

e-Inventory of Research Ideas 2018 Utrecht



*The event aims at stimulating **new partnerships**
in **food safety research**, and highlighting the importance
of **public funding***

© European Food Safety Authority, 2018

Correspondence: conferences@efsa.europa.eu

Reproduction is authorised provided the source is acknowledged.

Contents

Introduction.....	4
I. Research Ideas.....	8
II. Public funding opportunities.....	71

Introduction

RARA participants have registered the following 48 research ideas for food safety risk assessment to be presented at RARA as pitches and/or posters. The research ideas are listed in this e-Inventory in the way their proponents/participants matched them with one of the 28 food safety risk assessment areas of priority for research identified by Member States and EFSA as part of the EU Risk Assessment Agenda (EU RAA). The list of 28 priority areas is available below, highlighting in bold those with research ideas proposed (the number of ideas in each priority area are indicated in squared brackets); clicking on the page numbers while holding the Ctrl-key allows quick browsing:

1. Methods and systems for identifying emerging food risks (e.g. new food-borne diseases) [4] . 8	
A rapid risk assessment tool for introduction of zoonotic and food-borne diseases (A01)	8
Internalization of foodborne pathogens. Does it difficult their control? (A02)	9
Risk-ranking of chemical and microbiological hazards in foods (C01).....	10
Using "Big Data" gathered in Food production to be used for food safety/quality risk assessment (C02).....	11
2. Development of standard risk-benefit assessment methods (of foods) [7]	12
Developing methods for potency estimation for individual members of groups of toxins (D01) ...	12
Development of Risk-Benefit Assessment of foods in the EU: from methodology to application (C03).....	13
Implementation of health technology assessment methodology in food safety risk analysis case studies (C04)	15
Novel generic risk-benefit assessment approach (C05)	16
Risk-Benefit Assessment: a tool for a better food and health policy in Europe (RBA4betterEU) (5)	17
The relevance of 90-day toxicity studies in risk assessment of foods (D02)	19
Translational strategy to predict food allergenic potential (D03).....	20
3. Common data collection / surveillance scheme [3]	21
EU Inter-regional approach to Marine Shellfish Toxin regulations (B01)	21
Implementing Network science and Mathematical Modelling Tools into EU Food Safety Decision Making (C06)	22
Microbiological and chemical risk assessment in bivalve mollusc. Environmental and sanitary linkage (C07)	23
4. Multiple contaminant impacts on the risk profile of foods	24
5. Risks/benefits of botanicals/herbals in food supplements [3]	25
Creation of a HRMS-based platform for risk assessment of food supplements containing botanicals (B02).....	25
Integrative approaches for developing safety assessment methodologies of botanicals (B03) ...	26
The safety of hemp in food and food supplements (4).....	27
6. Allergenicity / food allergens in general (risk assessment and management) [1]	28
Improvement of allergenicity risk assessment strategy to support safe introduction of new proteins (D04)	28

7.	Aggregated exposure (via cocktail effects, but including environmental/ food exposure) [2]	29
	EuroMix follow-up on cumulative and aggregated risk assessment (D05)	30
	The influence of food components – an underestimated parameter in chemical risk assessment? (D06).....	31
8.	Harmonisation of methods for risk assessment of chemical contaminants [3]	32
	Advanced methods for integrating evidence for dose-response and antimicrobial resistance modelling (D07)	33
	Detection of Ciguatoxins in fish meat: an integrated approach for screening and confirmatory methods (B04)	34
	Development of a web-based intake model for chemical contaminants and nutrients (D08)	35
9.	Cumulative exposure assessment (e.g. for pesticide residues/ PAHs)	37
10.	Chemical contaminants in infant and baby food [2]	37
	Food packaging contaminants in baby and infant food: Analysis of packaging materials and food (B05)	38
	Risk assessment research in an European outermost region. Needs, challenges and results for locals (3)	39
11.	Emerging chemical contaminants [1]	39
	Biotest for toxicity evaluation of mixtures of contaminants from emerging food packaging materials (B06)	39
12.	Systems for monitoring and characterising microbes isolated from food, environment and human illness cases [3]	40
	Effects of (legal) criteria on exposure and health at national level (C08).....	41
	Microbiological risk assessment of food handlers and food contact surface in the Czech catering facilities (2)	42
	The use of next generation sequencing data in microbial risk assessment (A03)	43
13.	Improve the use of genetic data (e.g. from whole genome sequencing) for risk assessment of microbiological contaminants [2]	44
	Strengthen microbial Next Generation Sequencing in Europe (A04)	44
	TRACKING: Transcriptional Risk Assessment Combining KInetics aNd Genotyping (A05)	45
14.	Antimicrobial/ antibiotic resistance [2]	48
	A new method for identification of antimicrobial resistance genes based on whole plasmid sequencing (A06)	48
	Measurement of prevalence and concentration of ESBL-producing E. coli in meat and non-meat food (A07).....	49
15.	Microbial food pathogens (in general) [1]	50
	Harmonization and improvement of a decision-making tool for risk assessment (C09)	50
16.	Food-borne viruses (in general, e.g. Hepatitis A and Norovirus in fruit and vegetables) [1]	51
	Virus in fish - a clear view of the dangers associated with production and consumption (A08) ...	51
17.	Campylobacter (e.g. in poultry and ready-to-eat foods) [1]	52
	Consumer perception of food-borne disease by Campylobacter jejuni (A09)	52

18. Zoonoses (in general, including bio-hazards, MRSA etc.) [1]	53
Model for the survival of Methicillin-Resistant Staphylococcus aureus (MRSA) in aged cheese (A10).....	53
19. Improving information on the occurrence and spread of harmful organisms [2]	55
Implementation of standard operating procedures for research studies on livestock pathogens (C10).....	55
Role of the wildlife-livestock interface in zoonosis spreading (A11)	56
20. Ribonucleic acid interference (RNAi) applied to food producing organisms as pesticide, veterinary medicine or newly expressed trait in genetically modified crops	57
21. Better understand biological organisms and plant substances used in crop protection (reducing the need for chemicals, e.g. pesticides)	57
22. The impact of chemicals on the ecosystem (release of chemicals into the environment) [3] ..	58
Environmental risks to groundwater ecosystems related to use of feed additives (B07).....	58
Harmonization of the environmental risk assessment and risk management of pesticide use (1)	59
Soil organic Amendments and its effects on the pesticides behaviour in the environment (B08)	61
23. Presence/detection of environmental contaminants in food (e.g. from agricultural, industrial or household sources) [2]	62
Biosensing devices as a tool to refine the routine analysis of organophosphate pesticides (B09)	62
Safety of Imported Foods and Non-Foods into Europe that are Consumed by Different Ethnic Groups (B10)	63
24. Cocktail effects (health risk assessment of chemical mixtures, e.g. food additives) [3]	64
Cocktail effect calculator (D09)	65
Health Risk Assessment of Combined Exposure to Pesticides and Plant Growth Regulators (D10).....	66
Physiologically-based pharmacokinetic models to predict chemical residues in foods of animal origin (D11).....	67
25. Indirect effects on human health due to modified agricultural practices (e.g. via reduction of pesticide use, changed content of mycotoxins)	68
26. Developing standard biomarkers of intake of and/or exposure to contaminants [1]	69
Human biomonitoring for the assessment of dietary exposure to contaminants and micronutrient intake (D12)	69
27. Food supplements risk/benefits (in general)	70
28. Determination of allergen thresholds (clinical studies), in conjunction with immune-chemical measurements of allergens in foods	70

The 48 research ideas align with 20 out of 28 food safety risk assessment areas of priority for research identified by Member States and EFSA as part of the EU Risk Assessment Agenda (EU RAA).

In this e-Inventory, each research idea provides:

- Title
- Description
- Foreseen impact/benefit on food safety and public health
- What is needed to make the idea happen
- Proponents
- RARA Participant(s).

To each research idea, its poster number is assigned for the **Ideas Showcase** and where applicable in combination with one of four parallel **Break-out sessions** groups (A-B-C-D) for those to be presented as pitch.

I. Research Ideas

1. Methods and systems for identifying emerging food risks (e.g. new food-borne diseases)

The following four research ideas will be presented; more details below:

- A rapid risk assessment tool for introduction of zoonotic and food-borne diseases (A01)
- Internalization of foodborne pathogens. Does it difficult their control? (A02)
- Risk-ranking of chemical and microbiological hazards in foods (C01)
- Using "Big Data" gathered in Food production to be used for food safety/quality risk assessment (C02)

Details

Title of the research idea:

A rapid risk assessment tool for introduction of zoonotic and food-borne diseases (A01)

Description of the research idea: Increasing globalization and international trade contribute to rapid expansion of animal and human diseases, resulting in disease outbreaks in new geographical areas. Such outbreaks can pose a high disease burden to the livestock and/or human population and often result in severe economic losses. Preparedness is thus warranted to prevent, detect, and control outbreaks of emerging and re-emerging diseases. We propose the development of a rapid risk assessment tool to provide insight into the current and upcoming threats of zoonotic and foodborne diseases for risk management and early warning purposes. This rapid risk assessment tool will integrate information on disease occurrence worldwide, pathways for introduction such as trade in animal and animal products and movements of people, and the risk of infection of these pathways to assess the risk of zoonotic and foodborne diseases, the results of which can be used to identify high-risk source regions and pathways. Results of this rapid risk assessment tool can be used to guide the implementation of preventive measures and targeted surveillance well ahead of time.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: The proposed rapid risk assessment tool enables authorities to anticipate the potential introduction of emerging or re-emerging zoonoses and foodborne diseases. Results of the tool can be used to guide the implementation of measures to prevent large-scale outbreaks, e.g. by regulating imports of high-risk animals or products or by the design of targeted surveillance aimed at early detection of an introduction.

The prevention and control of zoonotic and foodborne diseases is a public responsibility. It is in the interest of public authorities to have tools available that support them in acting decisively and effectively. Being able to prevent outbreaks can save considerable amounts of money otherwise spent on controlling outbreaks. Although admittedly there is an interest for, for example, the livestock sector and food industry as well, it might be difficult to engage private parties in funding this research.

Need to make this idea happen (funding, expertise, partners,...): The development of such a risk assessment tool needs expertise of risk modellers in both animal and public health. As the quality of the tool will largely depend on the input data available to estimate the risks, expertise in data mining and the exploration and extraction of data available on the worldwide web is a prerequisite. WBVR has ample experience in risk modelling of animal diseases and is currently working on tools for rapid risk assessment of livestock diseases. However, the development of the proposed risk assessment tool for zoonoses and foodborne diseases requires a one health approach because the public health risks assessed originate from livestock production or companion animals. Hence we also need

expertise from public health institutes. Teaming up with similar expertise in animal and public health risk assessment available in other EU member states will definitely enhance the quality and reliability of results and broaden the applicability of the tool.

Proponents: Dr. Clazien de Vos, Wageningen Bioveterinary Research, The Netherlands; Dr. Ed van Klink, Wageningen Bioveterinary Research, The Netherlands.

Participant / Presenter:

Dr. Ed van Klink

Wageningen Bioveterinary Research

The Netherlands

Email: ed.vanklink@wur.nl

Ideas Showcase / Poster #: A01

Break-out sessions (pitches) group: A

Title of the research idea:

Internalization of foodborne pathogens. Does it difficult their control? (A02)

Description of the research idea: The internalization of intracellular foodborne pathogens like E. coli, Salmonella and Listeria in foods could protect them from removal during food production. This could be critical for minimally processed and ready-to-eat foods, which are increasingly produced in response to today's consumers' demand. To understand this internalization phenomenon could reveal an unrecognized factor contributing to increased risks.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: The major impact/benefit derived to assess the risk associated with the internalization of foodborne pathogens will be: 1. On food safety, by improving the methods for detecting and controlling pathogens in food industry. Monitorization and sanitization methods could be informed to prevent cross-contamination along the food chain; 2. On the public health, by increasing the likelihood of food contamination with these pathogens.

Internalization can protect bacterial pathogens during food production. This would allow them to enter silently the food chain, which would suppose a food safety threat for its control. For two reasons:

1. Internalized bacterial cells can resist to food-processing conditions. This could be particularly hazardous for minimally-processed as well as RTE foods, which are increasingly produced in response to today's consumer. The project could permit to develop new strategies of control of bacterial pathogens of food concern; 2. Internalized bacterial cells could not be efficiently recovered by the analytical reference methods so bacterial counts can be underestimated in particular occasions. The project could give rise to new inputs for risk assessment used as major tool for food safety legislation.

Need to make this idea happen (funding, expertise, partners,...):

- Partners with expertise in the target pathogens;
- Partners with expertise in infectivity processes in foodborne pathogens;
- Expertise in risk assessment studies.

Proponents: Marta Lopez Cabo, CSIC, Spain; Juan Jose Rodriguez Herrera, CSIC, Spain.

Participant / Presenter:

Dr. Marta Lopez

CSIC

Spain

Email: marta@iim.csic.es

Ideas Showcase / Poster #: A02

Break-out sessions (pitches) group: A

Title of the research idea:

Risk-ranking of chemical and microbiological hazards in foods (C01)

Description of the research idea: The Swedish National Food Agency (NFA), the Finnish Food Safety Authority (EVIRA), and the University of Maribor, Slovenia, have initiated a collaboration on risk ranking of chemical and microbiological hazards in foods. The project is partly funded by the European Food Safety Authority. The goal is to improve the ability to compare chemical and/or microbial risks, taking the available evidence and uncertainties into consideration. This initiative intends to provide tools that improve the basis for decision making and risk communication, helping to better describe and prioritize risks. Specifically, we aim to explore the possibility to develop approaches for estimation of the burden of disease, or similar, associated with chemical exposure, which more readily can be made in the microbiological area. To this end previous experience at national level regarding the development and application of risk ranking approaches for chemicals will serve as a starting point. Also, we aim to support interactions, for example in terms of workshops, between risk assessors, risk managers, and risk communicators, that can help to facilitate practical application of developed approaches/tools, and promote better understanding of the needs associated with the three sectors involved in the process of risk analysis.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: Public health agencies have an increasing demand to carefully plan their workload and direction of their work. In this context risk ranking can help to set priorities, and an increased availability of such methods can promote a more risk-based decision making process. Also, since risk ranking methods allow risks to be interpreted in a greater context this can help the communication of results to consumers, the media, and other stakeholders, that have interests related to the levels of different hazards in foods available on the European market.

While the overall objective is to provide improved support to risk management and risk communication, the principle of operational separation between risk assessment and risk management is still important. Also, funding from industry may potentially create a perception that the scientifically-based outputs from developed risk ranking methods are biased in one way or another. For this reason some of the partners involved in this initiative are not formally allowed to accept other than public funding.

Need to make this idea happen (funding, expertise, partners,...): The present idea spans different disciplines and sectors. A number of institutions are involved as a starting point, and extended collaboration and/or interaction with other partners is of interest. One challenge with this project relates to the evaluation of the severity of various health effects that may be used as part of the assessment of chemical toxicity: i.e., for example how various lower- to higher-order health effects can be ranked, and/or integrated, also keeping the exposure duration in mind. At the same time expertise related to consumer risk perception, and graphical presentation of (risk-related) results is also important.

Proponents: Salomon Sand, Swedish National Food Agency; Jukka Ranta, Finnish Food Safety Authority; Roland Lindqvist, Swedish National Food Safety Agency; Pirkko Tuominen, Finnish Food Safety Authority; Tomaž Langerholc, Faculty of Agriculture and Life Sciences, University of Maribor.

Participant / Presenter:

Dr. Salomon Sand

Swedish National Food Agency

Sweden

Email: salomon.sand@slv.se

Ideas Showcase / Poster #: C01

Break-out sessions (pitches) group: C

Title of the research idea:

Using "Big Data" gathered in Food production to be used for food safety/quality risk assessment (C02)

Description of the research idea: Quality control (including food safety) and quality assurance of food of animal origin will probably become more and more data dependent. The amount of data coming from primary production will explode in the coming years. In bovine production, data gathered by milk robots from individual animals become available. In bovine, pig and chicken production, on site information of feed consumption, weight of animals, air quality, information from the veterinarian (like prescription of drugs) of the farm and presence of microorganisms etc. will decide more and more the health status of a herd or individual animal. These data including data gathered in the processing phase will be used for risk assessment and quality control and assurance if these data can e.g. be related to risks for consumers and animal welfare levels. Before we can use these data to determine quality, research projects by veterinarians, food safety controllers, animal production specialists and data managers have to come together to determine ways to collect relevant data. Furthermore algorithms have to be made which will relate these data to food safety risks for humans and animal welfare levels of animals. Probably also environmental factors around primary farms will be incorporated in these algorithms in a One Health/Total Health quality system.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: This research will make risk assessment of food products of animal origin more robust and worthwhile. If risks for food safety (and quality) exist will be decided by information from the food chain and therefore less dependent on on-site control by quality controllers. No risk animals will become no-risk food products without food safety control whereby "risk" animals can be controlled on specific threats extensively.

In the Netherlands Food Safety control is done by both public and private partners. But finally food products from animal origin are safeguarded by the Dutch Food Safety Authority (NVWA). Veterinarians working for this governmental organization are using information from primary production to perform risk assessment for food safety and quality. The information used nowadays, is not quality controlled, not depending on whole life rearing data and can be influenced by personal interests. The quality of the information can be improved by using the "Big Data" gathered on farm level. Public funded science driven projects should translate these "Big Data" in a risk assessment tool for food safety which can then be used by the public control agencies.

Need to make this idea happen (funding, expertise, partners,...): A consortium of interested parties needs to be established. Parties including farm animal specialists, food quality control specialists, risk assessors etc. but also innovative (out of the box thinkers) animal and ICT specialists, which can create/measure robust data which relates animal information with food quality/food safety.

Data from animals gathered e.g. by camera systems, milk robots, farm animal data systems should be related to food quality/safety and then be used in risk assessment of food products.

Proponents: Len Lipman, Faculty Veterinary Medicine, Institute of Risk Assessment Sciences, Division Veterinary Public Health, Utrecht University, Utrecht, The Netherlands; Bert Urlings, Director QA and PA, VION Food group, VION N.V., Boseind 15. Boxtel, P.O. Box 1, 5280 AA Boxtel, The Netherlands.

Participant / Presenter:

Dr. Len Lipman

IRAS, Faculty Veterinary Medicine

Utrecht University

The Netherlands

Email: l.j.a.lipman@uu.nl

Ideas Showcase / Poster #: C02

Break-out sessions (pitches) group: C

2. Development of standard risk-benefit assessment methods (of foods)

The following seven research ideas will be presented; more details below:

- Developing methods for potency estimation for individual members of groups of toxins (D01)
- Development of Risk-Benefit Assessment of foods in the EU: from methodology to application (C03)
- Implementation of health technology assessment methodology in food safety risk analysis case studies (C04)
- Novel generic risk-benefit assessment approach (C05)
- Risk-Benefit Assessment: a tool for a better food and health policy in Europe (RBA4betterEU) (5)
- The relevance of 90-day toxicity studies in risk assessment of foods (D02)
- Translational strategy to predict food allergenic potential (D03)

Details

Title of the research idea:

Developing methods for potency estimation for individual members of groups of toxins (D01)

Description of the research idea: The aim of the project will be to develop an innovative method(s) for estimating relative potency (or toxicological equivalency factors) for structurally-related chemicals with limited toxicological data. Currently risk assessment for such chemicals is dependent either on the few members of the chemical class for which data are available, hence underestimating the combined risk, or by making a conservative assumption that all members of a class are equally toxic, which has the potential to overestimate the risk. Therefore there is a need to include more members of a class, taking into account their individual potency, in order to take a more proportionate approach to risk assessment and to development of regulations for these chemicals in food.

A paradigm should be developed for estimating the relative potency based on studies on one group of chemicals that can occur in food, and then the method could be verified using a different group of chemicals. Relevant groups of chemicals could include toxins produced by plants (e.g. pyrrolizidine alkaloids) or fungi (various classes of mycotoxin), or environmental contaminants that are persistent in the environment and hence widely present in the food chain (e.g. polybrominated diphenyl ethers, which were previously used as flame retardants). Limited potential for purification or synthesis of individual members of these classes of chemicals means that conventional toxicity testing is not feasible. Therefore in silico and/or in vitro approaches are likely to be needed. These should take into account the quantitative aspects of toxicokinetics and toxicodynamics. Recommendations should be made for applying the approach to other classes of chemicals.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: If successful, the research would lead to refinement of the risk assessment approaches for groups of related substances in food, in a manner that is protective for consumers without imposing undue restrictions on food businesses.

Need to make this idea happen (funding, expertise, partners,...): We need ideas and outline proposals that we can look into the possibility of funding through our strategic evidence fund. We would also be interested in partners interested in co-funding the approach.

In order to have credibility and widespread acceptance and not to be perceived as making life easier for industry in the way TTC has been attacked, the project requires public funding. The research addresses the basic paradigm of risk assessment and is unlikely to be funded by research councils due to its perceived low impact factor.

Proponents: David Gott, FSA, UK

Participant / Presenter:

Dr. David Gott

Food Standards Agency

United Kingdom

Email: david.gott@food.gov.uk

Ideas Showcase / Poster #: D01

Break-out sessions (pitches) group: D

Title of the research idea:

Development of Risk-Benefit Assessment of foods in the EU: from methodology to application (C03)

Description of the research idea: Methods for Risk-benefit assessment in foods (RBA) have been developed and proposed in European research projects (such as BRAFO). However, performing an RBA remains challenging. To further develop the RBA methodologies, case studies that address the challenges related to RBA are needed. Based on an EFSA sponsored RBA workshop (Copenhagen, May 2017), we present a research idea that addresses the main challenges that have been identified for RBA:

The integration of microbiological, chemical and nutritional risk and benefit assessment;

– Evidence synthesis, the imbalance between scientific evidence required for risk and benefit assessment;

- Data availability, data needs and the development of shared databases, including the development of novel harmonized consumption surveys for nutritional, chemical and microbiological exposure assessment;
- The consideration and quantification of uncertainty in RBA;
- The selection of integrated health metrics and the potentials for quantitative RBA;
- RBA beyond human health effects: inclusion of sustainability, (health) economy and variation between consumer groups;
- Risk-benefit communication to food safety authorities and consumers.

The research should be performed in a collaborative project that combines two strategies, one focussing on method development (construction of an RBA typology, modelling approaches and software tools) and one focussing on practical case studies, to test the proposed methods partly by re-analysing and expanding previously performed case studies, using new data and new methods. Relevant stakeholders should be included to assure that RBA meets the societal requirements.

The research will result in standardised tools that allow an integrative approach towards risk-benefit assessment of foods.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health:

Risk-benefit assessment of foods is proposed as a method to assess the overall health effects of food intake. In traditional risk assessment approaches, the focus is on human health hazards in foods: beneficial effects are often overlooked. This may lead to confusion among consumers and frustration among food producers, and may give the impression that all food is unhealthy. Eventually, this may even lead to a situation in which some consumers neglect food safety risks, as “everything is unhealthy anyway”. By developing a transparent methodology for an integrated assessment of risks and benefits associated to foods, food safety authorities can give sound and consistent dietary advices and consumers can make well-informed dietary choices.

Credibility, transparency and societal trust are of crucial importance for risk-benefit assessment of foods. RBA combines different research disciplines and provides answers that can be directly used for societal prioritization of health interventions and for communicating dietary advice to consumers.

With private funding, a conflict of interest is easily suspected. When RBA concludes that benefits are larger than the risks, it does not necessarily mean that the risks are acceptable, an issue that should be carefully addressed. Still, those performing RBA may be blamed to do this to “wipe the risks under the carpet of the benefits”, which may severely affect the societal trust. Hence, public funding is of crucial importance for the required credibility and reliability.

Need to make this idea happen (funding, expertise, partners,...):

Our RBA research idea requires international collaboration because the challenges are large and demanding, and not restricted to national borders. A new harmonised and standardised RBA research methodology will therefore need broad international support (incl. financing) to make it sustainable within Europe. Our research idea includes the performance of case studies and requires development and discussion of methods. Hence, a variety of research partners, in terms of expertise, geographical spread and stakeholder status is important. From the EFSA sponsored workshop (Copenhagen, May 2017) and past projects, we have a network of interested parties, which is a useful starting point for the collaboration foreseen in our proposal.

Parts of our proposal could be performed as separate projects (such as single case studies), but ideally the proposal gets shape as a large publicly funded EU project.

Proponents: Maarten Nauta, DTU, Denmark; Geraldine Boue, INRA- Secalim, France; Morten Poulsen, National Food Institute, Denmark; Jacob van Klaveren, RIVM, The Netherlands; Matthias Greiner, BfR, Germany; Salomon Sand, National Food Agency, Sweden; Helga Gunnlaugsdottir, Matis, Iceland; Brecht de Vleeschauwer, Scientific Institute of Public Health (WIV-ISP), Belgium; Annemarie Pielaat, Unilever, The Netherlands.

Participants / Presenters:

Dr. Maarten Nauta

National Food Institute, Technical University of Denmark
Denmark
Email: maana@food.dtu.dk

Dr. Géraldine Boué

INRA - Oniris Secalim
France
Email: geraldine.boue@oniris-nantes.fr

Dr. Morten Poulsen

Technical University of Denmark, The National Food Institute
Denmark
Email: morp@food.dtu.dk

Ideas Showcase / Poster #: C03
Break-out sessions (pitches) group: C

Title of the research idea:

Implementation of health technology assessment methodology in food safety risk analysis case studies (C04)

Description of the research idea: Food safety risk analysis and health technology assessment (HTA) are two different paradigms sharing multiple common features. Decision makers in both fields have the responsibility to promote the health of society deciding on intervention opportunities based on disease burden, intervention feasibility, effectiveness and cost, equity and ethical considerations. The evolution of HTA in the last two decades has resulted in the establishment and widespread use of quantitative tools to support and justify evidence-based decisions. In contrast, decision making in the food safety domain is still a qualitative process rendering ad hoc weights to all aspects considered. In our previous paper (Pitter, J. G., Józwiak, Á. B., Martos, É., Kaló, Z., & Vokó, Z. Next steps to evidence-based food safety risk analysis: opportunities for health technology assessment methodology implementation. *Studies in Agricultural Economics*, 2015, 117(3), 155-161) we proposed that cost-utility analysis (CUA) could better serve the priority settings in food safety risk management than the currently (rarely) applied cost-benefit analysis (CBA), considering either broad resource allocation or specific safety measure decisions. Moreover, development of multi-criteria decision analysis tools could help the introduction of consistent and explicit weighting among cost and health impacts, equity and all other relevant aspects. Risk sharing schemes established in performance based agreements of health technology reimbursement decisions may also contribute to the success of food safety interventions requiring cooperation of various stakeholders (Pitter, J. G., Vokó, Z., Halmos, Á., & Józwiak, Á. Cost-Utility Analysis of Potential Campylobacter Control Measures in the Food Chain of Indoor Broiler Chicken in the Eu. *Value in Health*, 2015, 18(7), A649). The proposed research idea is to evaluate the added value of these HTA tools in food safety risk analysis, by applying them in selected case studies.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: We believe that sharing the established methodological tools of health technology assessment with food safety risk analysis would pave the way to more systematic and evidence based food safety decision process along the whole risk analysis framework, with increased transparency, ensuring better and more justifiable decision with higher societal values and gains. In

the proposed case studies, the selection of technologies, interventions and any policy measures would be supported by full economic analyses without health gain monetisation (i.e. cost-utility, cost-effectiveness and cost-minimisation analyses, depending on the determination of the appropriate level of protection), with or without country-specific development of MCDA tools to deal explicitly and transparently with all relevant aspects of policy decisions. Lessons learned from risk sharing agreements in the HTA field could also be exploited to support the smooth implementation of the selected measures.

Results of the proposed case studies can directly contribute to the development of risk benefit assessment methods in food safety policy, cross-fertilizing it with quantitative methodology evolved in the last decades of health technology assessment. Thus, public benefits are clear. However, the availability of private funds for the proposed research is marginal at present. Therefore, this research is not feasible without public funding.

In a small-scale feasibility exercise, we recently re-assessed the cost-utility of available campylobacter control measures in broiler chicken with good consumer acceptance, and found that the combination of these measures would result in significant health benefits and cost savings at the same time in the EU (Value in Health, 2015, 18(7), A649; full publication ongoing). Therefore, it is of high public interest to conduct similar studies and to use their results in evidence based food safety decisions.

Need to make this idea happen (funding, expertise, partners,...):

- partners who are involved in food safety risk assessment and are interested in the benefits of applying HTA methodology (e.g. cost-utility analyses, MCDA development, and risk sharing schemes) in selected case studies.
- public funding for the above collaborative research.

Proponents: Prof. Zoltán Vokó: Syreon Research Institute; and Department of Health Policy and Health Economics, Faculty of Social Sciences, Eötvös Lóránd University, Hungary; Prof. Zoltán Kaló: Syreon Research Institute; and Department of Health Policy and Health Economics, Faculty of Social Sciences, Eötvös Lóránd University, Hungary; Ákos Józwiak DVM, PhD: National Food Chain Safety Office, System Management and Supervision Directorate, Hungary; János G. Pitter MD, PhD: Syreon Research Institute, Hungary.

Participant / Presenter:

Dr. János György Pitter

Syreon Research Institute Ltd.

Hungary

Email: janos.pitter@syreon.eu

Ideas Showcase / Poster #: C04

Break-out sessions (pitches) group: C

Title of the research idea:

Novel generic risk-benefit assessment approach (C05)

Description of the research idea: To date there is no methodology available to decide whether beneficial effects of a food outweighs possible side effects. Therefore, it would be extremely helpful to address this issue by developing a generic, pragmatic, flexible and science-based risk-benefit assessment approach.

Recently, we adapted the risk-benefit approach published by Renwick et al. (2004) and Krul et al., (2016), to develop a generic framework that is fit for the risk-benefit assessment of immune health

interventions.

To this end, all possible hazardous and beneficial effects were redefined into generic severity-based health effect categories. The incidence at which health effects in each category may be considered 'acceptable', was used to enable the comparison and weighing of the risks and beneficial effects.

The further development of such generic risk-benefit assessment framework will enable the evaluation of all food / pharma intervention data available, and will be able to form the basis to derive the optimal dose levels of intake.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: This novel risk-benefit assessment approach enables risk assessors to take the multitude of different types of data available covering toxicity and efficacy studies into account, by ranking and weighing all available data. Ultimately, this assessment will help to determine optimal beneficial and safe dose levels of intake.

To date there is no methodology available to decide whether beneficial effects of foods outweigh possible side effects. Therefore, it would be extremely helpful to address this issue by developing a generic, pragmatic, flexible and science-based risk-benefit assessment approach.

Need to make this idea happen (funding, expertise, partners,...): A process needs to be developed to i) work out an approach, ii) to test and validate it in case studies, iii) to discuss the approach and validation outcomes with stakeholders and iv) to identify further actions needed to implement it.

Proponents: Houben, Geert, TNO, The Netherlands.

Participant / Presenter:

Dr. Jolanda van Bilsen

TNO

The Netherlands

Email: j.vanbilsen@tno.nl

Ideas Showcase / Poster #: C05

Break-out sessions (pitches) group: C

Title of the research idea:

Risk-Benefit Assessment: a tool for a better food and health policy in Europe (RBA4betterEU) (5)

Description of the research idea: "RiskBenefit4EU – Partnering to strengthen the risk-benefit assessment within EU using a holistic approach", is a recent European pilot project funded by EFSA and coordinated by Portugal (PT), integrating a multidisciplinary team from health and food institutes, national food safety authorities, R&D institutions and academia from PT, Denmark (DK) and France (FR). The main objectives of RiskBenefit4EU concerns the development of a set of RBA (Risk Benefit Assessment) tools to assess and integrate food risks and benefits in the areas of microbiological, nutritional and chemical components through the development of a harmonized framework. This pilot project will validate the RBA framework created using a Portuguese case study on cereal-based foods.

The research idea for food safety risk assessment is to create an international network on RBA to promote and disseminate the outputs and knowledge acquired under RiskBenefit4EU, at European level. This network aims to promote knowledge and capacity building on RBA (acquired under RiskBenefit4EU) among European early stage researchers and to apply the harmonized framework on their countries. Health risks associated with consumption of cereal-based foods, an important

source of nutrients with beneficial health effects, could increase in the near future due to climate changes in Europe (dry conditions and increased ambient temperatures could promote the increase of toxins production; occurrence of emergent compounds) thus the dissemination and use of the RBA harmonized tools related with ingestion of cereal-based foods and derivatives could contribute to support future food and health policy in Europe.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: The expected impact of the research idea presented at RARA stands to help further developing and establishing RBA as a tool to provide scientific evidence to support food and health policies and to inform risk management decisions in the area of food safety, nutrition and public health at international, national or regional level. The application of the harmonized RBA set of tools developed and validated under RiskBenefit4EU could be implemented in different EU institutions with food problems concerning cereal-based foods promoting the comparison of results and interchange of ideas and experiences. Furthermore, the collaborations to be settled will provide a unique opportunity to establish critical mass thinking for research idea-generation dedicated to RBA and will contribute to create a new generation of young researchers dedicated to this topic.

The balance between risk and benefit is of interest to food and health authorities developing food and health policy and consumer advice, businesses developing new food products, and consumers considering dietary changes. The dissemination and use of the RBA harmonized tools by food and health authorities will be important contributes to support food policy and decision making and a significant help to strengthen the EU capacity to deal with difficulties/alternatives emerging in the context of climatic changes. The involvement of young scientists, partners and regions not formerly involved in RBA will allow for the increase of capacity building in the EU in this area.

Need to make this idea happen (funding, expertise, partners,...): It is of utmost importance to extent the utilization of the risk-benefit framework (developed under RiskBenefit4EU) to other institutions (scientific, academic and industry) and to assure the sustainability of the capacity building and knowledge transfer and the continuous collaboration within the network. In order to promote this idea, several actions need to be funded: i) organization of RBA network; ii) development of a website to disseminate the network, its aims and activities and ii) development of a database gathering data on RBA in different EU countries; iii) organization of an international set of conferences/workshops to share the methodologies, disseminate results and exchange ideas; iv) organization of training courses for young researchers, risk managers and assessors, and other professionals within this field, in order to maintain the knowledge transfer to other institutions and v) support for exchange missions between partners specially for early stage researchers.

Proponents: Paula Alvito, Ricardo Assunção, Carla Martins, Sílvia Viegas, Paulo Fernandes - National Institute of Health RJ (INSA, PT); Filipa Vasconcelos, Pedro Nabais - Economic and Food Safety Authority (ASAE, PT); Duarte Torres, Carla Lopes - University of Porto, Faculty of Food Sciences and Nutrition (UPorto,PT); Martin Poulsen, Sara Pires - Technical University of Denmark, Denmark (DTU Food,DK); Géraldine Boué, Jeanne-Marie Membré - Institut National de la Recherche Agronomique (INRA,FR).

Participant / Presenter:

Dr. Paula Alvito

National Institute of Health Dr. Ricardo Jorge
Portugal

Email: paula.alvito@insa.min-saude.pt

Ideas Showcase / Poster #: 5
Break-out sessions (pitches) group: n/a

Title of the research idea:

The relevance of 90-day toxicity studies in risk assessment of foods (D02)

Description of the research idea: Scientific evidence became key as basis for EU rules on foodstuffs, when legislation was reformed in response to various food scares such as the BSE crisis in the 1990s. These scandals identified the need for European food law to include measures to protect consumers from safety hazards and from being misled. Art 6 of the new European Food Law emphasises the need for scientific evidence to analyse the risk that a food poses, to ensure a high level of health protection. This scientific risk assessment is conducted independently and transparently by EFSA. The risk assessment's results feed directly into the EC's risk management decision, determining whether the product can be brought to market. Under the new Novel Food Regulation (NFR), all new foods need to be authorised by the EC before they can be brought to market. This authorisation is based on whether the scientific evidence establishes the product's safety for human consumption, as ascertained within various domains, including kinetics, toxicology, nutritional information and allergenicity. To analyse the safety of a food product in these domains and specifically when studying toxicity of a compound, 90-day toxicity studies are often relied upon. In these studies, experimental animals are sub-chronically orally exposed to the food ingredient, to analyse any adverse effects and to establish a safe limit of consumption. Such studies are requested based on the findings from mechanistic, in vitro studies that precede these experimental animal studies. It can however be questioned whether the findings from these toxicity studies lead to any change in the eventual evaluation of the ingredient, as established with the in vitro studies. This study therefore aims to establish a correlation between the outcomes of in vitro studies and 90-day toxicity studies conducted under the NFR and the food additive regulation, to review the relevance of requiring such studies in the assessment of novel foods and food additives.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: All dossiers submitted under the 1997 NFR will be reviewed upon their use of 90-day toxicity studies. From all dossiers, reasons to (not) conduct such sub-chronic toxicity studies will be retrieved. Secondly, findings from these toxicity studies are reviewed and correlated to the outcomes of the in vitro work within the same dossier. Studied endpoints of both study types and conclusions drawn from all studies are analysed. Subsequent to reviewing novel food dossiers, a selection of food additives dossiers will be analysed similarly: reasons to conduct toxicity studies are reviewed, and studied endpoints & outcomes from in vitro and sub-chronic studies are analysed. This will allow drawing a conclusion upon the relevance of requesting sub-chronic 90-day toxicity studies in risk assessment of food ingredients. Next to analysing the relevance of 90-day toxicity studies, this methodology can be used to review the use of other types of studies (mechanistic to RCTs), in establishing safety.

Need to make this idea happen (funding, expertise, partners,...): The findings from this research will impact the risk/benefit assessment as currently conducted in food safety. The results from this research will be of use for the discussion on the use of experimental animals in establishing food safety. It is a key that this research is conducted with public funding, to enable all stakeholders in this risk/benefit assessment of foods to get access to these findings. Only when all stakeholders are fully informed, the methodologies to establish food safety can be discussed between these stakeholders.

Proponents: Dr. Alie de Boer, Maastricht University, The Netherlands; Dr. Misha Vrolijk, Maastricht University / Netherlands Food and Consumer Product Authority, The Netherlands; Dr. Hubert Deluyker, retired Scientific Adviser to the EFSA Executive Director, Italy; Prof. dr. Aalt Bast, Maastricht University, The Netherlands.

Participants / Presenters:

Dr. Alie de Boer

Maastricht University

The Netherlands
Email: a.deboer@maastrichtuniversity.nl

Dr. Misha Vrolijk
Maastricht University
The Netherlands
Email: m.vrolijk@maastrichtuniversity.nl

Ideas Showcase / Poster #: D02
Break-out sessions (pitches) group: D

Title of the research idea:

Translational strategy to predict food allergenic potential (D03)

Description of the research idea: We present and further develop translational (in vitro to in vivo (incl human) strategies to assess allergenic potential of food components. Assays included are aimed to determine of content of allergenic proteins, as well as to assess the role of immune system.

In our research, we concentrate on gastrointestinal tract-related processes and how non-protein components (mycotoxins, NSAIDs) influence the allergic responses. For this we have developed in vitro assays to study:

- uptake of proteins (using cell-lines and intestinal organoids),
- protein degradation and presentation (using dendritic cells),
- activation of various gut associated epithelial cells (incl. Goblet cells, endocrine cells)
- antigen specific mast cell release.

We have initiated or were involved in inter-laboratory ring trials with in vitro (mast cell) assays, and with mouse models. In vitro models are also used to study effects (and uptake) of chemicals in food (other than proteins), and to assess potency of substances (naturally occurring) to counteract microbes (in relation to antimicrobial resistance, AMR)..

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: With our translational strategies we can predict the allergenic potential of new proteins (e.g. GMO, insect proteins, but also the hazard/risk of food components with adjuvant potential.

In addition, we use the e.g. organoid system to study processes that may contribute to AMR and to assess effects of a wide range of chemicals, including phytochemicals.

Need to make this idea happen (funding, expertise, partners,...): Many of our assays are not yet validated. They also need further specific development.

Apart from additional funding we also need expertise (e.g. microbiota assessment) that may help to further complete our strategies. We are also looking for companies (from SME to large) that are interested to implement assays in their work flow.

Only with additional information we can assess the full predictive spectrum of our assays (in particular 3R assays) and decide how they fit to adverse outcome pathways and MoA.

Proponents: Marianne Bol, Joost Smit, Raymond Pieters (IRAS-UU), NL; Stefan Vaessen, Jean Paul ten Klooster, Raymond Pieters (UASU), NL.

