Food and Agriculture Organization of the United Nations

FOOD SAFETY IN A CIRCULAR ECONOMY

Summary report of the FAO side event at the 47th Session of the Codex Alimentarius Commission (CAC47)

© FAO/WHO Codex Alimentarius

29 November 2024

FAO

Summary report of the FAO Side Event at CAC47:
Food safety in a circular economy

The FAO Side Event on Food safety in a circular economy was held at the 47th Session of Codex Alimentarius Commission (CAC47) on 29 November 2024 in Geneva, Switzerland. It was organized as a follow-up to the recent FAO publication. The aim was to stimulate discussion on the food safety aspects that need to be considered and addressed when implementing circular practices in agrifood production. The webinar was part of the activities under the FAO Food Safety Foresight Programme.

SPEAKERS:

Markus Lipp, FAO

Vittorio Fattori, FAO

Alexandra Ferraro, United States of America, Department of Agriculture

Yongxiang Fan, China National Center for Food Safety Risk Assessment

MODERATOR:

Ki Jung Min, FAO

SIDE EVENT RECORDING:

ENGLISH | FRENCH | SPANISH | ARABIC | CHINESE | RUSSIAN

FAO PUBLICATION AND RELATED RESOURCES:

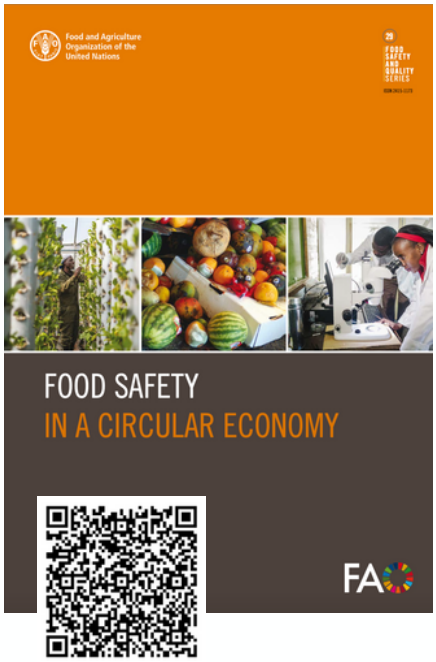
FOOD SAFETY IN A CIRCULAR ECONOMY

FAO FOOD SAFETY FORESIGHT PROGRAMME

Background

Circular economy is a cornerstone to agrifood systems transformation to guarantee a safe future for all, with adequate food produced within planetary boundaries. While circular solutions offer promising sustainability benefits, they can also introduce certain **food safety concerns**, such as risks posed by microbiological, chemical and physical hazards and antimicrobial resistance.

The FAO report, Food safety in a circular economy, provides an analysis of current and emerging evidence on food safety risks in circular food production systems. The report examines in depth the four major dimensions of concern – water scarcity, food loss and waste, food packaging waste, and land use efficiency.



Food safety policies and principles must be adapted to the unique characteristics of circular agrifood systems. Ensuring food safety requires a collective effort across all levels of the food supply chain, from producers to consumers and regulators. Each stakeholder has a critical role to play in safeguarding food safety as we move towards more sustainable agrifood systems.

The aim of the side event is to share the findings of the FAO work and stimulate discussion on this topic by learning from experiences at national level.

Overview

The FAO Side Event was officially opened by Markus Lipp, FAO Senior Food Safety Officer at the Agrifood Systems and Food Safety Division, who highlighted that with the increasing relevance of circular economy approaches, Codex and Members need to put circular economy in their plans to preempt any potential negative public health outcomes. “This will become even more critical in the light of food systems thinking, food systems transformation, where we will have to go towards more sustainable food production methods and circular economy is certainly one of those approaches,” said Lipp.

Main findings from the FAO publication

The opening remarks were followed by a presentation on the focus areas covered in the FAO publication Food safety in a circular economy[1] and its connection with the Food Safety Foresight Programme[2].

Vittorio Fattori, FAO Food Safety Officer, explained that the interconnectedness of circular agrifood systems, where resources come out of one process and enter another, can present challenges for contaminants, many of which can persist and accumulate along the processes. Therefore, transitioning to circularity requires development and application of appropriate food safety management measures to reduce the occurrence of contaminants. In particular:

- Assessing the microbial quality of **reused and recycled water** in agriculture can help prevent the contamination of crops by pathogenic microorganisms. The understanding of food safety implications of chemical contaminants is evolving and the potential for their residues to end up in foods requires careful evaluation. Also, the potential risk of antimicrobial resistance (AMR) genes to be transferred to humans is an emerging issue.
- Redistributing, upcycling or repurposing **food waste and by-products** requires correct management of food waste compost systems to eliminate pathogens and to address potential co-occurrence of other wastes in food waste and risk for the uptake of plastic additives from compost into food crops. Standards for compost sanitization are already present in many countries. Safety risks from microplastics are still not fully understood, while evidence of the behaviour of antibiotic resistance genes (ARGs) in food waste treatment is contrasting.
- **Reusable packaging** products, accelerating **plastic recycling** and developing safe and sustainable **packaging alternatives** can occur through the redesign of food packaging, which should be carefully implemented so as not to compromise food safety.
- **Integrated farming systems** that diversify production and other sustainable practices see potential reduction of agrochemical use thanks to natural pest and disease controls. However, there might be increased safety risks when multiple animal species occupy the same land area, especially in systems relying on manure or droppings as a source of nutrients or in aquaculture systems employing livestock manure. The transfer of pathogens to food can be efficiently prevented in controlled-environment agriculture systems.

[1] FAO. 2024. *Food safety in a circular economy*. Food Safety and Quality Series, No. 29. Rome. https://doi.org/10.4060/cd1789en
[2] https://www.fao.org/food-safety/scientific-advice/foresight/en/

Fattori concluded with reflections from FAO on the need to:

- Identify **emerging issues** to inform prompt risk assessment and then follow up with decision- making process.
- Make sure that **risk management and decision making** are highly attuned to changing times, and create frameworks and policies that can be flexible.
- Keep **consumers** centred in discussions around circular economy, so consumers know the trusted sources of information.
- Ensure adequate consideration is given to **food safety** alongside sustainability and economic performance.

Panel discussion

The panel discussion involved two food safety experts: **Alexandra Ferraro**, International Issues Analyst at the **U.S. Codex Office**, United States Department of Agriculture, and **Yongxiang Fan, Deputy-Director General of the China National Center for Food Safety Risk Assessment**.

Their views on the issues related to the food safety implications of circular practices in agrifood systems are outlined below. The discussion was moderated by Ki Jung Min, Communication Officer, FAO.

© FAO/WHO Codex Alimentarius

Challenges and areas of work for food contact materials in circular economy

From the US context, Alexandra Ferraro outlined three food packaging challenges that have arisen where food safety meets the circular economy:

1. **Fast-moving regulations**: Rapid advancements in circular economy initiatives within the food packaging space are driving national regulations to increase the use of more sustainable alternatives to single-use food packaging. As a result, food safety concerns unique to recycled materials are emerging and a lack of alignment among national regulations is creating trade barriers.

2. **Unintended consequences for food safety and the environment**: In the push to transition to a more sustainable packaging materials, food safety at times takes second priority or at worst can be compromised, due to a lack of suitable physical properties needed to keep food fresh during transportation and storage.

3. A varied landscape: Feed stocks for recycled packaging, access to those feed stocks, recycling technologies and infrastructure vary significantly depending on national context.

> "By attempting to address one problem, which is reducing food packaging waste, some circular economy initiatives are actually exacerbating another problem, which is food waste. And that's not only a problem for food safety, but also works against the redistribution of surplus food and reducing food loss at the consumer level."
> Alexandra Ferraro, U.S. Codex Office

Ferraro highlighted that the topic of food safety in a circular economy is a very active area of research and development in the United States, presenting some takeaways:

- Different solutions can lead to the same outcomes.
- Metrics and information sharing are especially important.
- There is no "one-size-fits-all".

Ferraro underscored the need for **science-, risk- and outcome-based approaches** that are focused on food safety, so that all stakeholders can find a common ground to enable broader participation in the circular economy.

Integrated farming systems

Yongxiang Fan discussed food safety considerations in integrated farming systems, which have been widely practiced in China for a long time. Examples include fish–crab farming, rice–duck farming and the integration of mulberry cultivation, silkworm rearing and vegetable farming, which offer a holistic approach to agricultural production by integrating crop cultivation, animal husbandry, aquaculture and agroforestry. Integrating agricultural practices into these systems promotes sustainability, improves resource use efficiency and increases farm income by diversifying sources of revenue while reducing environmental impact.

Fan noted that the Chinese government has published various policies to improve integrated farming systems and local governments are encouraged to facilitate farmers to build and maintain such systems by tax cuts or compensation funds. These systems support economic viability but also contribute to the preservation of natural ecosystem, making it a strategy for sustainable agriculture.

Fan also highlighted the food safety issues in integrated farming. “Food safety issues are always a challenge of this integrated farming system, for example pesticide and fertilizer residues and cross-contamination may happen from one system to another,” said Fan. He also noted transfer of disease from plant to animal and finally to human consumers can be of concern, along with food processing challenges, stressing the need to find an integrated approach to address those challenges.

Initiatives and solutions for food and agriculture in the circular economy

- United States Department of Agriculture (USDA) has offered grants and funding to incentivize more research and development in the circular economy space and to educate and inform stakeholders.
- China National Center for Food Safety Risk Assessment (CFSA) is carrying out risk surveillance and assessment work by the nationwide food safety control system to support food safety standard development.

