

THEME Human exposure to chemical cocktails in food

Organized by:







Delivering an Effective, Resilient and Sustainable EU-China Food Safety Partnership

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The Institute for Global Food Security in partnership with Queen's University Belfast, Universite Laval and *safe*food, hosted the inaugural **Belfast Summit on Global Food Integrity from 29 – 31 May 2018** which attracted over 600 delegates from 47 countries to the Waterfront Hall over three days.

The Summit brought together representatives from international and governmental agencies, the academic and industrial research community, non-governmental organisations and the commercial and technical leaders in the food industry and its supply chain to discuss, debate and provide leadership on tackling a range of serious challenges that face the integrity of our global food supply system.

Among the range of issues discussed were food safety events, outbreaks of pests and diseases, social and environmental aspects of the global food chain, and public policy.

The Summit was a great success, with a lively line-up of plenary and keynote speakers, workshops, EU project meetings and spinoff events.

Speakers from the United Nations, Pepsico, World Wildlife Fund and research centres such as Wageningen gave us thought-provoking insights on how AMR is likely to be a bigger public-health threat than cancer by 2050, or that 96% of all mammals left in the world are farmed animals with the remaining 4% of wildlife being squeezed into smaller and smaller areas of forest. And how it's all connected, biodiversity (or lack of), climate change, geopolitics, pollution, terrorism, Brexit, agriculture – they all have a direct impact on our global food supply system.

A central message to come out of the Summit is that there's still time to turn things around with some creativity, focus and action. But the action needs to be now. To that end, the next step is to funnel the outcomes of the Summit into clear recommendations and then feed these back into the regulatory organisations which participated in the Summit so policy can be influenced at the highest levels.

The Summit concentrated on four central themes:

- 1. Deliberate contamination of food
- 2. The threat from pathogens to the food system
- 3. Human exposure to chemical cocktails in food
- 4. Delivering the nutritional needs for the 21st century

Theme three, human exposure to chemical cocktails in food was composed of four discussion sessions, two per day, two led by EU-China-Safe Project and the other two by the MultiCoop Project. The main aims of these sessions were to gain a better understanding of human exposure to multiple chemicals present in foods which will lead to formulation of a call for action to develop new ways of assessing the risks to the human health from these exposures and possible routes for mitigation. Each session was composed of a chair and a panel of experts to discuss the pertinent topics and answer questions posed by those attending the talks. Junior rapporteurs documented the talks and fed the information back to a senior rapporteur. Senior rapporteurs for each theme reported back to the full consortium on the final day of the summit and further discussions arose.



Day 1, sessions led by EU-China-Safe: Identifying the problem

Panel 1: Chemicals in food: The Regulations

Chair: Professor Yongning Wu, China National Centre for Food Safety Risk Assessment, China

Senior Rapporteur: Professor Chiara Dall'Asta, Department of Food Science, University of Parma

Panel 1 discussed the current global regulations and important gaps on dealing with chemical cocktails in food including EU, USA etc. The direction of travel in terms of dealing with the complex topic was debated.

Rapport from discussion:





Panel 2: Chemicals in food: Links with illnesses

Chair: Ms Beth Hamelin, Centre for Disease Control and Prevention, USA

Senior Rapporteur: Dr Rebekah Wharton, Centre for Disease Control and Prevention, USA

Panel 2 discussed the potential links between chemical cocktails in food and acute and chronic illnesses. Special emphasis was placed on the additive and synergistic effects of the chemicals present and the possibility of increased likelihood of diseases such as cancer.

Rapport from discussion:

Chemicals in Foods: Links with Illnesses Goal: Protect human health through better identification of chemical-induced illness Needs: Develop human expertise to better understand complex data More epidemiological studies, focusing on chronic exposures of vulnerable populations Reevaluate previous exposure and risk data with updated models for combined exposures to better represent reality Challenges: Multiple factors lead to symptoms from chemical contaminants: age, gender, environmental, underlying conditions

- Far removed from initial exposure or low dose exposures, difficult to conclusively connect to chemical in guestion
- Identification of safe levels is a balance between individual response to the contaminant and the nutritional benefits of the food



Day 2, sessions led by MultiCoop: Addressing the problem

Panel 3: Techniques to quantify the risk

Chair: Professor Jana Hajslova, University of Chemistry and Technology, Czech Republic

Senior Rapporteur: Dr Jaroslav Zelenka, University of Chemistry and Technology, Czech Republic

Panel 3 discussed current and emerging techniques to help quantify the potential human health risks which included analytical and toxicological approaches.

Rapport from discussion:

- Risk = Exposure x Bioactivity (Effect of substance x Response of organism)
- Toxic x Protective (bioactive) substances
- Mixtures of good and bad = complex view
- Dose-response often non-linear
- Real exposure = uptake from intestine and role of microflora
- Individual sensitivity (age, sex, genetic background)
- Big data issue = storing, mining and sharing

Analytical techniques:

- Contaminants (exposure) x Biomarkers (the effect on organism)
- Known = targeted analysis (multiple analytes, matrix independence)
- Developing world issue = cheap but reliable methods
- Scienion = Point of care kits, dry chemistry
- Unknown and Emerging = non-targeted screening + OMICS
- Fingerprinting x Profiling (DART-HRMS)



Panel 4: Can chemicals in food be decontaminated?

Chair: Professor Rudi Krska, University of Natural Resources and Life Sciences, Austria

Senior Rapporteur: Dr Mari Eskola, University of Natural Resources and Life Sciences, Austria

Panel 4 discussed innovations in technologies that could be used during feed and food processing to reduce/remove a range of chemicals from the food supply system.

Rapport from discussion:



















Discussion

- Prevention is better than decontamination
 - e.g. biocontrol to prevent **mycotoxin** formation
 - e.g. reducing **acrylamide** formation
- Shall decontamination procedures existing for feed be applied for food?
- Risk to eliminate beneficial nutrients through decontamination
- By using degradation approaches more toxic metabolites may be formed
- There is no silver bullet = no generic approach to decontaminate all chemicals in food = shotgun of bullet for various chemicals
- Consumer acceptance and perception important they want food free of chemicals
- Majority indicated that they would not be in favour of consuming decontaminted food
- But de-caffeineted coffee = perfectly accepted by consumers

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Panel members for the four sessions:

Name	Institute	Panel Session
Prof Michel Nielen	RIKILT Wageningen University & Research Institute, The Netherlands	1
Dr LI Jingguang	CFSA, China	1
Dr Mari Eskola	University of Natural Resources and Life Sciences, Austria	1
Dr Lisa Connolly	IGFS, QUB, Belfast NI	2
Mr Geremew Tassew	Ethiopian Food, Medicine And Healthcare Administration And Control Authority	2
Prof Yongning Wu	CFSA, China	2
Prof Andy Meharg	IGFS, QUB, Belfast NI	2
Dr Rebekah Wharton	Centers for Disease Control and Prevention, Atlanta	3
Dr Chibundu Ezekiel	Babcock University, Nigeria	3
Prof Chiara Dall'Asta	University of Parma	3
Dr Andrew Sweet	SCIENION AG, Germany	3
Ms Susan MacDonald	Fera Science Ltd., UK	4
Dr Katrina Campbell	IGFS, QUB, Belfast NI	4
Dr Dieter Moll	BIOMIN Research Center, Tulln, Austria	4



Photos – EU-China-Safe panels:

