

**Critical and emerging issues in food safety and quality
identified by the European Union and its Member States**

Please identify what you believe to be the 3-5 most CRITICAL ISSUES related to Food Safety and Quality, from present to the next 2 - 5 years .	Please identify what you believe to be the 3-5 most important EMERGING ISSUES related to Food Safety and Quality in the next 2 to 5 years .
<ol style="list-style-type: none"> 1) Food Fraud / Food Authenticity 2) New distribution channels / E-commerce 3) Globalization of trade 4) Antimicrobial resistance 5) The risk of increased (through synergism, potentiation) adverse health effects through exposure to multiple stressors including multiple chemical residues (chemical mixtures) 6) Endocrine disrupters 	<ol style="list-style-type: none"> 1) Climate Change 2) New Technologies 3) Long term effect of food emulsifiers on the bowel permeability 4) Mycotoxins (mixtures, masking) 5) Circular economy

Short explanation for each issue identified

CRITICAL ISSUES:

- 1) **Food Fraud / Food Authenticity:** Different cases of fraud might arise which can be distinguished as adulteration, falsification, counterfeiting (e.g. infringement of intellectual property rights, including geographical indications and assimilated rights), misrepresentation (e.g. through labelling and commercial communication) or endangerment of public health (e.g. recycling of animal by-products back into the food chain, slaughtering in illegal premises /not approved establishments). This topic therefore covers both areas of food quality and food safety. The results of our annual control plans of some Member States on food adulteration as well as the conclusions based on literature, show that the leading food categories with reported cases of fraudulent practices are olive oil, honey, fish and fish products, milk and milk products, fruit juices and spices/herbs. Large profits can be made in trading substandard or non-authentic food that may or may not be safe. The need for new sophisticated analytical methods (e.g. DNA barcoding, NMR) has become more evident in order to detect and prevent food adulteration. Early warning systems based on data analytics applied to big data would be useful. To ensure quality standards are met and the consumer is not misled, there is likely merit in establishing controls across a range of foods to investigate the risk of fraudulent practices.
- 2) **New distribution channels / E-commerce:** New distribution channels such as online trade often elude the official control channels. There is the need to change how food controls and inspections are implemented, a challenge for both the food sector and national authorities.
- 3) **Globalization of trade/ invasive animal and plant health issues (linked to climate change):**
The globalization of food markets has resulted in the globalisation of food chains. This interconnectedness allows contaminated food to be distributed far and wide. Increase in international trade, especially when combined with climate change, may in fact contribute to a greater incidence of food-borne diseases, contaminants and toxins in food, and makes tracing contamination challenging.

Food safety scares and crisis have the potential to impact negatively on international trade in food. As trade liberalization opens national boundaries, frequent and recurring instances of food contamination threaten the health, trust and confidence of consumers. Certainty on the safety of the food that is traded internationally may thus contribute to preventing a downturn in the volume of the traded food.

Cross-cutting issues such as globalisation are expected to put pressure on current and future food safety policy and highlight the need for greater international cooperation.

- 4) **Antimicrobial Resistance:** Already identified as one of the major threats to human and animal health over the coming years, the development of multiple-resistance to commonly used and last resort antimicrobials is of great concern globally. Considerable antimicrobial use through veterinary and growth promoting practice occurs in the livestock including the aquaculture sector, therefore any global strategy to control the development and spread of antimicrobial resistance must take into account livestock use. Innovative international approaches need to be developed to control the spread and impact of new resistance and multiple resistance mechanisms.
- 5) **The risk of increased (through synergism, potentiation) adverse health effects through exposure to multiple stressors including multiple chemical residues (chemical mixtures):** The potential simultaneous exposure to a multitude of hazards (chemicals, micro-organisms and other effectors) possibly through different routes (oral, inhalation and dermal) highlights the necessity to move beyond the single hazard approach and consider e.g. chemical mixtures (combined exposure to multiple chemicals). Such effects have already been described on bee populations, and although not yet fully understood the consequences both on biodiversity and the sustainability of pollination are severe. Human risk assessment of combined exposure to multiple chemicals: “chemical mixtures” is a major challenge to scientists, risk assessors and risk managers particularly from the methodological

point of view in relation to the complexity of the terminology and problem formulations, the diversity of chemical entities, and the toxicological profiles and exposure patterns in test species and humans.

