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TECHNICAL REPORT

Annual report of the Scientific Network on Microbiological Risk Assessment 2014[1]

European Food Safety Authority[2, 3]

European Food Safety Authority (EFSA), Parma, Italy

ABSTRACT

The EFSA Scientific Network on microbiological risk assessment (MRA Network) held its biannual meetings on 12-13 May 2014 and 25-26 November 2014, in Parma. Currently, 22 European Union Member States and two observer countries (Switzerland and Norway) are members of the MRA Network. During the biannual meetings a wide range of topics were discussed in relation to microbiological risk assessment, food microbiology, food-borne infections and poisonings, and molecular typing. A workshop was held on TriMiCri, which is a tool for risk-based microbiological criteria. The MRA Network meetings for next year are foreseen for spring and autumn 2015.

KEY WORDS

meeting, microbiological risk assessment, network

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[2] Correspondence: biocontam@efsa.europa.eu

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SUMMARY

Establishment of a system of Networks of organisations operating in the fields within EFSA's mission is among the tasks of EFSA, according to its founding regulation (Regulation (EC) No 178/2002), in order 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. Additionally, the EFSA Science Strategy 2012-2016 set the objective of developing, together with Member States' competent authorities, multi-annual work programmes focused on filling data gaps and setting priorities for data collections. To implement the above provisions various Networks were established. The Scientific Network on Microbiological Risk Assessment (MRA Network) had its first meeting in 2007, and following this one/two meetings per year has been held.

Currently, 22 European Union Member States and two observer countries (Switzerland and Norway) are members of the MRA Network. In 2014, the MRA Network held its biannual meetings on 12-13 May 2014 and 25-26 November 2014, in Parma.

During the biannual meetings a wide range of topics were discussed in relation to microbiological risk assessment, food microbiology, food-borne infections and poisonings, molecular typing. A workshop was held on TriMiCri, which is a tool for risk based microbiological criteria.

The next year meetings of the MRA Network are foreseen in spring and autumn 2015.

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BACKGROUND AS PROVIDED BY EFSA

Art. 23 (g) of the EFSA founding regulation[4] 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 provides for collection, collation, analysis and reporting on scientific and technical data in the fields within the Authority's mission. The aim of such networking, 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, the exchange of expertise and best practices. Additionally, since "*in order to obtain data of adequate quality it is essential that data collections are planned over the medium to longer term*", the EFSA Science Strategy 2012-2016[5] set the objective of developing, together with the Member States' competent authorities, multi-annual work programmes focused on filling data gaps and setting priorities for data collections.

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

In 2006 the Network on Microbiological Risk Assessment and the Network on BSE-TSE convened, strengthening over time the scientific cooperation on issues of concern, anticipating and reducing the duplication of activities and hence avoiding divergence of opinions.

All these ongoing initiatives were supported by consultative processes, such as the review[6] of the EFSA's Strategy for cooperation and networking with Member States[7]. In result EFSA identified four priority areas for the cooperation, notably: (i) exchange of scientific data and information, (ii) sharing of the risk assessment practices, (iii) harmonisation of risk assessment methodologies, and (iv) cooperation and coherence in communication.

Meanwhile, the Management Board adopted a Decision[8] governing the establishment and operation of EFSA Networks.

In 2013 the Network mandates expired. Owing to a need for a strong specific cooperation platform between EFSA and the Member States to provide advice, steer the process and help establishing a common vision, EFSA Advisory Forum at their meeting in December 2013 made recommendations with regard to the terms of reference of the Networks. Therefore it is now opportune to renew the mandates of the Networks operating in the remits of the RASA units.

TERMS OF REFERENCE AS PROVIDED BY EFSA

The main overall goals of the Scientific Network on Microbiological Risk Assessment (MRA Network) are: to improve dialogue 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; and to provide increased transparency in the current process among Member States and EFSA. The Network also aims to raise the harmonisation level of the risk assessments developed in the EU.

The MRA Network strengthens the scientific cooperation on microbiological risk assessment. It aims at anticipating and reducing the duplication of activities and hence avoiding divergence of opinions.

[4] 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.

[5] EFSA Science Strategy 2012-2016. Available on-line: http://www.efsa.europa.eu/en/corporate/pub/sciencestrategy12.htm

[6] Interim Review of the Strategy for Cooperation and Networking between EU Member States and EFSA. http://www.efsa.europa.eu/en/keydocs/docs/msstrategyreview.pdf

[7] MB 19.12.2006 – 6a Strategy for cooperation and networking http://www.efsa.europa.eu/en/keydocs/docs/networksoperation.pdf

[8] 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. http://www.efsa.europa.eu/en/scdocs/doc/panelnetworksrop.pdf

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 MRA Network are:

a. Identifying common themes and areas for mutual collaboration.

b. Identifying and avoiding duplication and divergence of opinion.

c. Identification of 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.

g. Strengthening communication between EFSA and the EU Member States and among risk assessors, risk managers and stakeholders.

h. Focusing attention on and streamlining of common research needs.

i. Identifying potential emerging risks when addressing current issues.