Participant / Presenter:

Dr. Raymond Pieters
University of Applied Sciences Utrecht and IRAS-Utrecht University
The Netherlands

Email: r.h.h.pieters@uu.nl

Dr. Joost Smit

University of Applied Sciences Utrecht and IRAS-Utrecht University

The Netherlands

Email: j.j.smit@uu.nl

Ideas Showcase / Poster #: D3
Break-out sessions (pitches) group: D

3. Common data collection / surveillance scheme

The following three research ideas will be presented; more details below:

- EU Inter-regional approach to Marine Shellfish Toxin regulations (B01)
- Implementing Network science and Mathematical Modelling Tools into EU Food Safety Decision Making (C6)
- Microbiological and chemical risk assessment in bivalve mollusc. Environmental and sanitary linkage (C7)

Details

Title of the research idea:

EU Inter-regional approach to Marine Shellfish Toxin regulations (B01)

Description of the research idea: The King scallop (*Pecten maximus*) is an important commercially exploited species of bivalve in northern Europe in offshore waters from Norway south to Spain. It attains a large body size, is a high value species and is also the subject of extensive and intensive aquaculture in northern Europe. In Irish waters, the offshore fishery for king scallops occurs mainly off the south east coast, in the south Irish Sea and in the western approaches to England and Wales. Fleets from the UK, France and Ireland exploit stocks outside of national 12nm territorial limits in these areas.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: Scallops pose a particular difficulty due to the location of offshore fisheries, differing interpretation of the EU legislation and complex partitioning of toxins. In addition the variability in offshore management areas can be significant leading to differing results. Other live bivalves that are fished or farmed in inshore areas are controlled via defined production areas and normally tested by a single authority to assign status. Scallops may, however, be tested by several member states leading to potential conflicting advice because of variability within the management area. This proposal will improve the risk assessment of Scallops by quantifying this variability, and based on this propose a jointly managed advisory system as part of improved risk management plans between MS competent authorities.

This proposal is made to provide much needed information to reduce potential risk of toxic shellfish being placed on the market. Legislation focusses on the placing of whole scallops on the market, while some markets for processed meats rely on interpretation of the legislation that are not implemented the same in all MS. The research proposed is to inform the assessment of risk for these

shellfish and is for the common benefit of assisting regulatory authorities and should therefore be funded publically.

Need to make this idea happen (funding, expertise, partners,...): The proposal is dependent upon having an appropriate funding opportunity and would be best carried out among a multinational interdisciplinary group with expertise in risk assessment, shellfish toxicity and fisheries management. Implementation of an interregional advice platform would require the development of a database by a subgroup with IT skills, and a management cell would need to be established among participatory member states and given the required authority to deal with the uploading of information onto this system. A consortium approach to drafting such a proposal would be established to conform with requirements of an identified funding call.

Proponents: Joe Silke, Marine Institute, Ireland; Conor Duffy, Marine Institute, Ireland; Dave Clarke, Marine Institute, Ireland; Brian Nolan, Sea Fisheries Protection Authority, Ireland.

Participant / Presenter:

Mr. Joe Silke

Marine Institute

Ireland

Email: joe.silke@marine.ie

Ideas Showcase / Poster #: B01

Break-out sessions (pitches) group: B

Title of the research idea:

Implementing Network science and Mathematical Modelling Tools into EU Food Safety Decision Making (C06)

Description of the research idea: Increasing volume and complexity of food production and trade pose an increasing challenge to governmental stakeholders in their efforts to protect consumers from food-borne disease outbreaks, food fraud or even bioterrorist attacks. On the other hand, exponential growth of data available on food products and commodity chains provides the potential of better informed decisions. Network science and mathematical modelling – as decision support tools – may have an important role in enhancing the safety of the consumers and the supply chain itself. In our opinion, the combination of algorithms from network science and mathematical modelling could easily be adopted to support crisis prevention, risk-based control, early warning and predictive systems.

To promote the broad adoption of network science and modelling methods in the area of food chain safety we propose to carry out the following research and development activities, primarily dealing with animal health data, but with a future focus on the whole food chain:

- Development of static and dynamic network analysis tools for various data sources (including animal identification data, international trade data, RASFF data, business connection and transaction data, etc.) in order to enhance risk ranking, emerging risk identification, early warning and prediction systems.
- Development of a methodological framework capable of simulating different epidemiological situations to increase preparedness for real epidemics using network-based spreading models.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: The proposed research and development of network analysis and modelling tools would give a possibility for a deep insight into the connection of various entities of the food chain, to the data produced, and would make a more profound disease modelling possible. With the help of the tools,

subtle changes of the animal trade and movement network and their impact could be detected, making an earlier intervention possible.

With future further developments, those animal-related networks could be connected to the human population network in terms of disease modelling and early detection.

Results of the proposed research can directly contribute to more effective operation of the early warning systems and to better intervention strategies in the area of animal health, and generally to public health, with clear public health benefits. However, the availability of private funds for the proposed research is marginal at present. Therefore, this research is not feasible without significant public funding.

Need to make this idea happen (funding, expertise, partners,...):

- partners who are involved in animal disease modelling and would be interested in applying network analysis for that;
- funding for the collaborative research;
- funding for developing a network analysis based epidemiological modelling tool.

Proponents: Ákos Jozwiak, National Food Chain Safety Office (NÉBIH), Hungary.

Participant / Presenter:

Dr. Ákos Bernard Jozwiak

National Food Chain Safety Office (NÉBIH)

Hungary

Email: jozwiaka@nebih.gov.hu

Ideas Showcase / Poster #: C06

Break-out sessions (pitches) group: C

Title of the research idea:

Microbiological and chemical risk assessment in bivalve mollusc. Environmental and sanitary linkage (C07)

Description of the research idea: Controls of bivalve mollusc production areas are in place to improve the safety of bivalve molluscs intended for consumption.

The main risk factors for the contamination of mollusc production areas are human/animal waste and environmental factors (rainfalls, water temperature and dissolved oxygen, ph.): indeed food safety legislation and international guidelines ask to collect the environmental data in addition to health surveillance data.

Currently sanitary and environmental data are collected separately, with a consequent overloading of information, and there are no indications on how to integrate them in order to assess the jointed effect they may have on the microbiological and chemical contamination of molluscs production areas.

The main task in the food safety in bivalve molluscs is to evaluate the role of human and animal waste and environmental factors affecting the risk of chemical and microbiological contamination in a certain area: the control of bivalve mollusc production areas needs a risk model built by using environmental and sanitary dataset together and this has not been done yet.

Our research proposal is to build a unique database, where historical environmental, safety and made on purpose data are linked and to identify, by using a statistical model, factors related with the increasing of microbiological and chemical risks.

The project will give information useful to build a surveillance plan more efficient because less expensive (just necessary sample will be done) but with an higher food safety standard because

based on the risk evaluation.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: The foreseen benefit of the risk evaluation model proposed on food safety is based on a more efficient surveillance scheme and a safer model of control of the products.

Aim of the study is to identify the real risk factors for chemical and microbiological contamination in shellfish and, in the face of lower public expenditure on sea product control, to prepare a surveillance plan with the same or possible higher product safety.

The benefit to use shellfish as a model is evident because no other food product is so linked to hazards given by the environment.

The framework that is possible to build on how to weight and analyse different environmental aspects and how one environmental aspect can influence another can be used in other food production chain.

The public funds are necessary because no immediate private benefit are evident. In long term a better surveillance scheme which can be different for different shellfish and fishes products is even a private benefit in terms of non-compliance and monitoring pressure. As the first impact no benefit will not be so evident, except for the costumers who can buy a safer product.

Need to make this idea happen (funding, expertise, partners,...): It is necessary to have different expertise and some funds to make this idea happen. The expertise needed is: microbiologist, chemist, oceanographer, meteorologist, epidemiologist, statistician, computer scientist with experience in GIS, marine biologist. It is necessary to have funds to collect data from the environment to be linked to food safety data. The research needs to be spread in different years because season and different climate events can create different situation. The research cannot be considered with data less than 3 years.

Proponents: Mario Latini, Istituto Zooprofilattico dell'Umbria e delle Marche; Francesca Barchiesi, Istituto Zooprofilattico dell'Umbria e delle Marche.

Participant / Presenter:

Dr. MarioLatini

Istituto Zooprofilattico Sperimentale dell'Umbria e delle Marche
Italy

Email: m.latini@izsum.it

Dr. Francesca Barchiesi

Istituto Zooprofilattico Sperimentale dell'Umbria e delle Marche
Italy

Email: f.barchiesi@izsum.it

Ideas Showcase / Poster #: C07

Break-out sessions (pitches) group: C

4. Multiple contaminant impacts on the risk profile of foods

n/a

5. Risks/benefits of botanicals/herbals in food supplements

The following three research ideas will be presented; more details below:

- Creation of a HRMS-based platform for risk assessment of food supplements containing botanicals (B02)
- Integrative approaches for developing safety assessment methodologies of botanicals (B3)
- The safety of hemp in food and food supplements (4)

Details

Title of the research idea:

Creation of a HRMS-based platform for risk assessment of food supplements containing botanicals (B02)

Description of the research idea: HRMS/MS spectrometry is a well-established methodology of high sensitivity that can give with a great confidence the structural elucidation of constituents inside a complex mixture. These advantages find a great application on botanicals, since natural products extracts, widely used in food supplements, are extremely complicated mixtures of secondary metabolites that may include compounds of high risk, probably in low quantities. Furthermore the content in secondary metabolites largely alters by season and by geographical origin. Thus, quality control for botanical extracts used in food supplements includes specific molecules ignoring a large number of compounds that could be toxic.

HRMS spectrometry in combination with bionformatics tools have been extensively used for large scale metabolomics studies and for identifying both beneficial of hazardous compounds in clinical research. However this tool has not been fully exploited in risk benefit approaches for the risk assessment of food supplements.

Thus it is proposed to combine HRMS/MS spectrometry with dereplication, metabolomics and machine learning tools for big data analysis to create a universal database for the risk assessment of botanicals used in food supplements.

The basis of this tool will be :

- The adaptation of a protocol for recording all data
- The creation of a LCHRMS/MS compound database of a great number of commercially and non-commercially available standards of high risk.
- The creation of algorithm based on bayesian networks to identify the specific compounds in complex mixtures as well as their analogues
- The creation of an algorithm for identifying other compounds of biological interest
- Introduction of additional free access databases in the platform
- The development of platform for uploading data sets and processing of spectra
- Validation of the platform by applying the methodology in commercial available food supplements.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: The increasing problems that EU is facing in food supplements makes it essential to develop a tool that is using risk-based approaches on how to deal with risks taking into advantage the technologies that have been developed the last years and now can be incorporated in more complex systems. We consider that all stakeholders agree that an appropriate risk management tool for food supplements should depend in the context of both risks and benefits. In order to facilitate the common understanding on the value of risk-based methods for ensuring food safety and security, there is the need for the development of a universal platform for risk assessors, legislators and risk managers, risk communicators, food producers, food retailers, that at the end can fulfil its goal that is the protection of the general public as consumers.

Need to make this idea happen (funding, expertise, partners,...): This idea needs to be supported by public funding as this project is of great interest for EFSA and all National Authorities that are interested for the safety of food supplements that contain botanicals. The public authorities are the main organisation protecting the consumers and thus only by public funding the platform can be developed.

The main obstacle for developing this idea is the funding as several components of the proposed platform e.g. recording original LC/HRMS spectra, development of bioinformating tools, computers for big data analysis are quite expensive.

Also complimentary expertise in some areas like risk-benefit analysis in risk assessment and establishment of web based tools are needed.

Proponents: Dr Aikaterini Termentzi, Laboratory of Toxicological Control of Pesticides, Benaki Phytopathological Institute, Kifissia, Greece; Dr Kyriaki Machera, Laboratory of Toxicological Control of Pesticides, Benaki Phytopathological Institute, Kifissia, Greece; Prof Manolis Margoudakis, Department of Information and Communication Systems Engineering, University of the Aegean, Samos, Greece.

Participant / Presenter:

Dr Aikaterini Termentzi

Benaki Phytopathological Institute
Greece

Email: a.termentzi@bpi.gr

Ms Parthena Konstantinidou

Benaki Phytopathological Institute
Greece

Email: p.konstantinidou@bpi.gr

Ideas Showcase / Poster #: B02

Break-out sessions (pitches) group: B

Title of the research idea:

Integrative approaches for developing safety assessment methodologies of botanicals (B03)

Description of the research idea: Safety and risk-benefit assessment of botanical and botanical preparations using new approaches and methodologies, based on Aguaymanto fruit. New approaches are: the Margin of Exposures (MOE), the Mode of Action (MOA), the Threshold of Toxicological Concern (TTC), the matrix effect, the risk-benefit, and the analysis of the cellular kinases (the kinome). State-of-the-art methodologies to be applied will include analytical techniques, in silico and in vitro studies, computer models (Physiologically Based Kinetic and Dynamic, and Disability Adjusted Life Year) and kinome array analysis.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: In order to assure a high level of food safety within the EU, this research idea will provide new knowledge and methodologies at European level for harmonising evidence- and risk-based approaches of botanicals and its preparations, due to their chemical complexity and will impact on present and future projects related to botanicals.

The likelihood to use these new methodologies to evaluate the safety and risk-benefit of similar botanicals will help boost innovation in both public and private sectors and significantly improve the

robustness and efficiency of risk assessment.

The development of new risk assessment strategies will give rise to support European and international initiatives (EU, Codex Alimentarius, World Health Organisation, food safety polices).

The development of novel products derived from botanicals ingredients, as functional foods, food supplements by the European industries, will accelerate the transition to a sustainable European bioeconomy.

Need to make this idea happen (funding, expertise, partners,...): The safety assessment of botanicals and botanicals preparations is one of the food safety risk assessment areas of priority for research identified by Member States and EFSA. The field of the botanical safety assessment is presently underdeveloped due to their chemical complexity.

Proponents: Liliana Vargas-Murga (Biothani-Spain); Ivonne Rietjens (Wageningen University and Research Centre-The Netherlands).

Participant / Presenter:

Dr. Liliana Vargas-Murga

BIOTHANI

Spain

Email: lsvargas@biothani.com

Ideas Showcase / Poster #: B03

Break-out sessions (pitches) group: B

Title of the research idea:

The safety of hemp in food and food supplements (4)

Description of the research idea: The aims of the proposed project are:

- to evaluate the availability of hemp in conventional foods and food supplements on the European market;
- to use an appropriate analytical techniques and methods to determine the content of biologically active cannabinoids THC, CBD and CBN and possible other cannabinoids;
- to calculate exposures and to assess the risk/benefits of biologically active cannabinoids in food and food supplements.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: Foods containing or made entirely of various components of hemp may still contain trace amounts of THC, and more than sixty other cannabinoids, some of them are biologically active e.g. cannabidiol (CBD), cannabinol (CBN). Their content in the final product can be substantially increased by the contamination at harvest and storage procedures and in the concentration steps or extraction. Hemp is a botanical associated with many interests, therefore providing independent research and risk assessment is very important

Need to make this idea happen (funding, expertise, partners,...): Laboratory with appropriate equipment, financial resources for analyses, partners in other countries.

Proponents: National Institute of Public Health Slovenia (info@nijz.si), contact person: Urška Blaznik; e-mail: urska.blaznik@nijz.si; The National Laboratory of Health, Environment and Food (info@nlzoh.si); Nutrition Institute (info@nutris.org).

Participant / Presenter:

Dr. Urska Blaznik

National Institute of Public Health Slovenia (NIJZ)

Slovenia

Email: urska.blaznik@nijz.si

Ideas Showcase / Poster #: 4

Break-out sessions (pitches) group: -

6. Allergenicity / food allergens in general (risk assessment and management)

The following research idea will be presented; more details below:

- Improvement of allergenicity risk assessment strategy to support safe introduction of new proteins (D04)

Details

Title of the research idea:

Improvement of allergenicity risk assessment strategy to support safe introduction of new proteins (D04)

Description of the research idea: The world population is expected to increase to 9 billion by 2050 with a predicted accompanying shortage of proteins for human consumption. To address this challenge, strategies are being developed to change the current agricultural practices by creating more sustainable and new climate-resistant crops and to ensure an adequate, safe, sustainable and a nutritious food supply by introducing new protein sources (e.g. insects). Novel foods require a comprehensive risk assessment as directed in EC regulation 2015/2283. Although for risk assessment of nutritional, microbial and toxicological risks, standard and well-defined methods are available, risk assessment of food allergy is not yet fully developed. In Europe, more than 40 million people have food allergy that imposes a significant burden of disease and impacts allergic individuals and the people surrounding them. The economic impact of food allergy for the food sector and society is substantial, involving both direct and indirect costs. It is, therefore, key that the risk of allergic reactions against novel proteins is low. Detailed guidance on the assessment of the allergenic potential of novel foods is urgently needed. Current guidance relies mainly on a weight-of-evidence allergenicity risk assessment for genetically modified plant foods, which mainly focuses on cross reactivity with known allergens. This approach protects existing allergic individuals. However the approach is hardly suited to assess the potential risk of, sensitisation to novel protein sources. Therefore, an allergenicity assessment that addresses sensitisation to novel proteins is needed. The GMO EFSA panel and COST Action ImpARAS stress that a transparent, evidence-based, validated, allergenicity risk assessment based on novel methodologies is a necessity. Our idea will address the development of evidence-based approaches and tools for allergenicity risk assessment focused on sensitization of novel and modified proteins or protein.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health:

- Build on European networks of leading institutes on food allergy, food safety and food processing to develop a transparent, evidence based and validated approach for allergenicity risk assessment of novel food proteins.

- Ensure that newly introduced food protein products do not increase the burden of allergies on society and to expedite the introduction of sustainable, nutritious and safe foods to the market. Ensure cost savings (e.g., lower medical costs) due to the introduction of non-allergenic foods.
- Reduce costs for Industry by the prediction of allergenicity during the early stages of the development of novel foods with innovative, quick, reliable, and food industry-tailored tools for allergenic risk assessment.
- Increase the assurance to the European public that allergenic risks posed by novel foods are effectively managed.
- Disseminate knowledge to the European food industry, allergic and healthy consumers and food safety authorities on safe and sustainable.

This idea focusses on the development of an improved allergenicity risk assessment strategy that newly introduced food protein products do not increase the burden of allergies on society and to expedite the introduction of sustainable, nutritious and safe foods to the market. The topic is closely related to and could be seen as a follow-up of the COST Action FA 1402 and the GMO EFSA panel meeting in 2015. This proposal is adjacent to the EU project iFAAM (grant agreement no 312147) and Europrevall (contract no. FOOD-CT-2005-514000), which focused on the research gaps related to the allergy management by the patient and allergen management to prevent unexpected allergic reactions for the allergens indicated in EU directive. The topic is in line with the strategic research agenda of JPI. The idea is supported by members of the COST Action ImPARAS (www.Imparas.eu) who are scientists from Research institutes, regulators, Industry, universities and health care centers from 30 EU countries.

Need to make this idea happen (funding, expertise, partners,...): Currently, protein characteristics and mechanisms underlying allergic sensitisation remain unknown. Thus, a multi-disciplinary approach to assess all aspects involved in sensitisation and elicitation of allergic reactions to proteins will provide insights into food allergy and will allow for the establishment of a validated risk assessment strategy for assessing allergenic proteins. Currently, gaps are identified and new ideas and plans for an improved assessment strategy are discussed in a COST Action (FA1402). An European funded project must lead to the actual performance of the research, development and acceptance of the new strategy.

Proponents: On behalf of COST Action ImpARAS: the chair of the Action: Kitty Verhoeckx.

Participant / Presenter:

Dr. Kitty Verhoeckx

TNO

The Netherlands

Email: kitty.verhoeckx@tno.nl

Ideas Showcase / Poster #: D04

Break-out sessions (pitches) group: D

7. Aggregated exposure (via cocktail effects, but including environmental/ food exposure)

The following two research ideas will be presented; more details below:

- EuroMix follow-up on cumulative and aggregated risk assessment (D05)
- The influence of food components – an underestimated parameter in chemical risk assessment? (D06)

Details

Title of the research idea:

EuroMix follow-up on cumulative and aggregated risk assessment (D05)

1. **Description of the research idea:** This proposal links ongoing activities on cumulative pesticide risk assessment (NUMBER: GP/EFSA/PRAS/2014/02EFSA) and EuroMix research (GA no 633172) to future risk assessment on mixture or cocktail effects. The proposal includes follow-up needed to widely implement tools, models and techniques at the Member State level. It aims to identify means to translate the innovation from current research projects to practical application in tomorrow's risk assessment.

The project aims for a wider Member States involvement on the results generated in the EFSA and EuroMix projects, and to identify future research goals. For this, the following actions are proposed:

- To align with ongoing activities such as the EuroMix project and a number of EFSA procurements projects connected to cumulative risk assessment and the cocktail effect;
- To produce a useful concept combining integrated test strategies (EuroMix) and kinetics
- To provide hands on training to Member States, Focal Point members and/or EFSA experts on a number of tools and concepts needed for future cumulative and aggregated risk assessment, the cocktail effect. The tools which are under development in the EuroMix project, are:

Adverse Outcome Pathway wise testing in order to focus on biologically relevant endpoints for cumulative assessment groups;

2. The use of computational toxicology (QSAR and molecular docking) to for profiling of a chemical (in line with already ongoing EFSA training);

3. To train on exposure assessment tools already;

4. To address a number of new chemical classes not fully addressed in EuroMix or EFSA projects, to refine cumulative and aggregated risk assessment.

Ultimately, a strategic agenda will be drafted outlining future work that is needed on national and EU funding opportunities.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: Based on concern of the European citizens, the European Parliament has asked the Commission to provide an overview of how mixture regulations has accounted for mixture effects. Currently, in many regulatory framework mixtures have been addressed in open and general terms. Based on that concern the European and Member States concerns, the Commission Communication on the combined effects of chemicals (COM(2012)252 final) was send to the European Council in 2012.

The concern of mixture effect in Member States is significant. Some member states have questioned current MRLs (Maximum Residue Limits) for a lack of openness on how the MRL setting accounts for mixture effects.

Since 2000 NGÓ have asked national or international government to make progress on implementation of mixture policy.

Need to make this idea happen (funding, expertise, partners,...): In several European Member states mixture research is publically funded. Results of national funded research is, however, not fully utilised at the European level and it is expected that national efforts and results can be optimized by using the EuroMix data and model infrastructure and EFSA guidance.

H2020 funded projects on mixtures research will deliver useful concepts, however, they are proof of principles based on a limited number of chemicals.

The European Commission, including DG Research, are calling for follow-up research on adverse outcome of mixtures and on exposure routes and/or scenarios not covered yet, to be funded under KP9.

Public funding on mixtures is needed to avoid any conflict of interest.

There are many activities ongoing to make this idea happening for example a number of EuroMix harmonisation workshop and a FAO/WHO expert consultation are planned in the EuroMix project.

The big challenge will be political acceptance. Furthermore, mixtures of chemicals can affect many adverse outcomes, which have not been investigated yet. This needs follow-up activities embedded in a large international cooperation.

Proponents: <http://www.euromixproject.eu/partners/>

Participant / Presenter:

Prof. Jacob van Klaveren

National Institute for Public Health and the Environment RIVM

The Netherlands

Email: jacob.van.klaveren@rivm.nl

Dr. Ad Peijnenburg

RIKILT Wageningen University and Research

The Netherlands

ad.peijnenburg@wur.nl

Ideas Showcase / Poster #: D05

Break-out sessions (pitches) group: D

Title of the research idea:

The influence of food components – an underestimated parameter in chemical risk assessment?
(D06)

Description of the research idea: Dietary exposure assessment is traditionally performed by a combination of food consumption data and data on concentrations of chemicals in foods at the level of consumption. However, this approach does not take into account that bioavailability of contaminants can depend on food carrier as well as the combination of foods ingested during a meal (i.e., neglecting interactions with food components). Our in vitro data on bioaccessibility and transport across intestinal epithelia of heavy metals showed that presence of plant substances (polyphenols) can significantly decrease the total absorption of contaminants from digested foods, i.e. bioavailability. The observed decrease in bioavailability exceeded 99% in some cases, and depended on the heavy metal and the type of polyphenols. Only a few reports on this issue can be found in literature, primarily in the case of bioaccessibility of mercury. Therefore, a more detailed study should be performed to better understand the phenomenon. Scientific evidence-based results related to this issue would also demand dietary surveys to be modified to collect data on common food combinations used by consumers at the time of consumption, that vary substantially both geographically and culturally. Overall, the approach we propose would allow for a better estimation of the human dietary exposure, and lead towards more target consumer specific risk assessments of contaminants.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: Risk assessment using data on exposure adjusted by the information on food combinations at the level of consumption, would allow to more accurately determine consumer groups at high risk. By providing data on how to combine foods in the diet to minimize exposure to contaminants, public

authorities may be able to more accurately manage health concerns related to long term consumption of contaminated foods. As such, advice on food combinations could be used by public health authorities as a mitigation strategy to complement current consumer recommendations and to decrease consumption of food with higher risk.

Need to make this idea happen (funding, expertise, partners,...): The research idea is currently supported by in vitro data, and it is therefore not of high interest to be funded by industry at the current level of knowledge. Public funding is needed to expand data on this issue, for example starting with the contaminants of most concern. Public health authorities (risk assessment and management) may benefit from the results by providing recommendation to consumers, as well as industry, to prepare target functional foods that mitigate the effects of contaminants in specific foods (i.e. cadmium and mercury in seafood, lead and arsenic in plant products, etc.).

Since the effect of food components on the bioavailability of heavy metals is currently based on limited in vitro data, initial experimental efforts should focus on excluding potential interferences in tests and to identify relationships between food components and observed bioavailability. In this context, partners with capacities in chemical analysis of elements and food components are needed. Limited in vivo experiments with laboratory animals should be performed as a second step to validate the in vitro results. In the third step, extended consumption data gathering information on typical food combinations that involve risky foods should be collected and further used for risk assessment.

Proponents: Tomaž Langerholc, Faculty of Agriculture and Life Sciences, University of Maribor, Pivola 10, 2311 Hoče, Slovenia; Antonio Marques (PhD), Division of Aquaculture and Upgrading (DivAV), Portuguese Institute for the Sea and Atmosphere, I.P. (IPMA), Rua Alfredo Magalhães Ramalho, nº6, 1495-006 Lisbon, Portugal; Salomon Sand, National Food Agency, Harnesplanaden 5, Box 622, 751 26 Uppsala, Sweden.

Participant / Presenter:

Dr. Tomaž Langerholc

University of Maribor

Slovenia

Email: tomaz.langerholc@um.si

Ideas Showcase / Poster #: D06

Break-out sessions (pitches) group: D

8. Harmonisation of methods for risk assessment of chemical contaminants

The following three research ideas will be presented; more details below:

- Advanced methods for integrating evidence for dose-response and antimicrobial resistance modelling (D07)
- Detection of Ciguatoxins in fish meat: an integrated approach for screening and confirmatory methods (B04)
- Development of a web-based intake model for chemical contaminants and nutrients (D08)

Details

Title of the research idea:

Advanced methods for integrating evidence for dose-response and antimicrobial resistance modelling (D07)

Description of the research idea:

The Center for Statistics (CenStat) can contribute to methodological advancements, incl.:

1) New quantitative methodology, software and user-friendly interfaces for dose response models and derived benchmark dose estimates using integrated data from multiple studies and multiple endpoints. This will innovate current guidance from EFSA and EPA (e.g. doi:10.2903/j.efsa.2017.4658 or www.epa.gov/risk/benchmark-dose-technical-guidance) that is restricted to single endpoints and studies, a need stressed at the EFSA/EBTC colloquium on evidence integration in risk assessment in October 2017. Starting from existing methods combining endpoints and standard meta-analytic methods, we will develop more advanced/improved ones. Heterogeneity in type of studies (species, experimental designs), endpoints and data (individual, aggregated, continuous, quantal) will be dealt with, e.g. in a Bayesian way, to form a unifying paradigm of inference. Model extensions to big and in vitro data via mechanistic models, adverse outcome pathways, empirical or hybrid models are possible.

2) New source attribution models that link antimicrobial resistance (AMR) in animals and humans. The identification and integration of the source of resistance in AMR prevalence models and monitoring tools is highly novel. We will combine prevalence data on resistant isolates in food products with food and AM consumption data to identify food products leading to increased resistant bacteria prevalence in humans and animals. A logistic regression method may serve as basic source attribution model where the logit of the probability that a human isolate is resistant to an AM is a linear combination of the proportion of specific food-type isolates showing resistance, the consumption quantity of these food-types and human antibiotic use (daily dose/packages). Model extensions to include 1) trade data on the import/export of food products between countries and 2) pet ownership and AMR prevalence in pets are possible.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: An exhaustive and in-depth study of available methods and models is considered quintessential for a next update of EFSA's guidance for benchmark dose estimation, filling in the existing need for more guidance and harmonization in case of multiple endpoints and studies. Currently, this guidance is insufficient, very general and based on limited methodological insights.

The WHO emphasizes the importance of monitoring the prevalence and spread of AMR. Part of the strategy to fight AMR is to thoroughly study the sources of AMR in humans. This project will help identify which factors cause AMR in humans, focusing on antimicrobial resistance in food animals, consumption of meat, fish, or dairy. In addition, import/export data of meat from and to other countries will help differentiate between AMR in humans caused by consumption of meat from own versus foreign production. Identifying the major players in causing AMR in humans will enable policy makers to direct their efforts in fighting AMR.

Need to make this idea happen (funding, expertise, partners,...): Available funding mechanisms in Flanders prioritise fundamental research. The current project will advance important methodological frameworks used in public health research and management, making it a justified and needed investment of public funding.

Available in-house expertise: CenStat's expertise on composite endpoints, multivariate biomarkers, missing data, meta-analyses, big data, mechanistic and bio-mathematical models, statistical models, techniques for high-dimensional omics data,... in the field of dose response modelling, clinical trials and infectious disease modelling, will be of high value for the proposed advancements.

Missing funding: Funding for a PhD student (grants as from 50K/year) and part-time postdoc

(30K/year) to develop the proposed methods.

Missing complementary expertise and data: Collaboration with experts in biology, toxicology, animal health from EFSA, national and international public health institutes (e.g. CODA-CERVA in Belgium, RIVM in The Netherlands) and other universities will be essential. AM usage and consumption data are available through ECDC and EFSA but we hope to use data on additional factors (e.g. pet ownership, AMR in companion animals), via collaborations with other institutes.

Proponents: Robin Bruyndonckx, Hasselt University, Center for Statistics, Belgium; Stijn Jaspers, Hasselt University, Center for Statistics, Belgium; Sarah Vercruysse, Hasselt University, Center for Statistics, Belgium; Marc Aerts, Hasselt University, Center for Statistics, Belgium.

Participant / Presenter:

Dr. Sarah Vercruysse

Hasselt University, Centre for Statistics

Belgium

Email: sarah.vercruysse@uhasselt.be

Dr. Robin Bruyndonckx

Hasselt University - Centre of Statistics & Antwerp University - Lab of medical microbiology

Belgium

Email: robin.bruyndonckx@uhasselt.be

Ideas Showcase / Poster #: D07

Break-out sessions (pitches) group: D

Title of the research idea:

Detection of Ciguatoxins in fish meat: an integrated approach for screening and confirmatory methods (B04)

Description of the research idea: Ciguatoxins (CTXs) are produced as secondary metabolites from the algal genus *Gambierdiscus* and are accumulated in the marine food chain; due to their toxicological effects, which vary from gastrointestinal, neurological effects - like tingling of lips, hand and feet, reversal of temperature sensation - to cardiovascular effects up to fatality they represent a threat to human health after consumption.

While for regulated marine biotoxins effective and successful monitoring programs exist, there are for CTXs no regulatory limits established in the EU and validated methods for their determination are not yet available.

Aim of this project is to improve the analytical capabilities including first a screening bioassay and second confirmation methods for identification and possibly for quantification.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: Overall goal is to strengthen consumer health protection. The implementation of capable analytical methods would allow to prove CTX contents in suspicious samples and could therewith in combination with appropriate management measurements contribute to the reduction of CFP cases. The availability of a validated screening method for CTX like the neuro-2a assay would support the selection of suspicious samples out of a comprehensive batch of fish samples. Only samples generating a positive result in this assay would finally have to be confirmed by a confirmatory method. Furthermore, the use of the in vitro neuro-2a assay would contribute to the replacement of the still used in vivo Mouse Bioassay (MBA).

Ciguatera Fish Poisoning (CFP) is caused by Ciguatoxins (CTX) and is estimated to affect 10.000 to 50.000 people worldwide per year. Symptoms vary from gastrointestinal, neurological effects - like tingling of lips, hand and feet, reversal of temperature sensation - to cardiovascular effects up to fatality.

Since 2012 CTX intoxication cases occurred every year in Germany, caused by fish imported from tropical regions. Similar cases have been reported in France and United Kingdom. The Canary Island has recorded 17 outbreaks.

The Codex Committee on Contaminants in foods (CCCF) addressed CTXs in its 11th meeting 2017: FAO and WHO highlighted that analytical methods for detection and quantification of ciguatera to-date are not harmonized and stated that it was unclear, if any of the available methods of detection would be suitable as routine methods for analysis.

The growing number of CFP cases demands measures to prevent a further increase of serious intoxication cases.

Need to make this idea happen (funding, expertise, partners,...):

Funding: The funding of the project will be of utmost importance as the development and implementation of the integrated approach will demand a high input of methodology and instrumental devices.

Expertise: Competent staff to master the techniques will be required. For an optimum transfer of the available state of the art experts from the two disciplines biological and instrumental analytical methods are necessary.

The available specific knowledge on the extraction and clean-up of standard reference materials from natural sources is indispensable.

Partners: Trainings to transfer of knowledge on LC-MS/MS technology and on the isolation of CTXs from already experienced laboratories in USA (FDA), Japan or New Zealand to advanced laboratories in EU should be intended.

Contacts to fishing industry in tropical regions are preferable to collect samples from regions bearing a high CTX probability.

Proponents: Prof. Dr. Ana Gago-Martinez, University of Vigo, Dpt. Analytical and Food Chemistry, Vigo, Spain; Prof. Carmela Dell'Aversano, University of Napoli Federico II, Department of Pharmacy, Napoli, Italy; Marina Nicolas, Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail (Anses), Paris, France.

Participant / Presenter:

Dr. Angelika Preiß-Weigert

German Federal Institute for Risk Assessment (BfR)

Germany

Email: Angelika.Preiss-Weigert@bfr.bund.de

Ideas Showcase / Poster #: B04

Break-out sessions (pitches) group: B

Title of the research idea:

Development of a web-based intake model for chemical contaminants and nutrients (D08)

Description of the research idea:

Model A: (intended to be used by risk assessors)

The idea is to develop a dietary intake model for carrying out risk assessment of chemical contaminants and food additives. The model will function both in a probabilistic and deterministic way,

in order to compare the risk assessment output out of the two approaches. Probabilistic methodology is considered to lead to more accurate risk assessment, as compared to the deterministic method. Yet, it is good to have both approaches in order to be able to investigate if this is the case. The model will be configured in order to be compatible with the EFSA FoodEx2, as both Chemical Occurrence and Food Consumption Databases (as implemented in the EU MENU project) in Cyprus and other European countries already integrate or will soon integrate this new food coding system.

Additionally, through the deterministic part of the model, it will be possible to conduct nutrient intake assessment (in addition to contaminants), using the same food consumption data and either of the following data:

- Food nutrient data
- Food Composition Data.

Regarding the latter option, the model can be linked to a Food Composition Database of a country in order to estimate the micronutrients and macronutrients intake of a given population group or the general population of that country.

Model B: (intended to be used by European consumers)

Furthermore, a secondary tool will be developed as follows:

An “extension” of Model A will be made in the sense of a “personalized” nutrient intake model. Specifically, an EU citizen, by choosing the Food Composition Database of the country of interest and matching it with his/her own food consumption instances of a particular day, will be able to assess his/her nutrients intake and compare it with established Dietary Reference Values (DRVs). The whole procedure will be rather simple.

The models will be based on a web application, making them attractive and easy to use..

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: The project idea will have a great impact/benefit on food safety and public health both at national and European level. Model A will be harmonized according to EFSA requirements, which will allow comparability at European level.

Model A will possess a generic format. It will be configured in a way that will accept the relevant Databases (Chemical occurrence, Food Consumption, Food Composition) of several European countries so it will have a European impact and context. It will be user-friendly, compatible with FoodEx2, and therefore leading to accurate intake assessment for chemicals and nutrients. In that sense it will be a useful tool for risk assessors and risk managers at EU level.

Model B will have direct impact on European consumers. It will have high relevance to EU citizens with regards to their nutrition and health, as they will be able to investigate in a very quick, automated and reliable way whether their calculated nutrient intakes are comparable to the relevant DRVs.

Need to make this idea happen (funding, expertise, partners,...): Our research idea needs to be sustained through public funding as the execution of the abovementioned tasks will be a lengthy procedure, which will require resources and training by experts in the relevant fields.

Furthermore, the models will have a high impact on food safety and public health at European level.

Our team, through this research idea, aims to attract partners in order to create a multidisciplinary team of experts, which necessitates public funding.

In order for our idea to materialise, it requires public funding, which will be the driving force.

We believe that a consortium of partners will make this idea happen. Specifically, partners based in Institutions/Organisations or Departments of Universities, which have high expertise in probabilistic methodologies in risk assessment, nutrient intake assessment and Food Composition Databases, are invited to join our team. Additionally, web developers, software engineers and dieticians/nutritionists are of great importance for our team.

It is important to note that the Risk Assessment Unit of SGL, through its participation in trainings and relevant projects at EFSA and EU level (e.g. EUROMIX), has acquired experience over the years in risk assessment of chemicals (and nutrients) using deterministic and - to a lesser extend -

probabilistic methodologies. Finally, SGL has its own Food Composition Database, which will be used in case of materialisation of this project idea.

Proponents: Georgios Stavroulakis, EFSA Focal Point Alternate; Demetris Kafouris, Contaminants Lab; Lefkios Paikousis, Improvast Ltd (Cyprus); Maro Christodoulidou, EFSA Focal Point; Stelios Yiannopoulos, Advisory Forum member, Risk Assessment Unit, State General Laboratory, Ministry of Health, Cyprus.

Participant / Presenter:

Dr. Georgios Stavroulakis

State General Laboratory (SGL)

Cyprus

Email: gstavroulakis@sgl.moh.gov.cy

Dr. Demetris Kafouris

State General Laboratory (SGL)

Cyprus

Email: dkafouris@sgl.moh.gov.cy

Mr. Lefkios Paikousis

Improvast Ltd

Cyprus

Email: lefkiospaikousis@yahoo.co.uk

Ms. Maro Christodoulidou

State General Laboratory (SGL)

Cyprus

Email: mchristodoulidou@sgl.moh.gov.cy

Dr. Stelios Yiannopoulos

State General Laboratory (SGL)

Cyprus

Email: stelgian@spidernet.com.cy

Ideas Showcase / Poster #: D08

Break-out sessions (pitches) group: D

9. Cumulative exposure assessment (e.g. for pesticide residues/ PAHs)

n/a

10. Chemical contaminants in infant and baby food

The following two research ideas will be presented; more details below:

- Food packaging contaminants in baby and infant food: Analysis of packaging materials and food (B05)
- Risk assessment research in an European outermost region. Needs, challenges and results for locals (3)

Details

Title of the research idea:

Food packaging contaminants in baby and infant food: Analysis of packaging materials and food (B05)

Description of the research idea: The present research involves the development of a methodology based on a Total Diet Study (TDS) as a screening tool and to apply this approach for contaminants from food packaging and food contact materials particularly for infant and baby food, including new-emerging contaminants such as NIAS (Non Intentionally Added Substances).

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: The proposed research will be useful to:

- Risk Managers including Public Health Agencies and organizations responsible for ensuring food safety. These scientific studies provide essential information for research and risk assessment;
- Authorities responsible for supervising and regulating chemicals and food safety at European and international level.

The research proposed is of great interest and should be supported due to several reasons from the point of view of food safety:

- Data are currently very limited on exposure to chemical contaminants transferred from materials in contact with baby and infant food;
- Research conducted up to now in this field in the European Union has not contemplated new emerging contaminants from packaging materials such NIAS.

Need to make this idea happen (funding, expertise, partners,...): To carry out the proposed research public funding is critical. To conduct a deep and wide study it will be very interesting to involve several partners of different countries. Expertise on food packaging materials, on risk assessment and food chemical analysis would be welcome.

Proponents: Raquel, Sendón; Perfecto, Paseiro Losada; Ana, Rodríguez Bernaldo de Quirós, Department of Analytical Chemistry, Nutrition and Food Science, Faculty of Pharmacy, University of Santiago de Compostela, Campus Vida. 15782-Santiago de Compostela. Spain.

Participant / Presenter:

Prof. Raquel Sendón

University of Santiago de Compostela

Spain

Email: raquel.sendon@usc.es

Prof. Ana Rodriguez Bernaldo de Quiros

University of Santiago de Compostela

Spain

Email: ana.rodriguez.bernaldo@usc.es

Ideas Showcase / Poster #: B05

Break-out sessions (pitches) group: B

Title of the research idea:

Risk assessment research in an European outermost region. Needs, challenges and results for locals (3)

Description of the research idea: Are European outermost regions exposed to the same food risks as continent European sites?

What are the needs of these European populations? Are they food dietary profiles different? Should they dietary exposures be considered separately from continental regions? Do these regions follow a specific food safety policy?