- 6) **Endocrine disruptors and other low-dose chemicals with non-monotonic dose-response curve:** Some chemicals can have harmful effects on the body's endocrine system. Endocrine disruptors interfere with natural hormone systems, and the health effects can be felt long after the exposure has stopped. There is growing concern worldwide about negative human health and environmental impacts possibly caused by endocrine disruptors. It is therefore important to have a clear picture of the presence and action of endocrine disruptors in food.

EMERGING ISSUES:

- 1) **Climate Change (linked to the issue of Globalization of trade/ invasive animal and plant health issues):** This includes the effects of climate change on the food supply and the viability of agriculture in certain regions of reduced/increased rainfall and temperature. There is a need to understand how this might impact on the biological safety and chemical safety of our food supply. For instance, mycotoxin formation, pathogen contamination, marine biotoxin spread. This also affects food security. With the change of the climate conditions new pests and causative agents occur in the agricultural sector. The plant protection activities have to be updated due to these new and unknown effects. New dangers are also the direct effects of climate change, such as droughts, floods, too much or not enough rainfall, etc. Old species might become extinct while new, possibly more resistant species occur. We already see changes with regard to the spread of plants, diseases and pests.
- 2) **New Technologies/Scientific progress:** With the fast development of the economy, new raw materials, new food, new ingredients, new technological processes are increasingly used in the food industry. It should be noted that not all the new technologies, new materials, and compounds obtained in the manufacturing process are regulated at international level, e. g., trans fatty acid isomers in foods, acrylamide, perchlorates, nano-technologies; nor have they been subject to a thorough risk assessment. We need to understand the opportunities and threats that emerge from the use on new technologies in the food supply chain. Of particular interest are nanotechnology and synthetic biology. However, the brief could also be expanded to processing techniques like 3D printing. Consumers are not informed about new technologies or this information is very limited, this may cause reluctance in accepting these new technologies.
- 3) **Long Term effect of food emulsifiers on the bowel permeability:** A lot of food emulsifiers are listed among permitted food additives, with a wide variety of chemical structure and hydrophilicity. The use of emulsifiers is widespread and increasing. High proportions of food items commonly consumed contain emulsifiers with the result that the population exposed and the level of exposure are high, especially in industrialized countries where the consumption of industrially manufactured foods is predominant. Little is known on long-term effects in humans especially with regard to intestinal barrier integrity and consequent possible modulation of mucosal response and food allergy among the possible outcomes. According to recent scientific literature these chemicals could enhance the permeability of bowels and may contribute to the emerging tendency of some chronic diseases such as allergies, celiac disease, Crohn disease, autoimmune diseases etc.
- 4) **Mycotoxins -mixtures, masking (linked to climate change):** Despite the current attention for mycotoxin contamination, changes in contamination patterns could be expected due to climate change, which might lead to a different future approach to control contamination. Temperate regions like Europe are experiencing recurrent crises of mycotoxin contamination of commodities, mostly cereals, including maize with aflatoxin and DON, wheat and barley with DON. Mycotoxin contamination is an old and reasonably defined food safety problem, but some issues still need to be addressed, i.e. the toxicity of mixtures of toxins, the residue levels varying between countries, the lack of level for some toxins. Recent studies show the occurrence of modified chemical forms of mycotoxins as the result of metabolic transformations operated by contaminated plants. These forms, called masked mycotoxins, can lead to underestimation of the mycotoxin content of commodities due

to analytical overlooking of the modified molecules. Furthermore, little is known about the toxicity of the modified mycotoxins. A risk assessment in the European region would be useful.

- 5) **Circular economy:** The promotion of a circular economy, one that ideally aims at minimizing waste and pollution, raises questions about the management of risks. For many contaminants (organic and inorganic) accumulation in different matrices is unknown and quantitative data on contaminants in waste is not available. For example, various types of contaminants have been reported in recycled paper and many have not been specifically evaluated for their safety at the EU level. The ability of selected contaminants of various types to potentially transfer from recycled paper to foods has not been fully investigated. Recycling of plastic from electric and electronic equipment for the manufacture of black food contact articles may result in migration of unknown substances or substances of unknown toxicity at levels which could endanger human health. Another example is the use of sewage sludge for agricultural purposes (see also the issue of urbanisation above). Past risk assessment identified several knowledge gaps and many contaminants could not be assessed due to lack of data. Past experience indicates that recycling within food systems can lead to the rapid amplification of infectious diseases, as well as the potential emergence of new problems (BSE). Therefore when designing such recycling, these concerns have to be anticipated.