EFSA may entrust to the Network certain tasks, in particular preparatory work for scientific opinions, scientific and technical assistance, and collection of data.

CONSIDERATION

1. Introduction

The Scientific Network on Microbiological Risk Assessment (MRA Network) had its first meeting in 2007, and following this one/two meetings per year have been held.

As agreed during the MRA Network annual meetings in 2013, two bi-annual meetings were organised in 2014. The first bi-annual meeting was held on 12-13 May April 2014 and the second was held on 25-26 November 2014, both in Parma. The issues discussed are summarised in Section 2.

2. Bi-annual meetings 2014

2.1. Work programme of EFSA's Panel on Biological Hazards (BIOHAZ)

The Unit on Biological hazards and contaminants (BIOCONTAM) presented the new and ongoing activities in the field of MRA to the Network Representatives. In addition, a summary of the opinions/reports adopted/endorsed by the BIOHAZ Panel since the last 2013 Network meeting was presented for discussion:

- Scientific Opinion on carbapenem resistance in food animal ecosystems;
- Scientific Opinion on the evaluation of the safety and efficacy of peroxyacetic acid solutions for reduction of pathogens on poultry carcasses and meat;
- Scientific Opinion on the public health risks related to the maintenance of the cold chain during storage and transport of meat. Part 1 (meat of domestic ungulates);
- Scientific Opinion on the public health risks related to the maintenance of the cold chain during storage and transport of meat. Part 2 (minced meat from all species);
- Scientific Opinion on the evaluation of molecular typing methods for major food-borne microbiological hazards and their use for attribution modelling, outbreak investigation and scanning surveillance: Part 1 (evaluation of methods and applications);
- Scientific Opinion on the evaluation of molecular typing methods for major food-borne microbiological hazards and their use for attribution modelling, outbreak investigation and scanning surveillance. Part 2 (surveillance and data management activities);
- Scientific Opinions on the risk posed by pathogens in food of non-animal origin:
    - *Salmonella* and Norovirus in leafy greens eaten raw as salads;
    - *Salmonella* and Norovirus in berries;
    - *Salmonella* and Norovirus in tomatoes;
    - *Salmonella* in melons;
- Scientific opinion on the public health risks of table eggs due to deterioration and development of pathogens;
- Scientific report of EFSA on an update on the risk of transmission of Ebola Virus (EBOV) via the food chain.

2.2. Food-borne infections caused by enteropathogenic *Yersinia*

Bulgaria presented a study on enteropathogenic *Yersinia*. The aims of the study were: 1) to compare the pulsotypes of 20 strains of *Yersinia enterocolitica*, 2) to study the relationship between *Y. enterocolitica* and *Yersinia pseudotuberculosis* strains and 3) to evaluate the epidemiological relevance of pulsed-field gel electrophoresis (PFGE). Bulgaria also tested a real time polymerase chain reaction (PCR) protocol for the detection and quantification of *Yersinia* in raw milk.

2.3. Isolation and spread of enteropathogenic *Yersinia* spp. throughout the pork production chain

Lieven De Zutter from the Ghent University presented, on behalf of Inge Van Damme, a research on *Yersinia* spp. throughout the pork production chain. 70-80 % of human yersiniosis is estimated to be related to the pork reservoir. The samples included pig tonsils, pig carcasses and minced meat. This study shows that the occurrence of enteropathogenic *yersiniae* in pigs at slaughter in Belgium is high as the organisms were isolated from 56 % of tonsils and 26 % of faecal samples, with 65 % of pigs being positive in at least one of both samples. The prevalence of *Y. pseudotuberculosis* in pig tonsils and faeces at slaughter in the present study was lower compared to *Y. enterocolitica*. Yersinia contamination of pig carcasses originates mainly from positive pigs delivered to the abattoir as well as from cross-contamination from previously slaughtered pigs.