Are there enough founding, infrastructure and staff for food safety care and surveillance in the European outermost communities?

The case of the Canary Islands will be presented as example.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: Develop an interest on the outermost regions risk assessment research.

The outermost regions are strategic geopolitical sites for our European Union. The population living in these regions need close services and sustainable structures. Most of the regions are islands facing different risk from continental sites. A specific policy and a priority list of risk for these regions should always be included when developing European actions and regulations.

Need to make this idea happen (funding, expertise, partners,...): Partners from outermost regions should meet and share experiences on risk assessments in their communities.

Expertise must be shared among outermost regions but also outside them with national and European bodies.

Proponents: Carmen Rubio Armendariz; Arturo Hardisson De la Torre; Ángel Jose Gutierrez Fernández; Soraya Paz Montelongo.

Participant / Presenter:

Prof. M-Carmen Rubio-Armendariz

Universidad de La Laguna

Spain

Email: crubio@ull.edu.es

Ideas Showcase / Poster #: 3

Break-out sessions (pitches) group: -

11. Emerging chemical contaminants

The following research idea will be presented; more details below:

- Biotest for toxicity evaluation of mixtures of contaminants from emerging food packaging materials (B06)

Details

Title of the research idea:

Biotest for toxicity evaluation of mixtures of contaminants from emerging food packaging materials (B06)

Description of the research idea: During recent years the use of new packaging materials for food contact has increased. This includes new biopolymers such as PLA or starch, recycled materials and also new multilayers that contain different components such as adhesives and printing inks. In order to apply the risk assessment to the food packaging material is necessary to determine all components that are transferred from the packaging to the food, which implies a complex identification and quantification process that we performed in our laboratory. Afterwards the risk assessment can be applied to every single compound previously identified. However, the risk assessment cannot be applied to mixtures of compounds. The identification and quantification of all migrants is very difficult and time consuming. Then, it would be necessary the evaluation of the migrants mixture toxicity instead of an individual evaluation of each component. For this purpose, the development of biotests able to be applied to mixtures of compounds and validation of the results would be very useful.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: To be able to determine in a quick and easy way the toxicity of migration solutions containing mixtures of chemicals from new packaging materials intended for food contact would allow ensuring food safety and public health.

Need to make this idea happen (funding, expertise, partners,...): Results obtained from the development of this idea would allow a better risk assessment in food packaging materials. The experiments needed for the identification and quantification of emerging contaminants as well as the development of new biotest focused on the mixtures of these contaminants would require public funding.

For the development of this research idea, we would need the collaboration of partners with expertise in the area of toxicity evaluation and biotest development. The work carried out in our research group is focused on the identification and quantification of migrants, both volatile and non-volatiles, present in the simulants after having performed migration test. The collaboration between groups would allow a great advance in risk assessment for packaged food.

Proponents: Margarita Aznar Ramos (University of Zaragoza, Spain); Cristina Nerín de la Puerta (University of Zaragoza, Spain).

Participant / Presenter:

Dr. Margarita Aznar

University of Zaragoza

Spain

Email: marga@unizar.es

Ideas Showcase / Poster #: B06

Break-out sessions (pitches) group: B

12. **Systems for monitoring and characterising microbes isolated from food, environment and human illness cases**

The following three research ideas will be presented; more details below:

- Effects of (legal) criteria on exposure and health at national level (C08)
- Microbiological risk assessment of food handlers and food contact surface in the Czech catering facilities (2)
- The use of next generation sequencing data in microbial risk assessment (A03)

Details

Title of the research idea:

Effects of (legal) criteria on exposure and health at national level (C08)

Description of the research idea: Food is one of the major causes for public health concern in the EU. Therefore, risk-based, scientifically justified social decisions are needed. Important national/regional problems should be identified and compared, as studies inspecting EU-wide outcomes and EU-wide legislation may dismiss them.

While the EU gives orders for control and follow-up systems, the criteria included in control programmes targeting food safety should be based on firm knowledge that they really influence consumer's health.

With the information, the validity of the set criteria and control options can be assessed and proposals made to improve their efficacy. These criteria may concern either raw materials or products. Timely updating of assessments with accumulating evidence will require developing analytic tools and open access data. Based on specific occurrence and consumption data we will estimate, compare and rank the population risks or similar metrics towards assessment of burden of diseases due to food in order to identify the most important foodborne hazards (both microbiological and chemical). Collaboration on risk ranking has started between Swedish National Food Agency and Finnish Food Safety Authority Evira.

New laboratory technologies replacing those still currently used, such as whole genome sequencing vs. culturing methods, need correspondence adjustment so that results from previous and current years can be interpreted and trends noticed. Expanding risks of the food safety, most of all antimicrobial resistance, and their effects on the public health will be investigated.

For improvement of public health, not only legal criteria but also the behaviour of consumers is important. We will therefore investigate the effects of food risk perceptions and dietary recommendations to find out if consumers are aware of the recommendations and if they obey them or take advice from alternative media. Health, social and economic impacts will also be studied.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: Lowering occurrence levels is costly, and if strong measures have little impact on public health for some hazards while measures against other hazards can affect the public health much more, both the decision makers as well as public health and food production sectors can use this information to focus efforts to get better outcome with the same budget.

The project aims to decrease human suffering as well as control and health costs through ranking of risks and identifying criteria that have little effect or great effect on public health. With the information, efforts can be focused on measures that have the highest effect.

Need to make this idea happen (funding, expertise, partners,...): This kind of research, where the results can have an effect at industry level only after several years and through changes in legislation, is not one that companies would fund. In our experience, companies think that public instances should be responsible for all public health research and cost analysis as part of their responsibility on public health. Large and multidisciplinary studies such as this are, however, outside the bounds of national budgets. In addition, independence of risk assessment does not allow funding from all sources.

Especially funding will be needed, to gather and process data as well as fund researchers.

Several institutions are involved as a starting point, but extended collaboration and/or interaction with other partners will be of interest. Risk ranking collaboration with Swedish National Food Agency will be continued, but other partners from other MSs will also be needed for a deeper and wider view and additional expertise.

At a national level, multidisciplinary approach (Finland has a multidisciplinary group of collaborators.)

Proponents: Johanna Suomi, Jukka Ranta, Tero Hirvonen, Suvi Joutsen, Petra Pasonen, Antti Mikkilä, Auli Vaarala and Pirkko Tuominen, Finnish Food Safety Authority Evira; Otto Hänninen and Ruska Rimhanen-Finne, National Institute for Health and Welfare; Salomon Sand, Roland Lindqvist, Swedish National Food Safety Agency; Tomaz Langerholc, University of Maribor Slovenia; Marko Lindroos, University of Helsinki, Department of Economics and Management.

Participant / Presenter:

Dr. Johanna Suomi

Finnish Food Safety Authority Evira
Finland
Email: johanna.suomi@evira.fi

Prof. Pirkko Tuominen

Finnish Food Safety Authority Evira
Finland
Email: pirkko.tuominen@evira.fi

Ideas Showcase / Poster #: C08
Break-out sessions (pitches) group: C

Title of the research idea:

Microbiological risk assessment of food handlers and food contact surface in the Czech catering facilities (2)

Description of the research idea: The focus of this study was to assess the hygienic standards of 10 foodservice facilities located in Czech Republic by a microbiological monitoring of food contact surfaces (n = 250), and food handlers (n = 131) from April 2016 to April 2017. The samples were analysed for the presence of the following bacteria: Escherichia coli, Bacillus cereus, Staphylococcus aureus, Salmonella spp., Campylobacter spp., and Listeria monocytogenes. The swabbing technique for the contact surfaces and glove-juice tests for hands of the food handlers were used. Bacillus cereus and coagulase positive Staphylococcus aureus were confirmed in 34.4% and 16.8% of cases, respectively. The presence of verotoxigenic E. coli was not confirmed in samples. The presence of Bacillus cereus was confirmed in 34.4% of the samples (food contact surface 39.6%; handlers 24.4%). The presence of S. aureus was confirmed in 16.8% of the samples (food contact surface 14.8%; handlers 16.8%). L. monocytogenes was confirmed in 1 examined samples (0.3%). The microbial analysis examined showed an absence of Salmonella spp. and Campylobacter spp. In conclusion, the results suggest that more effort is needed in the application of HACCP principles. We would like to continue in this study, and extended it to monitor the presence of significant zoonotic foodborne illness in ready meals enjoy a delicious guests.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: From our results it is apparent that the incidence of foodborne disease agents in gastronomic facilities is high. These establishments are becoming a major risk to food safety. This research would bring screening in this area of food safety and would be beneficial to innovating hygienic standards and possible changes in sanitation and compliance with HACCP.

The issue of food safety is very important for the health of the consumer. The production and distribution of quality and health-conscious foods, as well as final dishes in gastronomy, are an

integral part of life. There is a need to monitor the occurrence of major food-borne illnesses in this sector as well, thus ensuring the overall safety of consumed food and meals.

Need to make this idea happen (funding, expertise, partners,...): We would welcome financial support for our proposed project and monitoring of the problem, which would ensure safe and simple screening in the Czech Republic.

Proponents: Doc. MVDr. Renáta Karpíšková Ph.D. Veterinary Research Institute, Brno, Czech Republic; Mgr. Marta Dušková, Ph.D. University Veterinary and Pharmaceutical Sciences Brno, Czech Republic.

Participant / Presenter:

Dr. Kateřina Bogdanovičová

University of Veterinary and Pharmaceutical Sciences Brno

Czech Republic

Email: bogdanovicovak@vfu.cz

Ideas Showcase / Poster #: 2

Break-out sessions (pitches) group: -

Title of the research idea:

The use of next generation sequencing data in microbial risk assessment (A03)

Description of the research idea: The objective of this research idea is to develop an expertise across Europe in using state of the art next generation sequencing techniques to characterise and track microbial pathogens in the farm to fork food chain but especially during processing, to identify contamination sources and transmission routes of microbial pathogens through the chain.

The programme of work will develop the use of sequencing techniques to characterise and track microbial pathogens across the food chain as a tool to identify contamination sources and transmission routes of pathogens through the food chain. This will be undertaken through a series of large scale surveillance projects for specific pathogens in high risk food chains. The surveillance work will use conventional microbiological techniques to identify occurrence of pathogens in the food chain. Positive isolates will then be sequenced to give a unique 'DNA fingerprinting' of the pathogen which can then be compared with the DNA fingerprint of other positive samples identified at different steps in the chain. The sequence data as well as the associated sample meta-data which includes information on the sample type, date and source can be analysed using various phylogenetic analysis techniques to address critical microbial risk assessment questions including the source of pathogens, their survival and transmission within the production facility, the potential for cross contamination and their long term persistence in the process environment.

This work will build on existing work already funded by the Irish Department of Agriculture and Food and elsewhere in Europe and will capitalise on the expanding expertise within the UCD Centre for Food Safety to conduct microbial pathogen surveillance programmes using next generation sequence techniques.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: NGS data obtained from microbial pathogens obtained across a food chain can answer many difficult risk assessment questions such as source of pathogens, their survival and transmission within the production facility, the potential for cross contamination and their long term persistence in the process environment. There is an urgent need to do this work on a pan-European basis to establish a large scale database of sequence data associated with food pathogens and through phylogenetic analysis, establish possible linkages between strains circulating within Europe and beyond. In a

second phase, the NGS data will serve as an invaluable database to monitor and track AMR in pathogens, emerging resistance to sanitisers, etc – a whole range of issues that can be informed through the availability of NGS data. Ultimately this knowledge will underpin the next generation of risk assessments of microbial pathogens in dairy powder products and advance existing EFSA risk assessment methodologies.

There is an urgent need to develop the use of next generation sequencing to underpin risk assessment on a pan-European basis to establish a large scale database of sequence data associated with food pathogens and establish possible linkages between strains circulating within Europe and beyond. This research activity constitutes 'Public Good Research' and as such needs funding through public funding at a national and pan European level.

Need to make this idea happen (funding, expertise, partners,...): To make this idea happen, an agency such as EFSA needs to coordinate the emerging national actions taking place in using next generation sequencing to underpin microbial risk assessment.

Proponents: Francis Butler, Centre for Food Safety University College Dublin, Ireland.

Participant / Presenter:

Prof. Francis Butler

Centre for Food Safety University College Dublin
Ireland

Email: f.butler@ucd.ie

Ideas Showcase / Poster #: A03

Break-out sessions (pitches) group: A

13. **Improve the use of genetic data (e.g. from whole genome sequencing) for risk assessment of microbiological contaminants**

The following two research ideas will be presented; more details below:

- Strengthen microbial Next Generation Sequencing in Europe (A04)
- TRACKING: Transcriptional Risk Assessment Combining Kinetics and Genotyping (A05)

Details

Title of the research idea:

Strengthen microbial Next Generation Sequencing in Europe (A04)

Description of the research idea: Next generation sequencing (NGS) technology for decoding at the nucleic acid level entire bacterial genomes is worldwide increasingly applied for high-resolution bacterial strain characterization e.g. in outbreak investigation, source attribution and risk assessment studies. The method significantly reduces time to results but also increases the information available and will improve understanding of the spread and microevolution of bacterial pathogens in epidemic and outbreak situations. However, it needs further capacity building and harmonization across European research institutions for providing qualitative comparable data sets applicable in risk assessment studies.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: Pathogen characterization by NGS provides considerable improvements microbial risk assessment and in the management of food safety risks and foodborne diseases. The network to be built within the project follows a One Health approach and will drive widespread deployment of microbial genomic sequencing data. Setting up a sustainable network integrating European research institutions, guarantee the maximum quality control measures of NGS data and enhanced data sharing by all partners for risk assessment studies. SOPs, advisory documents and expert guidelines produced in the project will be disseminated and published on appropriate platforms enabling the access of methods.

Therefore, this project will strengthen the knowledge and applicability of the NGS technology in Europe for combating infectious diseases and food safety due to application of high-resolution sequence data for risk assessment.

Combating zoonoses and lowering the exposure of foodborne pathogens to humans using an integrated genomic risk assessment approach is a global public health concern. NGS has the potential to boost microbial food safety issues saving in public health billions of Euro due to declining of cases caused by infectious diseases. However, the success depends on the establishment of a central database continuously collecting in real-time microbial genomic data from as many European countries as possible. Consequently, public European funding will lower the barrier of entry for countries and institutions that do not already have the capability of generating, analyzing and interpreting NGS data and is the basis for a common collaborative research network between the food, veterinary and public health sectors.

Need to make this idea happen (funding, expertise, partners,...): Funding is needed for all network partners to establish and sustain NGS capacities, possibly including genome sequence instruments for those who have no access to sequence facilities. The network should consist of partners across all sectors (One Health approach) who already have a high knowledge in this field and apply NGS as a routine tool in microbial genomic and partners who are willing to share data and establish genomic sequencing tools. To meet the requirement interdisciplinary expertise is necessary in the field of epidemiology, informatics, bioinformatics, genomic biology, veterinary medicine, and food hygiene.

Proponents: Sweden (NFA) ; Denmark (DTU) National Food Institute, Hungary, Slovakia; Netherlands (RIVM); Netherlands - (NVWA); Croatia (HAH), Spain - University of Córdoba, Portugal: Faculty of Veterinary Medicine, University of Lisbon.

Participant / Presenter:

Dr. Burkhard Malorny

German Federal Institute for Risk Assessment

Germany

Email: fk@bfr.bund.de

Ideas Showcase / Poster #: A04

Break-out sessions (pitches) group: A

Title of the research idea:

TRACKING: Transcriptional Risk Assessment Combining Kinetics and Genotyping (A05)

Description of the research idea: Omics technologies (genomics, transcriptomics, proteomics and metabolomics) provide a wealth of biological information that helps us explain the physiology,

behaviour, environmental distribution and virulence potential of foodborne pathogens. This can provide information for epidemiological studies, food/pathogen attribution, and outbreak investigations. Moreover, it has improved foodborne disease surveillance, outbreak investigation and control of foodborne diseases and is currently employed by regulatory authorities and actively explored by the scientific community. However, it is not yet integrated in the quantitative microbiological risk assessment (QMRA) framework. It is expected that in the near future omics data will be fully exploited in risk assessment as a basis for a better management of risks associated with pathogenic microorganisms in the food chain.

A discussion forum was initiated between academia, research organizations, food companies and regulatory authorities during the IAFP European Symposium in 2015 and continued in 2016. A workshop on Next Generation MRA - Integration of Omics Data into Assessment was co-organized by ILSI Europe, IAFP and ICFMH, in which four breakout groups on epidemiology, metagenomics, exposure assessment and hazard characterization brain-stormed and produced a common strategy to go beyond the current knowledge. Four "position papers" were generated from the groups and they are in the process of being published. Moreover in 2017, at both the IAFP European Symposium and Annual Meeting, the ideas were further discussed and elaborated.

Here we propose to build further on the main outcomes of initial research investigations and discussions carried out in the above-mentioned forums and papers. This will provide methodologies on how molecular data obtained via omics technologies can improve QMRA.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: QMRA integrated with omics data will be refined, and this added-value will benefit food safety. For example, the use of transcriptomics-derived biomarkers will enable to better characterize phenotypic variability between strains of pathogens and will provide information to food safety decision makers on how to take into consideration this aspect. Whole genome sequencing (WGS) aids in understanding virulence potential at the strain level and embedding of WGS in risk assessment will give more precise indications in outbreak source-attribution analysis. The proposed integration will enable the transition to the next generation of QMRA, both at governmental (regulatory authorities) and operational level (food industry). Nowadays, a new generation of sequencers is emerging, which are portable, fast and cost-effective, making possible the rapid on-site analysis. Early detection and prompt response will reduce the public health burden of outbreaks avoiding many citizens to get ill.

To be efficiently used at the European level in the decision-making process, moving to the next generation of risk assessment demands harmonised methods based on several proof-of-concepts covering hazard identification, exposure assessment and hazard characterization. Variability of pathogens, their interactions with endogenous microbiota and their specific behaviour in terms of growth or inactivation kinetics, survival and virulence as influenced by the surrounding environment, including processing and preservation conditions along the food chain are all elements that have to be taken into account. This requires scientific projects supported by public funding. Furthermore, the science-based decision-making tools that will become available to stakeholders will have an impact and benefit society as a whole.

Need to make this idea happen (funding, expertise, partners,...): Integrating multi-omics data in risk assessment is currently considered a challenge. Experts in molecular biology, microbial physiology, predictive microbiology, food processing and preservation, bioinformatics, risk assessment and risk management have to join in trans-disciplinary efforts. The research consortium that promotes this research idea is composed of partners that have interacted on this specific subject in the last two years and brought into the group a transdisciplinary view and methodological approaches to QMRA. This consortium needs to be expanded to include further expertise in omics technologies and in QMRA. The research idea will require research funding and other material support (for example, access to culture collections of foodborne pathogens as well as environmental,

food, and clinical samples) to be successful. In this context, collaboration between the food industry, academia, research/technology centres and regulatory authorities is essential.

Proponents: Luca Cocolin, DISAFA, University of Torino, Italy
- for the TRACKING consortium.

Participant / Presenter:

Prof. Luca Cocolin

University of Torino

Italy

Email: lucasimone.cocolin@unito.it

Dr. Marios Mataragas

Dairy Research Institute – ELGO

Greece

Email: mmatster@gmail.com

Prof. Panagiotis Skandamis

Agricultural University of Athens

Greece

Email: pskan@aua.gr

Prof. Marcel Zwietering

Wageningen University

The Netherlands

Email: marcel.zwietering@wur.nl

Dr. Heidy Den Besten

Wageningen University

The Netherlands

Email: heidy.denbesten@wur.nl

Dr. Marjon Wells-Bennik

NIZO

The Netherlands

Email: marjon.wells-bennik@nizo.com

Dr. Annemarie Pielaat

Unilever

The Netherlands

Email: annemarie.pielaat@unilever.com

Prof. Fernando Perez-Rodriguez

University of Cordoba

Spain

Email: fernando.perez@uco.es

Ideas Showcase / Poster #: A05

Break-out sessions (pitches) group: A

14. Antimicrobial/ antibiotic resistance

The following two research ideas will be presented; more details below:

- A new method for identification of antimicrobial resistance genes based on whole plasmid sequencing (A06)
- Measurement of prevalence and concentration of ESBL-producing E. coli in meat and non-meat food (A07)

Details

Title of the research idea:

A new method for identification of antimicrobial resistance genes based on whole plasmid sequencing (A06)

Description of the research idea: Antimicrobial resistance is an emerging and global problem. Therefore, there are numerous efforts to understand the mechanisms of resistance, promote the responsible use of antimicrobials and seek effective therapeutic alternatives. Epidemiological surveillance of resistances is crucial when evaluating control measures aimed at reducing them. The official methods used for the evaluation of resistances are based on the culture of one or more indicator species; however, the latest scientific advances seem to indicate that these techniques are not representative of the whole microbial community.

