsp. enterica prevalence and serotype diversity at farm, slaughterhouse and meat cutting level in pork, beef and broiler chicken meat production in Estonia in 2016-2020. Additionally, information on trends in Salmonella human serotypes during the same period in Estonia was given as well as Estonian *Salmonella* control program was briefly introduced (Kuus et al., 2021).

2.9. Multi-country outbreak of monophasic *Salmonella* Typhimurium sequence type 34 linked to chocolate products

The EFSA BIOHAW secretariat presented a Rapid Outbreak Assessment (ROA) on *Salmonella* Typhimurium linked to chocolate products. On 17 February 2022, the United Kingdom (UK) reported a cluster of cases with monophasic *S.* Typhimurium sequence type 34 infection. As of 18 May 2022, 324 cases had been reported in 12 EU/EEA countries and the UK, including two distinct representative strains. Epidemiological investigations suggested specific chocolate products of Brand A, produced by Company A in Processing Plant B in Belgium, as likely vehicles of infection. This outbreak has evolved rapidly, with children most at risk for severe infection. The closure of Plant B and the global recall of all their products have reduced the risk of exposure. However, eight cases cannot be explained by the consumption of chocolate products such as those manufactured at Plant B, suggesting that there may also be other sources of infection.[5]

2.10. Prevalence of *Toxoplasma gondii* in the food chain and natural reservoirs in Slovakia

The participant from Slovakia presented the results of seroprevalence of toxoplasmosis in domestic animals in Slovakia with a particular focus on animal species intended for human consumption (small

[4] https://www.livsmedelsverket.se/globalassets/publikationsdatabas/rapporter/2022/l-2022-nr-09-risker-med-frukt-gronsaker-och-rotsaker-som-har-moglat.pdf

[5] https://www.efsa.europa.eu/it/supporting/pub/en-7352

ruminants, cattle). In addition, prevalence of IgG antibodies in dogs, cats, wildlife animals and some groups of the human population are also given.

2.11. Risk of Monkeypox virus (MPXV) transmission through the handling and consumption of food

The participant from France presented a qualitative risk assessment performed to investigate the probability that MPXV transmission occurs through food during its handling and consumption. The risk assessment used both a "top-down" (the episode monitoring approach) and "bottom-up" (following the agent through the food chain to assess the risk of foodborne transmission to human) approaches (Chaix et al., 2022)(ANSES opinion no 2022-SA-0110).[6]

2.12. Classification of food establishments on a risk basis within the Spanish National Plan for Official Control of the Food Chain

The participant from Spain presented an Opinion that resulted from the assessment of a Guidance whose main objective is to establish a common system for the risk-based assessment and classification of food establishments, setting certain basic criteria of risks, as well as its objective assessment in accordance with standardised criteria. Overall, the criteria used to establish the risk-based classification of food establishments in the Guidance Document are deemed to be accurate. Other criteria have been suggested for consideration such as the adherence of each establishment to the self-monitoring system and good hygiene and handling practices or correct training of the establishment's employees.[7]

2.13. Antimicrobial resistance distributed by pig farms in Bulgaria

The participant from Bulgaria provided results from a study on antimicrobial resistance in pigs. The prevalence of resistant Escherichia coli strains from swine feces and lagoons was evaluated according to ISO 16654:2001/Amd1:2017. The biochemical characterization and AMR were investigated by Phoenix M50 and the disc diffusion method, according to CLSI and EUCAST. Some isolates showed phenotypic resistance to ampicillin, trimethoprim, trimethoprim/sulfamethoxazole, amoxicillin, tetracycline, chloramphenicol, etc. With the optimized ddPCR protocol, it was possible to detect the presence of pathogenic Yersinia enterocolitica after direct isolation of DNA from swine feces samples found negative for this pathogen by applying classical microbiological methods.