2.4. Investigation of toxin production by *Bacillus cereus*, characterization and detection of the strains responsible for food poisoning (BACEREUS project)

Belgium presented results from a project on *Bacillus cereus*. One part of the study elaborated on the conditions that are necessary for the production of enterotoxin. The project used a dynamic gastrointestinal simulation model and found that vegetative *B. cereus* cells do not seem to survive the gastro-intestinal passage and do not compete well with intestinal microbiota. *B. cereus* spores survive and germinate to a certain extent, but no enterotoxins seem to be produced or may be rapidly degraded. Possibly, ingested *B. cereus* spores germinate and multiply locally in the mucus layer of the intestine with enterotoxin production close to the gut epithelium.

2.5. TRiMiCri: a free tool for risk based microbiological criteria, developed in a Nordic project

During the first 2014 bi-annual meeting, Denmark gave an introduction a to a software tool, TRiMiCRi, which assists in the development of risk based microbiological criteria. The definition of a microbiological criterion (MC) is based on the current health risk and the risk reducing effect. There are two types of risk based MC: a microbiological limit and a relative risk limit. TRiMiCri was developed for *Campylobacter* in chicken meat with the aim to explain how such an approach could be applied. The tool is a downloadable stand-alone program with tutorial, available at http://tools.food.dtu.dk/trimicri

During the second 2014 bi-annual meeting, a workshop was held on the use of the software tool, TRiMiCri. This workshop was kindly organised by the representative from Denmark.

2.6. Risk map Austria concerning microbiological hazards in food

AGES (Austrian Agency for Health and Food Safety) conducted a general risk map for hazards in Austria which was presented to the MRA Network by Austria. Each stage from farm to fork is defined as one possible hazard carrier for the risk carrier of interest: human being and economy. This risk map consists of several subsets, e.g. animals as hazard carriers and economy as risk carrier. In a first step an expert elicitation was conducted, which resulted in a list of 20 hazards. Pathogens in food and malnutrition where ranked as the most important threat for the population concerning food.

Within the detailed risk map of microbiological hazards in food, a logarithmic weighted risk estimate is calculated for 14 microorganisms. In short, the multiplication of probability of illness with the sum of logarithmic weighted damage measures and the proportion of illness due to food gave a risk

estimate. The top three microbiological hazards in Austria are *Campylobacter*, *Salmonella* and *Toxoplasma gondii*.

The risk map presented by Austria is used by risk managers and within the AGES to plan working programs, scientific programs and human resources.

2.7. EFSA Activities in the field of Molecular Typing of Food-borne Pathogens

Apart from the Scientific Opinions published in 2013/2014 on molecular typing and the Scientific Colloquium on Whole Genome Sequencing (WGS) held in June 2014, EFSA is also involved in other activities on molecular typing, such as PulseNet International, Global Microbial Identifier, 100k Genome Project, staff training on molecular epidemiology, a procurement call including activities on molecular characterisation using WGS of *Listeria monocytogenes* strains and the EFSA Scientific Colloquium on WGS of food-borne pathogens and its application for public health protection. EFSA activities on molecular typing data collection at EU level were presented. ECDC collects molecular typing data from food-borne pathogens isolated from human cases and EFSA collects similar data from food, feed and animal isolates, in close collaboration with relevant EURLs. The data collection covers initially *Salmonella*, VTEC and *Listeria* with PFGE and MLVA (*Salmonella enterica* serovar Typhimurium) methods. Other methods may be added later.

2.8. Challenges and feasibility of analysis of microbial risks throughout the entire food chain

The Netherlands introduced the concept of Food Chain Analysis. In order to estimate the relationship between the microbiological risks at the different stages of the chain and the final product, a thorough analysis of the entire chain is needed. This analysis can be divided in several stages:

- summing up of the risks and disease load;
- description of the chain and the points at which risks may be introduced;
- prioritizing of the public health risks;
- listing of potential risk factors and interventions;
- development of an overall risk-matrix and formulating advice to the risk-manager.

2.9. Heat inactivation of pathogens in meat (PATHOGENCOOK project)

Belgium presented a research project that assessed heat resistance of various pathogens and their survival in meat from different animal species during cooking. The meat was inoculated, stored over night at 7 °C and then fried in pan (steak and hamburger) or stir fried (meat strips). Meat preparations of grounded meat (hamburgers) yielded the highest number of countable results. Temperatures which were actually reached during cooking are generally overestimated. Because of the obtained bi-phasic survival curves, the acknowledged “safe harbour” of 2 minutes at 70 °C does not achieve a 6 log reduction of all vegetative pathogenic cells in broth and it is not sure if obtaining an equivalent heat treatment in the meat matrix will accomplish a complete elimination of high numbers of pathogens present.

2.10. What is actually meant by “risk assessment”?

Denmark raised a discussion on what the MRA Network actually means by “risk assessment” and how this term is used by EFSA and Codex Alimentarius. The definition of microbiological risk assessment could be interpreted in the broad sense, i.e. any scientific research to support food safety risk managers also including risk management or in a more narrow sense as defined by Codex Alimentarius.