It is now known that more than 80% of bacteria are not culturable, and that most of the resistance mechanisms of sanitary and epidemiological importance are found in mobile elements of the genome (mainly in plasmids). It is also known that these mobile elements can pass from one bacterium to another, between different genera and even families; as well as between commensal and zoonotic species. Therefore, the study at a specific moment of a few bacterial species may not be representative of the totality of the microbiota, which is much more diverse and complex.

The main hypothesis of this work is based, therefore, on the fact that the current risk of resistance is undervalued, since the reference procedures for its identification are not representative of the bacterial community. For this, the idea for a further proposal will cover two main objectives: 1- the development of an alternative method for the detection and identification of resistance genes, not dependent on the culture, based on the direct sequencing of all the plasmid DNA of the bacterial community of the sample; and 2- the comparison of this new technique with the gold standard method (the reference procedure) in samples from livestock.

In short, the objectives set out in this proposal intend to establish guidelines for the design of a true representative resistance-monitoring program.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: The identification of the plasmids by a non-culture dependent method could give a more realistic information of the resistance potential of the bacterial community. This method could improve or complement official methods, substantially improving the epidemiological surveillance of antimicrobial resistance.

The methodology to be developed in the current proposal is aimed at developing new strategies in monitoring antimicrobial resistance. Therefore, the focus of the proposal is directed to the public institutions responsible for the national and international antimicrobial resistance surveillance plans. The main results expected from the proposal could shed more light on the epidemiology of antimicrobial resistance.

Need to make this idea happen (funding, expertise, partners,...): The methodology to be developed in the current proposal is aimed at developing new strategies in monitoring antimicrobial

resistance. Therefore, the focus of the proposal is directed to the public institutions responsible for the national and international antimicrobial resistance surveillance plans. The main results expected from the proposal could shed more light on the epidemiology of antimicrobial resistance.

Proponents: Fernando Esperón; Animal Health Research Centre-National Institute for Agricultural and Food Research and Technology, Spain; Ana de la Torre; Animal Health Research Centre-National Institute for Agricultural and Food Research and Technology, Spain.

Participant / Presenter:

Dr. Fajardo Esperón

Animal Health Research Centre- National Institute for Agricultural and Food Research and Technology

Spain

Email: esperon@inia.es

Ideas Showcase / Poster #: A06

Break-out sessions (pitches) group: A

Title of the research idea:

Measurement of prevalence and concentration of ESBL-producing E. coli in meat and non-meat food (A07)

Description of the research idea: Bacteria that produce extended-spectrum β -lactamases (ESBLs) are resistant to β -lactam antibiotics. Humans that are carrier of ESBL-producing E. coli are considered at risk for antibiotic therapy failure following e.g. urinary tract E. coli infection. In The Netherlands about 5% of the human population is carrier of ESBL-producing E. coli. Meat consumption is considered an important transmission route for ESBL-producing E. coli.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: A comparative exposure assessment can be used as an indication of the attribution of human ESBL E. coli carriership. This provides governments a list of food products or food categories which are most important in this respect. For these food products, interventions by the government are most likely to lead to a reduction of ESBL E. coli carriership and therewith to a reduction of public health risk. These interventions can cover the whole food chain, from a reduction in ESBL E. coli load in primary production by hygiene measures, to changing consumer behaviour by an information campaign or a warning on the food product in retail.

Need to make this idea happen (funding, expertise, partners,...): Typically this type of data can only be obtained through public funding.

Partners needed for laboratory capacity, as many food samples will need to be analysed.

Proponents: -

Participant / Presenter:

Dr. Eric Evers

RIVM

The Netherlands

Email: eric.evers@rivm.nl

Ideas Showcase / Poster #: A07
Break-out sessions (pitches) group: A

15. Microbial food pathogens (in general)

The following research idea will be presented; more details below:

- Harmonization and improvement of a decision-making tool for risk assessment (C09)

Details

Title of the research idea:

Harmonization and improvement of a decision-making tool for risk assessment (C09)

Description of the research idea: The development in computers and software engineering in parallel with the progress of predictive microbiology field enabled the development of prediction software tools to be used for decision-making processes in a quick and easy manner. However, the integration of predictive microbiology models into Risk Assessment models remains as an important challenge to industry and academia due to the complexity derived from the multidisciplinary approach required to accomplish risk assessment studies which includes epidemiology, food technology, microbiology, numerical methods, etc. Among the software tools available for risk assessment purposes, MicroHibro (available in www.microhibro.com) has demonstrated to be a valuable resource. The tool permits the design of the food distribution chain under study by the end-users and the assignment of predictive models to each step considering that microbial growth, inactivation or transfer can occur. By defining the inputs of the models, an exposure assessment can be carried out followed by the generation of risk estimates when appropriate dose-response models are selected. In this context, the lack of standardization and agreement in predictive microbiology and risk assessment modelling approaches makes difficult their effective application and the knowledge exchange between model developers and end-users. The main purpose of the research would be to deepen into predictive model harmonization and risk assessment methodology using as proof of concept MicroHibro, in conjunction with other existing tools. To this end, ontologies should be developed to be used as standards for food matrix classifications, model development, kinetic parameter and unit definitions, with the paramount aim to facilitate an effective mathematical model exchange and application among predictive microbiology practitioners and developers (i.e. import/export systems in predictive software).

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: Predictive Microbiology tools like MicroHibro are important resources for food safety managers and assessors as they can be used for decision-making processes at both the industrial and governmental level. Furthermore, it is relevant educational resource to convey and teach concepts about Quantitative Microbial Risk Assessment facilitating the development of skills in Risk Assessment for end-users in the academic and industrial sector. Thus, software improvement would beneficiate the food safety community and the public health.

Providing more efficient decision support tools for risk assessment and enhancing interpretability and applicability of predictive models are crucial to assure safe food production in Europe. The advances to be achieved through this project will be of great relevance to stakeholders along the food chain and will have an impact and benefit society as a whole.

Need to make this idea happen (funding, expertise, partners,...): Harmonization in predictive microbiology and model integration in Quantitative Risk Assessment constitute an important challenge in the field with an important impact on the decision-making process. Considering different inputs and incorporating partners from different perspectives (risk manager and assessors), expertise (risk modellers, microbiologist, IT) and applications (industry, food inspection, food safety authorities) is key to attain a valid and universal approach, enabling a better interpretability and use of models for food safety. The need to translate these concepts into existing risk assessment and predictive microbiology tools should be also addressed through a multi-disciplinary and EU consortium. Given the different types of tasks involved in the project, i.e., standardization, software adaptation and interoperability validation along the food chain, the research idea will require research funding to be successful.

Proponents: Arícia Possas, University of Córdoba, Spain; Fernando Pérez Rodríguez, University of Córdoba Spain.

Participant / Presenter:

Ms. Arícia Possas

University of Córdoba

Spain

Email: ariciamp@gmail.com

Ideas Showcase / Poster #: C09

Break-out sessions (pitches) group: C

16. **Food-borne viruses (in general, e.g. Hepatitis A and Norovirus in fruit and vegetables)**

The following research idea will be presented; more details below:

- Virus in fish - a clear view of the dangers associated with production and consumption (A08)

Details

Title of the research idea:

Virus in fish - a clear view of the dangers associated with production and consumption (A08)

Description of the research idea: Food products, in special bivalves, red fruits and salads, are already tested for Hepatitis A and Norovirus. Nevertheless, more data and knowledge is needed to have a clear view of the dangers associated to the presence of virus in fish, both in terms of production in aquaculture and in terms of consumption of wild aquaculture produced fish.

This proposal aims to assess virus distribution in selected species of wild and farmed fish from aquaculture environments. The idea is to not only to survey the presence of several known viruses pathogenic for fishes and for humans, but also, and specially, to obtain the virome characterization of the samples. The analyses will provide direct access to the viral genomic content of the different samples, bringing unique insights into the main viral families present in fish, and indirectly in the aquatic environment.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: Such proactive characterization of viruses may support the identification of putative viral

pathogens before an epidemic occurs, benefiting fish as well as human health and aquaculture management.

The study will allow a better know the virome of selected fish species, important to the EU economy, regarding the pathogenic viruses present, and also to identified and characterized possible new viruses, evaluating its hazards to fish and human health, in the "One Health" concept perspective.

Need to make this idea happen (funding, expertise, partners,...): The funding is need because many samples will be analysed by real-time PCR and next generation sequencing: Also the there is a need for phylogenetic studies and infectivity tests. As the projet is mainly knowledge gathering driven, no private funding is expected to be obtained.

Partners from other areas of EU would be interesting because the viromes can be varied according to geographical location.

Proponents: Mónica Nunes; Maria Teresa Crespo.

Participant / Presenter:

Dr. Maria Teresa Crespo

Instituto de Biologia Experimental e Tecnológica

Portugal

Email: tcrespo@itqb.unl.pt

Ideas Showcase / Poster #: A08

Break-out sessions (pitches) group: A

17. **Campylobacter (e.g. in poultry and ready-to-eat foods)**

The following research idea will be presented; more details below:

- Consumer perception of food-borne disease by *Campylobacter jejuni* (A09)

Details

Title of the research idea:

Consumer perception of food-borne disease by *Campylobacter jejuni* (A09)

Description of the research idea: The research that I want to pursue is to identify if consumers are familiar with the following: what is *Campylobacter jejuni*, the way that it enters to the food chain, the illness that ensues and how the contamination can be prevented. After collecting this information, the aim is to develop a practical guide for consumers about good food safety behavior at home.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: The impact aimed is to raise awareness in the population about *Campylobacter*, but also to develop a practical and quick guide for consumers, easy to read, but with the key knowledge that they need to acquire in order to reduce the potential contamination with the bacteria trough food.

Need to make this idea happen (funding, expertise, partners,...): The research idea needs funding to be able to afford the public survey to measure consumer's knowledge about *Campylobacter Jejuni*. The idea is to develop an electronic survey that contains questions to measure the level of knowledge about the bacteria, the illness that ensues and how food gets contaminated by this microorganism.

Furthermore, as the purpose of the survey is to find areas to reinforce the knowledge, funds are needed to develop and produce a quick guide for consumers, containing information about good food safety behavior when manipulating food and how to prevent the contamination by *Campylobacter* Jejuni.

The needs are:

- Expertise in Microbiology
- Expertise in data collection, such as public surveys.
- Materials for the survey, I would prefer a developer, to create an online survey.
- Materials for the guide design and development.
- People with experience in guides, manuals, design, graphic design.
- Publisher.

Proponents: Julieta Moreira Abeijon, student (Uruguay) from the Msc in Food Technology, University of Reading.

Participant / Presenter:

Ms. Julieta Moreira Abeijon

University of Reading

United Kingdom

Email: julietamoreira91@gmail.com

Ideas Showcase / Poster #: A09

Break-out sessions (pitches) group: A

18. Zoonoses (in general, including bio-hazards, MRSA etc.)

The following research idea will be presented; more details below:

- Model for the survival of Methicillin-Resistant *Staphylococcus aureus* (MRSA) in aged cheese (A10)

Details

Title of the research idea:

Model for the survival of Methicillin-Resistant *Staphylococcus aureus* (MRSA) in aged cheese (A10)

Description of the research idea: Methicillin-resistant *Staphylococcus aureus* (MRSA) has emerged as a major pathogen for both nosocomial (HA-MRSA) and community acquired infections (CA-MRSA). The third significant emergence of MRSA has been in livestock (LA-MRSA). The widespread of CA-MRSA and LA-MRSA has raised a question as to whether MRSA is indeed a foodborne pathogen.

As is well known in literature, food, especially meat and milk, may be contaminated by MRSA. Eating and handling contaminated food is a potential vehicle for transmission.

Fermentation processes with high numbers of lactic acid bacteria will reduce *S. aureus* numbers; however, this pathogen may grow during the initial stage in the production of semi-hard and hard cheeses when it is already present in high numbers in the milk. Thus, European standards for coagulase positive staphylococci in cheese rely on controlled analyses carried out during the production process at time points where numbers are expected to be high. We would like to study the point of fermentation in cheese-making technology, in order to provide data on the survival of MRSA

isolated from raw milk semi-hard cheeses.

The study will be performed in two stages: firstly, by predictive models and secondly by challenge test. We will design a food model predictor with dynamic environmental conditions (pH, aw, temperature, NaCl) so as to predict the behaviour of MRSA with different combinations of factors.

The validation of this predictor will be carried out by challenge test. A known quantity of raw milk will be artificially contaminated with a known quantity of mecA positive and enterotoxigenic *S. aureus* strains of either human or animal origin. All of the cheese making and ripening processes will be simulated in the laboratory. We will periodically analyze the survival of those inoculated strains during the various processes (e.g. inoculated raw milk, curd, cheese at the first week of aging). The molecular typing of each strain will be determined by PCR test.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: Despite the high prevalence of MRSA in food products, there is a relative paucity of literature dealing with the foodborne risk. To date, it is unclear whether MRSA can act as a foodborne pathogen. This fact should be considered in risk assessment and when devising appropriate public health intervention.

Whether or not *S. aureus* can grow and/or produce detectable amounts of enterotoxins in a given food product depends on the nature of the product (composition, raw, semi-processed, or fermented) and the interactive influence of the environmental conditions (pH, aw, T, NaCl) during the various phases of handling, processing, packaging and storage.

The study of MRSA survival in aged cheese will enable us to know more about the growth and outgrowth of this widespread pathogen in fermented food, providing more in-depth information for consumers regarding the health risks represented by the presence of MRSA in contaminated food.

Need to make this idea happen (funding, expertise, partners,...): This study aims to put forward a number of ideas for consideration, and should be thought of as an initial contribution to the dialogue between research centres, such as universities, the food industry and consumers. All this means that more partners need to be found. The study will also respond to unexpected major developments (e.g. it could be extended to other types of fermented food). With the support of public funding we could ensure that the research is ongoing.

In order to design the mathematical model, it is necessary to use adequate predictive microbiological and cross-validation software. In order to carry out the experiment we would need to seek the collaboration of experimental cheese dairies. These dairies usually perform challenge tests in their own laboratories with the aim of improving the shelf life of their products. We would like to introduce into their research programme the survival study of MRSA.

Alternatively, we could work in a university laboratory, where we could simulate the entire cheese making and ripening processes from raw milk artificially contaminated by MRSA strains.

In order to work with MRSA (Biosafety Level 2), we would need facilities, equipment and consumables based on risk assessment. In order to perform molecular typing of each strain, we would need to purchase a specific type of PCR kit. Taking into account what is required to carry out the project (the budget would amount to € 10,000).

Proponents: Elisa Spinelli, VMD, Ph.D. student, Department of the Science of Agriculture, Food and Environment (SAFE), University of Foggia; Giovanni Normanno, VMD, Associated Professor, Department of the Science of Agriculture, Food and Environment (SAFE), University of Foggia, Italy.

Participant / Presenter:

Dr. Elisa Spinelli

Department of the Science of Agriculture, Food and Environment (SAFE), University of Foggia
Italy

Email: e.spinelli1991@gmail.com

Ideas Showcase / Poster #: A10
Break-out sessions (pitches) group: A

19. Improving information on the occurrence and spread of harmful organisms

The following two research ideas will be presented; more details below:

- Implementation of standard operating procedures for research studies on livestock pathogens (C10)
- Role of the wildlife-livestock interface in zoonosis spreading (A11)

Details

Title of the research idea:

Implementation of standard operating procedures for research studies on livestock pathogens (C10)

Description of the research idea: Europe is facing the threat of a continuous spread of animal diseases caused by the bite of arthropods (e.g. mosquitoes, biting midges) that are infected with specific pathogens such as Bluetongue (a vector-borne disease, VBD). Stakeholders, including the European Commission, are dedicating attention and resources to investigate transmission with the goal of preventing further spread and better assessing risks to livestock food resources in Europe. A lack of reproducibility in insect experimental infections is a critically important area of weakness. This is mainly due to a lack of standard protocols for operating procedures (SOPs) and certification of products (in this case insects and pathogens), generated and in use for experimental infection. This critical weakness limits independent corroboration of results between laboratories

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: A list of benefits and impacts that our idea will have on food and safety and public health are here listed:

- increasing the biosafety level towards the environment and animals' health by conducting research experiments under standardized operating procedures that are harmonized on a European level;
- more coordination among research groups;
- standardization and traceability of scientific data generated;
- reducing costs by reproducibility of data across European laboratories;
- long-term improvements in livestock with consequent ameliorating of human health.

Animal health is a common concern for the public, moreover, most of the funding spent for research investigating animal welfare and food chain related topics are coming from tax payers. Therefore, it is extremely sensible to make sure that their money are worth producing science that will indeed have a strong impact on our food consumption thus human health.

Moreover, improving research and scientific strategies, to better understand how animal diseases can be control and prevent, will inevitably engage connections and strengthen collaboration also with experts on human health field, promoting the one health concept.

Need to make this idea happen (funding, expertise, partners,...): While our consortium has EC funding for many activities, we request complementary funding to create an expert working group to develop standard EU harmonized operating procedures to reduce risks to the food supply from VBDs that will deal with thematic above described.

We propose to use this funding to organize regular meetings/workshops with key persons in the field of animal welfare and VBD scientific community in order to discuss how we can improve our

standards and goals. Communication is a crucial tool in science, the benefit of having this advisory group is to foreseen troubleshooting that can hamper the quality of scientific operate concerning animal health.

Finally, collaboration with governmental bodies can lead to further development of our aims and goals towards a sustainability of all our achievements.

Support and recognition by governmental agencies dealing with risk assessment for animal welfare and food safety, will strongly improve our visibility and authority.

Proponents: Eva Veronesi, National Centre for Vector Entomology, Institute of Parasitology - University of Zurich (Switzerland); Ken Vernick, Institute Pasteur, Paris (France); Andrea Crisanti, the Imperial College, London (UK); Alain Kohl, University of Glasgow, Glasgow (UK).

Participant / Presenter:

Dr. Eva Veronesi

National Centre for Vector Entomology, University of Zürich, Parasitology department, Zürich Switzerland

Email: eva.veronesi@uzh.ch

Ideas Showcase / Poster #: C10

Break-out sessions (pitches) group: C

Title of the research idea:

Role of the wildlife-livestock interface in zoonosis spreading (A11)

Description of the research idea: The increasing co-occurrence of wildlife with livestock and humans along with the large number of pathogens shared is a growing risk for cross-species transmission. Direct or indirect contacts between wildlife and domesticated animals can lead to the spread of disease and AMR, or complicate the effective implementation of animal disease programmes.

According to the "Special report on Eradication, control and monitoring programmes to contain animal diseases" (EU, 2016) and the AMR plan (EC, 2017) "A European One Health Action Plan against Antimicrobial Resistance (AMR)", the feasibility and implementation of monitoring programmes need to be further studied, including the development of harmonised monitoring of zoonosis and resistances in wildlife and in the environment. Links between farming practices, animal and human health should be further investigated and risk assessment methodologies should be developed in order:

*to consider different pathways by which wildlife can be involved in human health,

*to provides the most comprehensive overview of research on infectious diseases at the wildlife,

*to characterize animal species and regions involved, as well as to identify trends over time,

*to provide efficient tools to prevent the transmission of diseases and AMR between wildlife and livestock and evaluate surveillance plans.

Research areas and innovative tools developed by our Institution focused on this topic will be presented.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: Benefit: improvement of surveillance plans.

Justification: The "Special report on Eradication, control and monitoring programmes to contain animal diseases" (EU, 2016); the audit performed by the European Court of auditors to examine whether the animal disease eradication, control and monitoring programmes adequately contain animal diseases and; the AMR plan (EC, 2017) "A European One Health Action Plan against Antimicrobial Resistance (AMR)" recommends the improvement of animal disease monitoring

programms and AMR plans. Some examples:

*New indicators related to the environment, including wildlife; need to be explored to optimize the effectiveness of surveillance programs.

*Economic indicators to assess the effectiveness of the surveillance program should be included.

*Improve knowledge on the release of resistant microorganisms into the environment and their spread.

Improvement of Animal disease and AMR monitoring programmes would allow to reallocate the human and economic resources. Therefore, the initial investment would result in a higher final economic benefit.

*Direct benefit for public institutions involved in surveillance programmes.

*Direct benefit for animal health status.

*Direct benefit on public health status.

Need to make this idea happen (funding, expertise, partners,...):

Public funding is needed (INIA is a public institution).