2.14. The EFSA One Health WGS System for foodborne outbreak detection at EU Level

As response to a EC mandate, EFSA has developed the EFSA One Health WGS System that interoperates with the ECDC Molecular Typing system exchanging core genome Multi Locus Sequence Typing profiles and minimum metadata for foodborne outbreak detection at EU level. The presentation described the system, including its architecture, the users and their relative data visibility, as well as data ownership and intellectual property.

2.15. Ionophore resistance and potential risk of ionophore driven co-selection of clinically relevant antimicrobial resistance in poultry

Mariel Pikkemaat from Wageningen University (NL) presented a report by Wageningen University on the risks of adding ionophores to chicken feed. Ionophores are allowed as an additive to chicken feed since they are effective coccidiostats. However, the research reported in this document shows convincingly that this practice causes antimicrobial resistance, specifically salinomycin resistance, but

[6] https://www.anses.fr/fr/system/files/BIORISK2022SA0110.pdf

[7] https://www.aesan.gob.es/AECOSAN/docs/documentos/seguridad_alimentaria/evaluacion_riesgos/informes_cc_ingles/CLASSIFICATION_ESTABLISHMENTS_RISK.PDF

also co-selects for resistance against other antibiotics. Hence it seems questionable whether prophylactic usage of ionophore coccidiostats is a safe practice.

2.16. Recent and ongoing activities of BIOHAZ Panel

The EFSA BIOHAW secretariat presented recently adopted and ongoing BIOHAZ Panel opinions

Adopted:

- Efficacy and safety of high-pressure processing of food (EFSA BIOHAZ Panel 2022a);
- Evaluation of the safety and efficacy of lactic acid to reduce microbiological surface contamination on carcasses from kangaroos, wild pigs, goats and sheep (EFSA CEP Panel, 2022);
- Transmission of antimicrobial resistance (AMR) and zoonotic agents during animal transports (EFSA BIOHAZ Panel 2022b).

Ongoing:

- Microbiological safety of aged meat (EFSA-Q-2020-00527)[8] (Deadline 31 December 2022)
- Self-task on microbiological hazards associated with the use of water in post-harvest handling and processing operations of fresh and frozen fruits, vegetables and herbs (EFSA-Q-2021-00374)[9] (Deadline 30 September 2024)

A new BIOHAZ panel self-task mandate was presented on the persistence of microbiological hazards in food and feed production and processing environments, excluding primary production.[10] Deadline for this mandate is 31 December 2023.

Network participants were asked to share relevant information on the topic, including sector specific guidance documents on environmental monitoring and interventions to remove persisting strains.

3. Planned network activities for 2023

The next MRA network meeting is planned for autumn 2023. The network members suggested to have an additional web-meeting in spring 2023, if possible, which is under consideration.

References

Chaix E, Boni M, Guillier L, Bertagnoli S, Mailles A, Collignon C, Kooh P, Ferraris O, Martin-Latil S, Manuguerra JC and Haddad N, 2022. Risk of Monkeypox virus (MPXV) transmission through the handling and consumption of food. Microbial Risk Analysis, p.100237.

EFSA (European Food Safety Authority), 2010. Analysis of the baseline survey on the prevalence of Campylobacter in broiler batches and of Campylobacter and Salmonella on broiler carcasses in the EU, 2008, Part A: Campylobacter and Salmonella prevalence estimates. EFSA Journal 2010;8(3):1503, 100 pp. doi:10.2903/j.efsa.2010.1503.

EFSA BIOHAZ Panel (EFSA Panel on Biological Hazards), Koutsoumanis, K, Alvarez-Ordóñez, A, Bolton, D, Bover-Cid, S, Chemaly, M, Davies, R, De Cesare, A, Herman, L, Hilbert, F, Lindqvist, R, Nauta, M, Peixe, L, Ru, G, Simmons, M, Skandamis, P, Suffredini, E, Castle, L, Crotta, M, Grob, K, Milana, MR, Petersen, A, Roig Sagués, AX, Vinagre Silva, F, Barthélémy, E, Christodoulidou, A, Messens, W and Allende, A, 2022a. Scientific Opinion on the efficacy and safety of high-pressure processing of food. EFSA Journal 2022;20(3):7128, 195 pp. https://doi.org/10.2903/j.efsa.2022.7128