Fan highlighted the importance of **education and training** for farmers on safe farming practices and community awareness campaigns. He proposed establishing an **integrated risk-based food safety management system** from farm to table to cover various types of food commodities harvested within the integrated farming systems (i.e. plants, animals and aquatic products). He stressed that taking a holistic approach to control possible food safety risk such as chemical contaminants, mycotoxins, pathogens and microplastics will be a possible solution, in which good agricultural practices will be a key part of the framework.

Noting the role of Codex, with its dual mandate to ensure fair practices in the food trade and protect consumer health by developing science-based standards, Ferraro added, “we really don't see a more appropriate body to work on food safety guidance that could help us continue to meet circular economy objectives”.

Q&A

During the Q&A session, delegates raised several key questions on safeguard measures, risk analysis and the future of food safety in a circular economy.

> “Given that the production of plastic additives is expected to increase by 100 percent by 2050, I'd like to know what panelists think would be good safeguard measures for environmental protection given the harm caused by plastics and food additives at an international level and that might be within Codex or outside?” – Germany

Markus Lipp responded that not all additives necessarily cause health concerns; it's a question of quantity. He highlighted that although microplastics have not been connected to any public health concerns as of yet, it is a concern to all of us and we need to make decisions that better suit our priorities of today and tomorrow to combine food safety, food security and environmental sustainability.

Vittorio Fattori commented that, aside from the work already carried out for the Food safety in a circular economy report, FAO is conducting a review on food contact materials with support from USDA, providing information that will hopefully equip Codex to make informed and timely decisions.

> "I want to know the opinions of our panelists regarding our current concept of risk analysis, which has been valid for a long time in the linear economy. Will it also remain valid for the circular economy concept?" – Tunisia

Vittorio Fattori responded that risk analysis principles are applicable also in circular economies, but it is important that circular economies principles also recognize those related to food safety. "Food safety needs to be built into circular economy design to make sure that we are doing the right things, and we are not creating issues down the line. The risk analysis paradigm, where risk assessment can inform decisions and intervention, is very useful in this regard."

> "The circular economy is advancing by leaps and bounds. However, what are the main challenges that should be highlighted as the most sensitive in order to make it's development and impact more efficient in food safety considering the slogan of CAC47 Looking to the future?" – Panama

Vittorio Fattori highlighted four key areas that FAO has focused on as a starting point – reusing and recycling water, food packaging, food loss and waste and integrated farming systems. Food safety implications of circular solutions in these areas is a common thread which should be balanced with other challenges like mitigation measures for climate change and water scarcity in agrifood production, food security and environmental safety issues when valorizing food waste and by-products, and potential transfer of contaminants from food contact materials and through agricultural practices like integrated farming to food. It is important to identify and address the potential food safety issues and in this context FAO will continue working on other areas relevant for circular economy.

> "How do we, as food safety agency, stay ahead of the curve? The industry is obviously moving quite fast, and it will take us quite a while to develop certain standards." – Singapore

Vittorio Fattori commented on the need to find a balance between not blocking innovation and research while also ensuring food safety. He also remarked on the importance of being transparent about what is known and what is not known, where the evidence exists supported by science and what are the limitations.

Alexandra Ferraro commented on the important role that national governments play in protecting consumer health, having constant communication with industry and reviewing and evaluating new technologies to make sure that food safety is given as much consideration as sustainability.

Yongxiang Fan added that at national level governments should work very closely with industry, with small farmers in the case of integrated farming systems. The collaboration between ministries such as the Ministry of Health and the Ministry of Agriculture and other competent authorities should be improved. Working together is one way to develop an integrated framework to control possible food safety risks.

Conclusion

Ensuring food safety requires a collective effort across all levels of the food supply chain, from producers to consumers and regulators. Embedding food safety within the transformed agrifood system requires raising food safety outcomes to an equal level of importance as sustainability and economic performance.

FAO endeavours to provide advice to Codex and other stakeholders that is flexible, updated and timely. This includes a recent review[3] of some of the latest innovations related to food packaging, a future review on food contact materials with support from USDA, and an upcoming expert meeting on the topic of water reuse and recycling from a chemical safety perspective.

National and international food safety policies that are adaptable, outcome-based and flexible are essential in the transformation to circular systems. Aligning these policies will bring food safety further into a circular economy for food.

[3] Lacourt, C., Mukherjee, K., Garthoff, J., O'Sullivan, A., Meunier, L., & Fattori, V. (2024). Recent and emerging food packaging alternatives: Chemical safety risks, current regulations, and analytical challenges. *Comprehensive Reviews in Food Science and Food Safety*, 23, e70059. https://doi.org/10.1111/1541-4337.70059