Partnerships are needed for stronger and active cooperation to share methodologies, data and expertise.

Proponents: Dr. Ana de la Torre Reoyo; Dr. Fernando Esperón Fajardo; Dr. Matilde Carballo Santaolalla; Dr. Irene Iglesias Martín.

Participant / Presenter:

Dr. Ana de la Torre

National Institute for Agronomic Research (INIA) - Center for Animal Health Research (CISA)
Spain

Email: torre@inia.es

Ideas Showcase / Poster #: A11

Break-out sessions (pitches) group: A

20. Ribonucleic acid interference (RNAi) applied to food producing organisms as pesticide, veterinary medicine or newly expressed trait in genetically modified crops
n/a

21. Better understand biological organisms and plant substances used in crop protection (reducing the need for chemicals, e.g. pesticides)
n/a

22. The impact of chemicals on the ecosystem (release of chemicals into the environment)

The following three research ideas will be presented; more details below:

- Environmental risks to groundwater ecosystems related to use of feed additives (B07)
- Harmonization of the environmental risk assessment and risk management of pesticide use (1)
- Soil organic Amendments and its effects on the pesticides behaviour in the environment (B08)

Details

Title of the research idea:

Environmental risks to groundwater ecosystems related to use of feed additives (B07)

Description of the research idea: In the EU, groundwater (GW) is the most important source of drinking water. GW is as well an ecosystem that is often burdened with intensive agriculture, urbanisation, infrastructure and industry. Feed additives present in the manure can pose a risk for the GW ecosystems when spread onto the grassland or arable land. Probably the most representative GW habitats in EU are in karst (fractures, channels, caves) and in alluvial gravel interstitial spaces. The impact of feed additives on the GW ecosystems, particularly coccidiostats, histomonostats and heavy metals such as zinc and copper is not sufficiently studied.

The current EU guidelines for the environmental risk assessment of feed additives in GW suggest an approach based on the threshold concentration of 0.1 µg/L. The latter is the upper limit of the concentration of pesticides in groundwater in the EU. It is assumed that the concentration of 0.1 µg/L is by default safe for both humans and exposed GW organisms. However, there is increasing evidence that the vulnerability of GW ecosystems can be much higher than previously thought. Largely unrecognised biodiversity in GW habitats is worthy of protection through the adoption of a scientifically sound risk analysis and the adoption of risk mitigation measures. The aim of the project is to perform a deterministic assessment of risk for groundwater ecosystems related to use of selected active substances as feed additives. The risk assessment would base on the field study from the exposed locations in different EU member states. The study will tend to evaluate the presence of active substances or their degradation products in relation to the use (veterinary medicine, feed additive) and origin (agriculture, other sources).

Data obtained will be used to protect GW ecosystems and in the support of the probabilistic assessment of fate and exposure of different groups of feed additives.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: Coccidiostats and histomonostats are widely used in poultry production to prevent the outbreak of coccidiosis and histomoniasis. The manure with these active substances and their degradation products is spread over the arable land and grassland. The behaviour and the fate of ionophoric coccidiostats are often not very well understood. Some of the coccidiostats are also very persistent. Active molecules can enter the groundwater and can pose a potential risk for the communities in the shallow karst, in the alluvial aquifers and springs.

The obtained data from the study will support the risk managers to set the environmental protection goal in order to protect vulnerable groundwater ecosystems. Moreover, the information provided will be used by assessors in preparation of adequate guidance document to support the assessment of environmental risks of feed additives.

Coccidiostats are widely used all over the EU member states. The intended network will comprise researchers from different Mediterranean as well as northern European countries. As well, the targeted environmental compartments (karst, alluvial flatlands) are covering parts of different

countries. It is therefore very difficult to find public financing mechanism that will cover studies in different European regions.

The aim of the project idea is to the large extent related to the regulatory frameworks and environmental risk assessment during the authorization and registration process. This type of research is not commonly supported by public funds.

The collaboration between southern European countries is on the field of environmental protection and feed additives relatively weak, and need to be strengthened.

Need to make this idea happen (funding, expertise, partners,...): Coccidiostats are widely used all over the EU member states. The intended network will comprise researchers from different Mediterranean as well as northern European countries. As well, the targeted environmental compartments (karst, alluvial flatlands) are covering parts of different countries. It is therefore very difficult to find public financing mechanism that will cover studies in different European regions.

The aim of the project idea is to the large extent related to the regulatory frameworks and environmental risk assessment during the authorization and registration process. This type of research is not commonly supported by public funds.

The collaboration between southern European countries is on the field of environmental protection and feed additives relatively weak, and need to be strengthened.

The crucial for the research idea to be realized is the funding of 4 years of the project. Following the release of the Risk Assessment Agenda Catalogue, representatives from several research institutions expressed their interest to participate in the project consortium.

Proponents: Boris Kolar; National Laboratory of Health, Environment and Food, Prvomajska ulica 1, 2000 Maribor, Slovenia; Dimitris Tsaltas, Department of Agricultural Sciences, Biotechnology & Food Science Cyprus University of Technology PO BOX 50329, 3603 Limassol Cyprus; Antonio Finizio: University of Milano-Bicocca, Piazza dell'Ateneo Nuovo, Italy; Ludek Blaha; Masaryk University, Research Centre for Toxic Compounds in the Environment, Kamenice 753/5, Bohunice, Brno, Czech Republic.

Participant / Presenter:

Dr. Boris Kolar

National Laboratory for Health, Environment and Food

Slovenia

Email: boris.kolar@nlzoh.si

Ideas Showcase / Poster #: B07

Break-out sessions (pitches) group: B

Title of the research idea:

Harmonization of the environmental risk assessment and risk management of pesticide use (1)

Description of the research idea: Regulation 1107/2009 establishes the need to perform the environmental risk assessment of pesticides, to demonstrate that the use of the plant protection product complies with the criteria of the Regulation and that the substances are not persistent, bioaccumulative, or meet the criteria of potential long-range transport in the environment. In the risk assessment process, the FOCUS (FORum for the Co-ordination of pesticide fate models and their USE) models are used. These models consider different scenarios at European level to calculate exposure concentrations. In this sense, it would be necessary to develop a set of new scenarios that cover the specific conditions of other areas, such as the Mediterranean conditions. The inherent diversity of landscapes, soils, vegetation, fauna, water fluxes,... and the overwhelming range of processes, interactions and controls that create the pattern of landforms at a particular area and

determine the ecosystem biodiversity, influences the environmental risk assessment. In prioritising pesticide management activities, connectivity concept should be taken into account. Connectivity approach can be used across Europe to determine pressures and limiting factors to pesticide assessment and the capacity we may have to forecast future environmental/ecotoxicological condition in order to define the impact of pesticides on the ecosystem. Mapping pesticide risk, vulnerability and environmental recovery would be very helpful for risk characterization, categorization and prediction.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health:

The impact/benefit of this risk assessment research approach focus on the harmonization of the criteria, procedures and conditions for the authorization of plant protection products and the use of as much information as possible taking into consideration new scientific and technical knowledge in the interest of predictability, efficiency and consistency of the environmental risk assessment carried out. Careful attention shall be given to climatic, agronomic and environmental conditions (waters including ground, surface, transitional, coastal and marine; sediment, soil, air, land, wild species of fauna and flora, and any interrelationship between them, and any relationship with other living organisms). The research will focus on the development of scenarios of typical Mediterranean crops, citrus and olive, subtropical crops and banana.

The impact of the research results is of general interest, having a social, economic and environmental impact at European level. Productivity is only one dimension of sustainability and it is necessary to ensure a stable supply of food and feed, dealing in harmony with the essential natural resources on which agriculture depends. Crop pests are a major constraint to agricultural production in many parts of the world, with new challenges related to global change (climate, land use, biological invasions, plagues and emerging diseases, etc.), food security, conservation of natural resources and biodiversity. Food security remains a pillar of the economic policy of a country and in this context the importance of the use of plant protection products in a proper, safe and effective way becomes fundamental. In the evaluation process for active substances approval, different gaps have been identified in the environmental risk assessment, whose approach can help safeguard public health.

Need to make this idea happen (funding, expertise, partners,...): A key aspect that should be covered to make this idea happen is the funding, to support the hiring / granting of the necessary technical personnel, the purchase of equipment / material, and the cost of the training courses and work meetings. We have the facilities and expertise to help this research from the initial idea to development and result. There is a research group that can support the development of the idea but collaboration with other partners would be very interesting and helpful in order to cover different expertise areas, such as software and modelling. Furthermore, collaboration with environmental risk assessors from other Member States is advisable and thus considered. The end-to-end support provided by experienced advisors, researchers, scientists and stakeholders will help identify each step in the development of the project.

Proponents: Ana-Patricia Fernández-Getino García (INIA); José-Luis Alonso Prados (INIA); Elena Alonso Prados (INIA); Ana Fandiño Carro (INIA).

Participant / Presenter:

Dr. Ana-Patricia Fernández-Getino García

Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria (INIA)

Spain

Email: fgetino@inia.es

Ideas Showcase / Poster #: 1

Break-out sessions (pitches) group: -

Title of the research idea:

Soil organic Amendments and its effects on the pesticides behaviour in the environment (B08)

Description of the research idea: Maintenance in the market of pesticides will depend on the application of risk mitigation measures that guarantee a sustainable and safe use of them. The use of organic soil amendments, as risk mitigation measures for the use of plant protection products, is having very positive and promising results. However, little information exists on the influence of organic amendments on the environmental behaviour of the pesticides. The main objective of the project is to study and evaluate the soil organic amendments as possible risk mitigation measures for the use pesticides, from laboratory to field; and considering different crop systems. Results and knowledge could be used to progress in the modelling of the behaviour of pesticides.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: Use of risk mitigation measures in the pesticide application contributes to reduce human and environmental risk of pesticides. Organic soil amendments (biochar) are a mitigation measure that has been implemented in the sustainable agriculture to increase the content of carbon in agricultural soils and to enhance the soil structure. However it is necessary to understand the behaviour of pesticides when this type of soil amendments is used. Combination of risk mitigation measures will contribute on the safe use of pesticides.

Availability of risk mitigation measures to be applied in the application of pesticides are essential for a sustainable agriculture, and the use of pesticide will be done in combination with risk mitigation measure. Competitiveness of the European Agriculture depends on the availability of sufficient plant protection tools and risk mitigation measures. The impact of the results of this research idea is of general interest, having a social, economic and environmental impact at a European level.

Need to make this idea happen (funding, expertise, partners,...): Public funding to support the hiring / granting of the necessary technical personnel, the purchase of equipment / material, and the cost of field trials are necessary for the success of this Project. We have the facilities and expertise to help this research from the initial idea to development and result. There is a research group that can support the development of the idea but collaboration with other partners would be very interesting and helpful in order to cover different expertise areas.

Proponents: Alonso-Prados, José Luis INIA – Spain; Sandin- España, Pilar INIA – Spain; López-Goti, Carmen INIA – Spain; Alonso-Prados, Elena INIA – Spain; Fernández Getino, Ana Patricia INIA – Spain.

Participant / Presenter:

Dr. José-Luis Alonso-Prados

INIA - Spanish National Agronomic Research Institute

Spain

Email: prados@inia.es

Ideas Showcase / Poster #: B08

Break-out sessions (pitches) group: B

23. Presence/detection of environmental contaminants in food (e.g. from agricultural, industrial or household sources)

The following two research ideas will be presented; more details below:

- Biosensing devices as a tool to refine the routine analysis of organophosphate pesticides (B09)
- Safety of Imported Foods and Non-Foods into Europe that are Consumed by Different Ethnic Groups (B10)

Details

Title of the research idea:

Biosensing devices as a tool to refine the routine analysis of organophosphate pesticides (B09)

Description of the research idea: The presence of pesticide residues and metabolites has been one of the major issues in food safety research. Although pesticides have improved agricultural productivity, they are associated with many health effects. Quantitative analysis of pesticides by chromatographic and spectroscopic technologies are limited by the time required to analyse a high amount of samples as the workloads and workforce involved in pesticide laboratories are immense. However, to perform food safety risk assessment a lot of data is needed, which is derived from large quantities of samples and a methodology which enables rapid quantitative analysis.

To propose a solution for the foreseen issue, we are in process of developing specific enzymes for the detection of selective organophosphate (OP) pesticides and implementing the designed biosensing devices in a robotic system in combination with fluorescence and mass spectrometric (MS) detection. Analysis time for multiple samples by fluorescence measurement takes about one minute, which is at least ten times faster than common quantification methods. If any positives for OPs are found, analysis is continued, provided the extra selectivity by tandem MS (fragmentation patterns) or high resolution MS (accurate mass and fragmentation). Data processing and elaboration for fluorescence measurements is continued by employing artificial neural networks (ANNs). ANNs database is collected through determination of patterns and relationships in data and thus are trained via experiences from sample dataset.

Generally, the system is optimized to minimize the means of sample preparation and analyse the native samples. Our methodology enables rapid preliminary testing approach and works as a filter/frit prior to chromatographic analysis, avoiding to test the majority of negative samples. The goal of the research is to provide rapid quality control and achieve a more continuous monitoring of the OPs in the environmental (water and liquid food) samples..

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: This methodology improves pesticide laboratory workflows. Biosensing devices are a rapid and cost effective pre-screening tool for sample diagnostics. Pre-screening allows for the reduction of samples subjected to costly instrumental analysis, by filtering a significant amount of negative samples. Positive samples detected from the fluorescence-based assay mass screening would be checked for false positive results and confirmed using MS techniques. Immunoassay approach allows for much better enabling the possibility for mass screening.

Further method development would allow incorporating the technology also in solid samples, which typically require extra treatment (SPE, QuEChERS etc.) prior to pesticide data procurement.

This methodology improves pesticide laboratory workflows. Biosensing devices are a rapid and cost effective pre-screening tool for sample diagnostics. Pre-screening allows for the reduction of samples subjected to costly instrumental analysis, by filtering a significant amount of negative samples. Positive samples detected from the fluorescence-based assay mass screening would be checked for

false positive results and confirmed using MS techniques. Immunoassay approach allows for much better enabling the possibility for mass screening.

Further method development would allow to incorporate the technology also in solid samples, which typically require extra treatment (SPE, QuEChERS etc.) prior to pesticide data procurement.

Possibility of further research would enable not only the ability for fast routine screening in environmental or QC laboratories, but also for on-site operation in places significantly remote for the immediate identification of hazard, risk assessment and action.

Decisions regarding environmental health and food safety risks include both science and broader public communication on that science. Although public discourse can be belligerent at times, successful dialogue and decision making are improved only with broad scientific engagement.

Collaborative engagement is important to ensure that diverse, and in some cases novel, scientific knowledge and perspective are considered in the improvement of public and food safety and risk assessment.

Need to make this idea happen (funding, expertise, partners,...): Public funding can benefit further research to enable the commercialization of biosensors to achieve the monitoring of contaminants at the household level, broadening the surveillance scheme. In particular, pesticides are ranked #1 food safety concern in most EU member states by Eurobarometer, thus the society is very interested in the evaluation and monitoring of the risk. Moreover, this topic is also relevant to public because of common misconceptions and perseverance of media related to pesticide use.

Appropriate grants would immediately broaden the research base for the biosensor development initiative and expose more eager scientists to the scientific challenges involved. In turn, researchers could identify opportunities for improvement, such as adding new contaminant targets and genetically modified enzyme to obtain new specific enzymes for desired analyses or families.

Partners such as academic and research institutions and also manufacturers, farmers, distributors are viable sources for collaboration, sample collection and monitoring data. This would benefit also the producers as we offer a way to augment to the common testing laboratory scheme. Additionally, common research and environmental testing laboratories would be appreciated to join our project as partners to provide another platform for the base of analysis by enabling the analysis of samples using our developed biosensors prior to common testing procedures for OPs.

Proponents: Janis Rusko, Ferdinando Febbraio, Giuseppe Manco; IBP - Institute of Protein Biochemistry, CNR, Naples, Italy.

Participant / Presenter:

Dr. Janis Rusko

IBP - Institute of Protein Biochemistry, CNR, Naples

Italy

Email: j.rusko@ibp.cnr.it

Ideas Showcase / Poster #: B09

Break-out sessions (pitches) group: B

Title of the research idea:

Safety of Imported Foods and Non-Foods into Europe that are Consumed by Different Ethnic Groups (B10)

Description of the research idea: Many diverse types of foods and non-foods are imported into Europe from many parts of the world making it extremely difficult to determine their risk to consumers of eating such foods. We have been monitoring the presence of toxic chemicals in geophagy materials such as clay tablets that are imported into the UK and eaten by members of different ethnic

groupd. We have determined the content of toxic elements such as arsenic, lead and cadmium in such clay tablets that are consumed by members of certain ethnic communities, especially those from countries in South Asia and sub-Saharan Africa. We have also been analyzing betel (Areca nut) quids that are eaten by Bangladeshi & Indian communities in the UK. Our research reveals that there are health risks associated with consumption of clay tablets, betel quids etc that are eaten as part of cultural habits. Consumption of such materials are not widely known and more needs to be done to establish an European wide network on imported ethnic foods for risk assessment purposes.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: Our research highlights that certain types of foods consumed in different ethnic communities in ethnically diverse parts of UK that have not been well investigated. I would like to highlight some examples from research conducted by my group in Leicester, UK which has one of the most ethnically diverse cities in Europe.

Members of certain ethnic communities suffer disproportionately from certain diseases which could be linked to their food consumption. This has negative impact on the health of the consumers. It also creates a burden on the health system and also the economy. Hence more research is needed in this area to counter the dangers of consuming certain types of foods in different ethnic communities.

Need to make this idea happen (funding, expertise, partners,...): More funding for research into unusual food habits and imported foods and non-foods that are eaten by members of different ethnic communities are needed. A Europe-wide network/group is needed to be formed so that a good knowledge of what is being imported from different regions of the world are assessed for their risk to public health.

Proponents: Professor Parvez Haris, De Montfort University, Leicester.

Participant / Presenter:

Prof. Parvez Haris

De Montfort University

United Kingdom

Email: pharis@dmu.ac.uk

Ideas Showcase / Poster #: B10

Break-out sessions (pitches) group: B

24. **Cocktail effects (health risk assessment of chemical mixtures, e.g. food additives)**

The following three research ideas will be presented; more details below:

- Cocktail effect calculator (D09)
- Health Risk Assessment of Combined Exposure to Pesticides and Plant Growth Regulators (D10)
- Physiologically-based pharmacokinetic models to predict chemical residues in foods of animal origin (D11)

Details

Title of the research idea:

Cocktail effect calculator (D09)

Description of the research idea: To enable assessment and management of cocktail effects we have developed a tool for mixture risk assessment ("Cocktail Effect Calculator", a project for Danish food authorities to be finalized in 2018). Our database of exposure and toxicity data includes substantial knowledge on exposure from foods and other sources and information of effects on a wide range of biological endpoints. Chemical groups include pesticides, mycotoxins, metals, phthalates, bisphenols, chlorinated, brominated and perfluorinated compounds, food additives, flavorings and processing contaminants.

Two ideas are proposed:

1. Using the Cocktail Effect Calculator. Defined research questions can be examined in close collaboration with interested partners including regulatory authorities. The Cocktail Effect Calculator can be applied to determine critical food groups or chemicals, and to determine the impact of altering food habits and intake patterns. Using this tool, risk assessment is performed for groups of chemicals with similar effect patterns, even across chemical classes and exposure sources.
2. Including in vitro based toxicology data for cumulative risk assessment. In the current version of this tool hazard characterization is based on available in vivo studies. To include chemicals for which only in vitro toxicity data are available we propose a model for cumulative risk assessment based on internal human dose levels compared with active doses in vitro. Risk characterization ratios (RCRs) are calculated by comparison of human internal dose levels to in vitro active concentrations. Cumulative risk assessment by adding RCRs for chemicals with same/related effects and/or same mode of action. Alternatively, a relative potency factor approach is applied. As a starting point we will focus on including chemicals with endocrine disrupting effects, but depending on possible interested partners this approach can be expanded to other effects/modes of action.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: The "Cocktail effect calculator" enables pragmatic mixture risk assessment taking into account exposures via foods and other sources. This tool can be applied by researchers and authorities to determine critical food groups or chemicals, and to determine the impact of altering food habits and intake patterns. By expanding the tool to include data from in vitro studies, we expand the number of chemicals for which cumulative risk assessment is possible.

- This pragmatic tool will make cumulative risk assessment easier for regulators and researchers
- Risk assessment of single chemicals can take into consideration exposure to similarly acting compounds
- Risk assessment of mixtures for various parts of the human population is made feasible using the collected information on chemical exposures from certain food groups or diets
- Focused research questions can be addressed by grouping chemicals based on effect patterns, including chemicals for which no in vivo data are available.