The network members had different views on this, partly supporting a narrow definition but others favouring a broader view. The terms of reference of the MRA Network are defining the tasks of the network in a larger context.

2.11. Public health risk from raw milk – questions from WG of BIOHAZ Panel

A Questionnaire was circulated to the MRA Network by the EFSA BIOHAZ Panel WG on public health risks related to the consumption of raw milk in order to collect information to support the related EFSA assessment. EFSA acknowledged the feedback received from 19 Member States. Most data available are on cow milk, to a lesser extent on goat milk, far fewer on sheep milk. There is hardly any information on milk from horses and donkeys. There is variability across Member States with regard to the legislation on the sale of raw milk and on the use of vending machines. Some of the information collected through the Questionnaire would be used in the assessment by the BIOHAZ Panel, and reference to some of the data would be made in the resulting EFSA scientific Opinion, together with the countries of origin of the data.

2.12. Microbiological risks and benefits of the consumption of raw milk from cows and other animal species

Belgium presented the outcome of a risk assessment by the Scientific Committee of the Belgian Food Safety Agency (FASFC) on "Microbiological risks and benefits of the consumption of raw milk from cows and other animal species"[9]. It was concluded that consumption of raw milk poses a real microbiological risk, in particular for *Salmonella*, *Campylobacter* and human pathogenic *Escherichia coli*. Heat treatment has proved to be an efficient method to guarantee the microbiological safety of milk. Consumers in Belgium are therefore advised to shortly heat raw milk till cooking point before consumption. Another scientific advice is ongoing on the microbiological risks of raw milk products.

2.13. Risk assessment of irrigation water used for cultivation of vegetables, fruits and berries

Norway presented the background of the assessment. The water sources used for irrigation and their levels of variation in water quality were described. The hazard identification (including bacteria, viruses and parasites), hazard characterization, exposure assessment and risk profile were presented. The use of indicator bacteria was discussed.

2.14. Public Health and Economic assessment of consumer food safety information. Part 1: Ranking of pathogen/food combinations with regard to consumer information

France presented the background and terms of reference of the mandate of the French Ministry of Agriculture. Part 1 of the activity examined the prioritisation of the hazard-food combinations according to the impact of preventive measures that can be applied by the consumer and the inventory of conceivable information measures on the microbiological food risks[10]. In Part 2, the evaluation of the efficacy and the efficiency of information strategies on the prevention of food microbiological risks will be performed. This activity is expected to be completed by the end of 2015.

2.15. *Campylobacter* activities in Austria with special focus on exposure due to cross-contamination during food preparation

Austria presented the facts and numbers related to contamination of broiler meat with *Campylobacter* in Austria. The current activities by the Nationwide *Campylobacter*-platform and in particular the exposure model were presented. The study revealed that high positive meat samples must be avoided at retail to prevent people getting ill from consumption of broiler meat due to cross-contamination to cooked broiler meat or a ready-to-eat side dish.

[9] http://www.favv.be/scientificcommittee/advices/_documents/Advice11-2013.pdf
[10] https://www.anses.fr/sites/default/files/documents/BIORISK2012sa0118Ra-01.pdf

2.16. Does reduction of antibiotic usage in agriculture reduce resistance in human pathogens?

The Netherlands investigated the question: "Does reduction of antibiotic usage in agriculture reduce resistance in human pathogens?" It was concluded that: (i) the reduction of antibiotic usage in agriculture most likely lowers resistance in human health care setting, (ii) the greatest risk for both *de novo* development and for transfer of resistance occurs at exposure to low concentrations of antibiotics, and (iii) the limited ecological range of resistant strains may be used to design "smart" measures.

2.17. Guidelines for coordination of the information flow between Advisory Forum members, Focal Points and national representatives in EFSA's Scientific Networks

EFSA presented the guidance for scientific network representatives which results from a self-review of EFSA's scientific networks and was discussed in EFSA's Advisory Forum. The document aims at providing guidance on good practice for improving communication at national level at the different EFSA counterparts. It also provides a general description of the main roles of the different actors.

2.18. New coordination mechanisms regarding EFSA´s Scientific Networks and the role of AFSCO and new Document Management System in EFSA

EFSA informed the Network about the new coordination mechanisms regarding EFSA's Scientific Networks and EFSA's Scientific Cooperation Roadmap 2014 - 2016[11].

[11] http://www.efsa.europa.eu/en/corporate/doc/scientificcooperationroadmap1416.pdf