[8] https://open.efsa.europa.eu/questions/EFSA-Q-2020-00527

[9] https://open.efsa.europa.eu/questions/EFSA-Q-2021-00374

[10] https://open.efsa.europa.eu/questions/EFSA-Q-2022-00217

EFSA BIOHAZ Panel (EFSA Panel on Biological Hazards), Koutsoumanis, K, Allende, A, Álvarez-Ordóñez, A, Bolton, D, Bover-Cid, S, Chemaly, M, Davies, R, De Cesare, A, Herman, L, Hilbert, F, Lindqvist, R, Nauta, M, Ru, G, Simmons, M, Skandamis, P, Suffredini, E, Argüello-Rodríguez, H, Dohmen, W, Magistrali, CF, Padalino, B, Tenhagen, B-A, Threlfall, J, García-Fierro, R, Guerra, B, Liébana, E, Stella, P and Peixe, L, 2022b. Scientific Opinion on the transmission of antimicrobial resistance (AMR) during animal transport. EFSA Journal 2022;20(10):7586, 83 pp. https://doi.org/10.2903/j.efsa.2022.7586

EFSA CEP Panel (EFSA Panel on Food Contact Materials, Enzymes and Processing Aids), Lambré, C, Barat Baviera, JM, Bolognesi, C, Chesson, A, Cocconcelli, PS, Crebelli, R, Gott, DM, Grob, K, Lampi, E, Riviere, G, Steffensen, I-L, Tlustos, C, Van Loveren, H, Vernis, L, Zorn, H, Bolton, D, Bover-Cid, S, de Knecht, J, Peixe, L, Skandamis, P, Martino, C, Messens, W, Tard, A and Mortensen, A, 2022. Scientific Opinion on the evaluation of the safety and efficacy of lactic acid to reduce microbiological surface contamination on carcases from kangaroos, wild pigs, goats and sheep. EFSA Journal 2022;20(5):7265, 31 pp. https://doi.org/10.2903/j.efsa.2022.7265

Foddai A, Nauta M and Ellis-Iversen J, 2022a. Risk-based control of Campylobacter spp. in broiler farms and slaughtered flocks to mitigate risk of human campylobacteriosis–A One Health approach. Microbial Risk Analysis, *21*, p.100190.

Foddai A, Takeuchi-Storm N, Høg BB, Kjeldgaard JS, Andersen JK and Ellis-Iversen J, 2022b. Assessing Campylobacter cross-contamination of Danish broiler flocks at slaughterhouses considering true flock prevalence estimates and ad-hoc sampling. Microbial Risk Analysis, p.100214.

Kuus K, Kramarenko T, Sõgel J, Mäesaar M, Fredriksson-Ahomaa M and Roasto M, 2021. Prevalence and Serotype Diversity of Salmonella enterica in the Estonian Meat Production Chain in 2016–2020. Pathogens, 10(12), p.1622.

Saelens G, Planckaert S, Devreese B and Gabriël S, 2023. Transmissibility of anisakid allergenic peptides from animal feed to chicken meat: Proof of concept. Journal of Food Composition and Analysis, 115, p.104939.

Abbreviations

AMR	Antimicrobial resistance
BSE-TSE	Bovine spongiform encephalopathies and other transmissible spongiform encephalopathies
CLSI	Clinical and Laboratory Standards Institute
ddPCR	Droplet digital polymerase chain reaction
DNA	Deoxyribonucleic acid
ECDC	European Centre for Disease Prevention and Control
EU	European Union
EUCAST	European Committee on Antimicrobial Susceptibility Testing
ISO	International Organization for Standardization
MRA	Microbiological risk assessment
MS	Member State
ROA	Rapid Outbreak Assessment