Need to make this idea happen (funding, expertise, partners,...): Research in methods for risk assessment is not considered to be within the scope of other funding options such as national research foundations or private sector funding. Without public funding for this work, risk assessment methods will not be progressed towards inclusion of alternative methods as basis for risk assessment. Funding is needed for a team of researchers for 3-4 years to collect available data from literature sources, to further develop methods for hazard and risk characterization based on in vitro data, and to perform case studies.

DTU has the expertise in cumulative risk assessment and data collection, but may need input from authorities (EFSA, ECHA, national regulatory agencies) regarding needs for application of the tool.

Partners with research focus on other toxicological endpoints than endocrine disruption/reproductive toxicity will be relevant in order to expand the existing tool to include other data.

Proponents: Julie Boberg, Technical University of Denmark; Anne Marie Vinggaard, Technical University of Denmark.

Participant / Presenter:

Dr. Julie Boberg

Technical University of Denmark

Denmark

Email: jubo@food.dtu.dk

Ideas Showcase / Poster #: D09

Break-out sessions (pitches) group: D

Title of the research idea:

Health Risk Assessment of Combined Exposure to Pesticides and Plant Growth Regulators (D10)

Description of the research idea: Combined toxicity of pesticides is not commonly studied during preregistration studies. Obviously, different pesticides used in different PPP, but used on same commodity during its growth, and may lead to presence of its residues in the foods, are not studied as a mixture in preregistration phase. Meanwhile, many publications on topic testify that single-chemical risk assessments are likely to underestimate the impacts of chemical mixtures, including pesticides, on human health and environment where mixtures occur. We conducted studies of acute toxicity (on Wistar Han rats by the OECD 425 method) of eight pesticide formulations, contained 2 or 3 pesticides. Results showed that combined effects of two or more active substances contained in the same product often lead to potentiation of toxicity (4 formulations). For two formulations we have observed antagonistic interaction. One formulation caused dose addition effect for males and synergistic effect for females. Furthermore, we observed decrease of signs of acute toxicity of pesticide formulations when they were combined with plant growth regulator.

Idea for further studies is to conduct repeated dose and, if resource available, chronic and DART studies of these preparations in parallel with testing of number of *in vitro* (with accent on endocrine disrupting properties) and *in silico* (mainly molecular docking and models predicting affinity to nuclear receptors) methods to assess their predictive value for such mixtures.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: Realization of research idea will contribute to risk assessment of mixtures of pesticides used in same formulations and will help to advance establishment of ITS of alternative methods for assessment of mixtures. Latter will help to use resources more effectively for risk assessment of other mixtures. All mentioned results are important for improvement of public health protection from harmful effect of chemicals.

Improvement of risk assessment of chemical mixtures and use of less expensive and faster options, like *in vitro* and *in silico* methods, will further contribute to improved public health protection. Besides, as was mentioned above, registration requirements for dossier do not require companies to conduct such studies and, obviously, do not require conducting studies of toxicity of mixtures with chemicals produced by other companies.

Need to make this idea happen (funding, expertise, partners,...): Being GLP certified laboratory we can conduct repeated dose, DART and chronic toxicity studies of previously tested in acute experiment in conformity with relevant OECD guidelines. However, now we have no dedicated funding for such purposes. Thus, to make idea happen we need funding for conducting of these

research. Furthermore, we would welcome partners in such research and will need additional expertise and access to computation facilities for in silico studies.

Proponents: Mykola Prodanchuk, Petro Zhminko, Oleksandr Kravchuk, Elena Riabuha, Olesia Vasetska, Nataliia Bubalo, Volodymyr Bubalo, Yana Kolianchuk, Inna Rashkivska, Serhii Kolesnyk, L.I. Medved's Research Center of Preventive Toxicology, Food and Chemical Safety, Ministry of Health Ukraine.

Participant / Presenter:

Prof. Mykola Prodanchuk

L.I. Medved's Research Center of Preventive Toxicology, Food and Chemical Safety,
Ministry of Health
Ukraine

Email: ecohyntox@gmail.com

Dr. Serhii Kolesnyk

L.I. Medved's Research Center of Preventive Toxicology, Food and Chemical Safety,
Ministry of Health
Ukraine

Email: skolesnick@gmail.com

Ideas Showcase / Poster #: D10

Break-out sessions (pitches) group: D

Title of the research idea:

Physiologically-based pharmacokinetic models to predict chemical residues in foods of animal origin (D11)

Description of the research idea: Develop validated physiologically-based pharmacokinetic (PBPK) models for major food-producing animal species to predict human exposure to environmental and feed contaminants, and veterinary drugs through food of animal origin (meat, milk and eggs): Quantitative, in silico PBPK models describe the rate and extent to which chemicals move through an animal's body based on animal- (physiological) and chemical- (physico-chemical) specific parameters. They can be used to predict a chemical's concentration in tissues at different times following exposure, thereby predicting indirect exposure in humans through consumption more mechanistically than current residue studies currently do. We propose to develop models for 3 major veterinary drugs in cattle, pigs and chickens using tissue residue data collected for the registration of these products. We will conduct pharmacokinetic studies to collect any missing plasma and tissue time-concentration data needed to fully inform the model. The predictive value of the models will then be tested for three environmental contaminant classes by fixing the animal-specific parameters, while the chemical-specific parameters are adjusted for each compound's physico-chemical characteristics. Various 3R (reduction, refinement and replacement of animal test) methods (in silico QSAR, in vitro studies) will be used to calculate the chemical-specific parameters. Prospective experimental pharmacokinetic studies will be conducted to generate plasma and tissue concentration-time data to compare to the model predictions. Samples will be collected at times that are most informative for the model as opposed to simply following standard regulatory test guidelines. Open source software (R) will be used and the code made freely available so that the model can be applied by others. Users will be asked to give feedback so that the models can be iteratively updated and improved, and a database will be created of parameter values for different compounds.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: This project addresses the need for rapid and cost-effective responses to potential and unanticipated chemical threats to human health through consumption of food of animal origin. The recent contamination of eggs with fipronil through environmental exposure to laying hens highlights how unanticipated chemical threats can be passed on to humans indirectly through the food chain. A PBPK model can be rapidly deployed in such situations to make quantitative predictions of human exposure thereby guiding risk management. The goal is that a model for a food producing animal species can be used to predict tissue concentrations for a novel chemical compound by altering only the values of the chemical-specific parameters. This project is unique in that data using a range of different compounds will be specifically collected to develop and validate a model in three major food-producing species, thereby producing a robust model that is suited for such extrapolations. Chemical contamination of food of animal origin can sometimes be anticipated (e.g., the use of veterinary drugs to treat and control disease in animals), and in such cases the burden to conduct the necessary studies to ensure human safety should be placed on the manufacturers of these products. However, sometimes contamination cannot be anticipated (e.g., in cases of environmental contamination, illegal use, and indirect exposure through waste). In these cases, public funding is necessary. The development of in silico models and associated databases is an ideal goal for publically funded projects, as they are cost-effective and avoid unnecessary duplication and expensive animal experiments.

Need to make this idea happen (funding, expertise, partners,...): The Institute of Risk Assessment Sciences (IRAS) within the Faculty of Veterinary Medicine at Utrecht University is uniquely positioned to develop PBPK models with expertise in in silico mathematical modelling coupled with access to animals for experimental and observational data collection. It also houses expertise in developing in vitro tests for pharmacokinetics and toxicity in for non-rodent species, including intrinsic hepatic clearance. Partnerships with industry and regulatory authorities will avoid duplication of studies, as tissue, milk and egg data for many compounds are already available.

Proponents: Dr Nynke Kramer, Institute of Risk Assessment Sciences, Utrecht University, The Netherlands.

Participant / Presenter:
Prof. Ronette Gehring
Utrecht University
The Netherlands
Email: r.gehring@uu.nl

Ideas Showcase / Poster #: D11
Break-out sessions (pitches) group: D

25. Indirect effects on human health due to modified agricultural practices (e.g. via reduction of pesticide use, changed content of mycotoxins)
n/a

26. Developing standard biomarkers of intake of and/or exposure to contaminants

The following research idea will be presented; more details below:

- Human biomonitoring for the assessment of dietary exposure to contaminants and micronutrient intake (D12)

Details

Title of the research idea:

Human biomonitoring for the assessment of dietary exposure to contaminants and micronutrient intake (D12)

Description of the research idea: Human biomonitoring (HBM) enables to assess the nutritional status of a population and the association with health and wellbeing outcomes with a view to pursuing health promotion and disease prevention.

For dietary contaminants, HBM gives an indication of the aggregated (i.e. dietary plus non-dietary) exposure of a population. If estimates of dietary exposure are available (e.g. by means of total diet studies), HBM may enable to assess the relative magnitude of the different exposure pathways. In many cases, e.g. for trace elements, the diet is by far the major source of exposure and HBM can be used to directly assess the intake through food and water.

The identification, validation and application of appropriate biomarkers in food safety studies are developing fields where much remains to be done.

HBM, integrated with a variety of dietary-based approaches (total diet/basket-market/duplicate diet studies) and mechanism-driven toxicological data, can yield robust and novel evidence for risk and risk/benefit assessment.

Foreseen impact/benefit of this risk assessment research idea on food safety and public health: Developing standard biomarkers of exposure to contaminants and of micronutrient intake and status would have a significant impact on food safety and public health by underpinning the different phases of risk assessment (e.g. linking evidence on external exposure, internal exposure, ADME and critical effects on target organs) and substantially reducing associated uncertainties.

Need to make this idea happen (funding, expertise, partners,...): The research idea would require a considerable effort from the European research community in the area of Food Safety and Nutrition and critically relies on cross-cutting interdisciplinary research. It is unlikely to be addressed appropriately if not sustained through public funding.

On the basis of appropriate funding, the research idea would require multidisciplinary expertise and would necessarily involve a number of partners.

Proponents: Francesco Cubadda, Alberto Mantovani, Marco Silano, Dept. Food Safety, Nutrition, Veterinary Public Health; Istituto Superiore di Sanità-National Institute of Health Rome, Italy.

Participant / Presenter:

Dr. Francesco Cubadda

Istituto Superiore di Sanità - Italian National Institute of Health
Italy

Email: francesco.cubadda@iss.it

Ideas Showcase / Poster #: D12

Break-out sessions (pitches) group: D

27. Food supplements risk/benefits (in general)
n/a

28. Determination of allergen thresholds (clinical studies), in conjunction with immune-chemical measurements of allergens in foods
n/a

II. Public funding opportunities

Among participants there will be representatives of the following public funding bodies. Brief information on the bodies' roles and funding mechanisms have been provided, with reference to the respective web sites for more details.

1. COST Association

COST (European Cooperation in Science and Technology) is a pan-European intergovernmental framework. It is a unique means for researchers to jointly develop their own ideas and initiatives across all fields of science and technology, while promoting trans-disciplinarity. As a precursor of multi-/ inter-disciplinary research, COST plays an important role in building a European Research Area (ERA) and enhances European excellence.

COST is supported by Horizon 2020; COST anticipates and complements the activities of the EU Framework Programmes. Through funding of bottom-up networks COST creates integration between European countries and their diversities, it builds trust and long-lasting networks enabling defragmentation of research and at the same time increased access opportunities to EU funding. COST aims at bridging the innovation divide in Europe and provide opportunities for younger generations.

COST networks (COST Actions) are selected through a proposal and evaluation process that is peer-reviewed, simple, transparent and competitive. COST Actions grow through a four year funded period and use networking tools, such as workshops, conferences, short-term lab exchanges and training schools to address the identified common challenge of the network participants.

Web link: <http://www.cost.eu/>

2. Department of Agriculture, Food & the Marine (DAFM), Ireland

The Irish Department of Agriculture, Food & the Marine (DAFM) operates three 'public good' competitive research funding programmes for agriculture, food and forestry to support innovation and economic success across the bio-economy. These programmes fund a range of strategically relevant research topics including ones relating to food safety risk assessment all along the farm-to-fork chain.

DAFM allocates some funding from its three competitive research programmes to support national participation in strategically aligned transnational competitive research Calls. The majority of transnational research funding Calls that DAFM supports are undertaken in conjunction with other EU Member States and the EU Commission (through ERA-NET Calls and Joint Programming Initiative funding Calls). DAFM support also extends to the US-Ireland Research & Development Partnership which was recently extended to include agricultural research under an arrangement involving DAFM, DAERA NI and the USDA's National Institute of Food and Agriculture (NIFA). Finally, DAFM promotes and provides non-financial support to Irish researchers to help them participate in the Societal Challenge 2 and the Biobased Industries Joint Undertaking elements of the EU Horizon 2020 Framework Programme on research and innovation relating to agriculture, food, forestry, marine and the bioeconomy.

Web link: <https://www.agriculture.gov.ie/research/competitivenationalprogrammes/>

3. EU funding programme

European Commission provides an overview of funding programmes implemented through the Multiannual Financial Framework which support EU policies. Currently including at Participant Portal:

- Horizon 2020 - research and innovation (2014 – 2020), €80 billion budget;
- 3rd Health Programme - actions that complement, support and add value to the policies of the Member States to improve the health (2014 – 2020), €449 million budget;
- Consumer Programme - actions that ensure a high level of consumer protection (2014 – 2020), €188 million budget;
- other programmes possibly relevant for food safety aspects.

Web link: <http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/index.html>

4. European Food Safety Authority (EFSA)

EFSA is a European agency funded by the European Union that operates independently of the European legislative and executive institutions and EU Member States. It was set up in 2002 following a series of food crises in the late 1990s to be a source of scientific advice and communication on risks associated with the food chain. The agency was legally established by the EU under the General Food Law - Regulation 178/2002.

EFSA regularly awards grants or subsidies for projects and activities that contribute to EFSA's mission in the following areas:

- data collection
- preparatory work for scientific opinions
- other scientific and technical assistance.

Only competent organisations, based on designations by Member States, are eligible to apply for a call.

Web link: <http://www.efsa.europa.eu/en/calls/art36grants>

5. EUPHRESCO

The European Phytosanitary Research and Coordination network (Euphresco) is a network of organisations which were initiated as EU funded ERA-NET projects in 2006 and 2010. The goal of the network is to strengthen the networking of research activities carried out at national or regional level and the mutual opening of research programmes. In 2014, having received EU funding twice, Euphresco members decided to continue to work together as a long-term and self-sustaining network. The coordination of Euphresco is now hosted within the European and Mediterranean Plant Protection Organization (EPPO), and in addition to consolidating the network and its procedures, it is also preparing the ground for future developments. Since 2008 Euphresco members have funded 80 ca. research projects in the phytosanitary field (regulated and emerging pests).

Euphresco transnational research funding is considered most appropriate for applied research in relatively small projects of short to medium length duration (1–3 years), i.e. enabling rapid and customised answers for quarantine plant pests.

Conversely, other sources of funding such as the EU Framework Programme funding are more appropriate for larger and/or more strategic projects that will typically have a wider EU benefit and context.

Web link: <https://www.euphresco.net/>

6. Food Safety, Veterinary and Phytosanitary Affairs Administration, Montenegro

Ordinance of the Government of Montenegro approved in December 2015 appoints the newly established Administration for Food Safety, Veterinary and Phytosanitary Affairs as the administration body in charge of food safety. The Administration is part of the MARD and shall perform the following tasks in: food & feed safety, animal health & welfare, animal by products and plant health.

Web link: <http://www.ubh.gov.me/uprava>

7. Health, Safety of the Food Chain and Environment (FPS Health) Federal Public Service, Belgium

The Federal Public Service of Public Health, Safety of the Food Chain and Environment (FPS Health) allocates grants for scientific research that supports its food safety, plant and animal health policy. All the Belgian research institutions may apply in response to this call for proposals.

The organisation of the calls and the management of the selection procedure are managed by the unit contractual research.

The grants may be granted to thematic (RT: Targeted Research), free (RF: Free Research) and international (RI) research projects.

Web link: www.health.belgium.be/contractualresearch

8. Spanish Scientific Agency (AEI)

The mission of the Spanish Scientific Agency (Agencia Estatal de Investigación, AEI) is to promote scientific and technical research in all areas of knowledge, allocating public funds through competitive calls, monitoring the activities funded and assessing their impact. The activities of scientific and technical research are focused to the challenges of Spanish society: health, food safety and quality, energy, environment, transport, economy and digital society and defence. The Agency's role also includes advising on the design of scientific plans and science policy.

The Agency organises public calls to fund scientific activities and performs the ex-ante evaluation, selection and monitoring of funded actions, using internationally standard scientific and technical criteria. The Agency funds scientific projects, training and incorporation of young scientists both in the public and private sectors, researcher's mobility, scientific networks, centres of excellence and infrastructures, among others.

Web link:

<http://www.idi.mineco.gob.es/portal/site/MICINN/menuitem.8d78849a34f1cd28d0c9d910026041a0/?vgnnextoid=664cfb7e04195510VgnVCM1000001d04140aRCRD>

9. Ministry of Food, Agriculture and Livestock-Directorate General of Agricultural Research and Policies (TAGEM), Turkey

Directorate General of Agricultural Research and Policies (TAGEM) is the agricultural research and innovation body of the Ministry of Food Agriculture and Livestock (MFAL). There are 50 agricultural research institutes throughout the country which are under the administration of TAGEM. These

institutes are Central Research Institutes (10), Regional Research Institutes (10) and Crop/Subject Oriented Research Institutes (30). TAGEM evaluates, funds and monitors the projects conducted in these public institutes.

As a funding body, TAGEM funds universities, private sector and NGO's as well. In addition to project funding, TAGEM also participates in national and international projects.

The research areas of TAGEM are;

- Plant Breeding and Agronomy
- Plant Health
- Livestock Breeding and Husbandry
- Animal Health
- Aquaculture and Fisheries
- Food and Feed
- Soil / Water Resources and Biodiversity
- Agricultural Economics

The Missions of TAGEM are;

- Increasing yield and quality of crop or livestock production,
- Developing new crops, varieties, breeding stocks and technologies in accordance with foreign and domestic market demands,
- Developing methods and techniques to ensure food safety, plant and animal health,
- Conservation of natural resources (soil, water, pasture, and genetic resources) and providing the sustainable use,
- Improving physical and human capacity of the research system,
- Improving national and international efficiency of institutes and their collaboration with stakeholders
- Developing the National Agricultural Research Master Plan,
- Determining research priorities and ensuring the use of resources in accordance with these priorities,
- Monitoring and evaluating research programs,
- Publishing the results of research and providing the implementation of latest technologies developed,
- Providing information to support decision makers through policy making and in preventing potential crises.

Web links:

http://www.tarim.gov.tr/TAGEM/Belgeler/yayin/TAGEM%20AR-GE%202017_EN.pdf

<http://www.tarim.gov.tr/TAGEM/Belgeler/yayin/TAGEM%20%C4%B0NG%C4%B0L%C4%B0ZCE.pdf>

10. Technology Agency of the Czech Republic (TA CR)

The Technology Agency of the Czech Republic (TA CR) is an organizational unit of the state that was founded in 2009 by the Act No. 130/2002 Coll. on the support of research, experimental development and innovation. The Technology Agency of the Czech Republic simplifies the state support of applied research and experimental development which has been fragmented and implemented by many bodies before the reform.

TA CR is a member of the European network of innovation agencies TAFTIE.

- BETA 2 Programme of the Technology Agency of the Czech Republic

The BETA 2 programme of TACR focuses on applied research and innovation to meet the needs of government authorities. Due to the cross-cutting nature of the programme, thematic areas of research and development are structured

The programme supports, in particular, the creation and innovation of models, novel legal standards and strategies for the current state policy in a national and European context. The expected results should also include a proposal for methods of assessing the effectiveness of these policies and strategies. The programme will consequently fulfil the national priorities of targeted research, experimental development and innovation.

The duration of the programme is expected to be five years, from 2017 to 2021. The minimum and maximum implementation period of approved projects will be determined with respect to the focus on applied research and the different character of the various needs. The project implementation period shall not exceed the duration of the programme.

Total expenditure on the programme to the amount of 1,635,062,000 CZK (approximately 65,402,500 EUR). This amount will be allocated for the duration of the programme according to the expected gradual financing of projects and in relation to their expected average duration. The share of expenditure from the state budget in the total expenditure will reflect the character of the programme implemented through public procurement projects, whose eligible costs will be reimbursed in full. The gradual increase in expenditure will also reflect the need to fund projects from the current and previous years in the coming years.

Web link: <https://www.tacr.cz/index.php/en/>

