STANDARDS İN THE REGULATİONS OF CONTAMİNANTS İN FOOD: 18TH SESSİON OF THE CODEX COMMİTTEE ON CONTAMİNANTS İN FOOD

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Discussion

In 2050, the world population is projected to be 97 billion. The pressure on agronomy to guarantee global food security has never been greater. The rapid changes for providers, manufacturers, distributors and others require an equally rapid and strategic evolution to anticipate, absorb and adapt to the emerging challenges. This is key to ensure that people have regular access to enough high-quality food considering the possible impact of climate change, globalization, resource scarcity, inequality gaps, geopolitical instability, e-commerce and emerging dangers, including contaminants in food (FAO, 2022).

Contaminants in food represent a serious threat to public health, including negative consequences on economy, society and environment. According to WHO (WHO, 2023), contaminants in food are any substance not intentionally added to food and can cause diseases; these can come from natural sources, environmental contamination, or residues from processing aids such as manufacturing, packaging, transport, and storage (Duan, Pang, Duan, Onyeaka & Krebs, 2025).

Keywords: contaminants in food, standards, regulation, Codex

The main authorities in matters of food innocuity, including the Food and Drug Administration (FDA, USA), the European Food Safety Authority (EFSA, Europe), the Canadian Food Inspection Agency (CFIA, Canada), and the Food Standards in Australia and New Zealand (FSANZ, Australia / New Zealand), classify contaminants in five food categories: chemical, biological, physical, allergenic, and radiological (see Table 1), based on their origin, toxicological properties, and possible effects on health (Bereda, 2025).

Table 1. Types, examples and health effects of contaminants in food

N°	Types	Examples	Cause/sources
		Chemical pollutants	
1	Pesticides and herbicides	Organophosphates, carbamates, pyrethroids, and glyphosate	Agricultural application, contaminated soil or water
2	Food additives	MSG, nitrates, and nitrites	Intentional addition during processing; overuse can be harmful
3	Heavy metals	Lead, mercury, chromium, nickel, and cadmium	Natural mineral content, industrial pollution, mining, combustion, and fertilizers
4	Phytotoxins	Cyanogenic glycosides, ricin, saponins, and tannins	Certain plant species, improper processing or storage

N°	Types	Examples	Cause/sources
5	Mycotoxins	Aflatoxins, ochratoxins, fumonisins, deoxynivalenol, zearalenone, and ergot alkaloids	Mold growth in crops during harvest, storage, or transport
6	Processing aids	Amylase, solvents like hexane, catalysts such as nickel, and antifoaming agents	Residual chemicals from food processing steps
7	Veterinary drugs	Antibiotics like tetracyclines, hormones like estradiol, and antiparasitics like ivermectin	Residues in meat, milk, or eggs from treated animals
8	Food contact materials	BPA, phthalates, mineral oil hydrocarbons, and PFAS	Leaching from plastic containers, cans, coatings, and non-stick surfaces
9	Process-related contaminants	Acrylamide, PAHs, chloropropanols, furan, and nitrosamines	Thermal treatment, frying, smoking, roasting, and chemical reactions in processed food
10	Environmental pollutants	Dioxins, PCBs, and POPs like DDT and HCB	Industrial discharge, waste incineration, pesticide use, and environmental contamination
Biological Contaminants			
11	Bacteria	*Salmonella, E. coli*, and *Listeria monocytogenes*	Contaminated water, raw food, poor hygiene, inadequate cooking
12	Virus	Norovirus and Hepatitis	Contaminated food or water, and infected handlers
13	Parasites	*Giardia lamblia, Toxoplasma gondii,* and *Trichinella spiralis*	Contaminated water, undercooked meat, and unwashed produce
Physical Contaminants			
14	-	Plastic, shattered glass, metal bits, stones, wood splinters, hair, bone fragments, and pests.	Improper handling, packaging, machinery, or storage
Allergenic Contaminants			
15	-	Peanuts, dairy, eggs, soybeans, wheat, seafood, shellfish, tree nuts, and sesame.	Cross-contact during processing, mislabeling, and natural presence in foods

N°	Types	Examples	Cause/sources
Radiological Contaminants			
16	-	Cesium-137, Iodine-131, and radon	Nuclear accidents, contaminated soil, water, or air

Source: (Bereda, 2025). Abbreviations: BPA: bisphenol A; DNA: deoxyribonucleic acid; DDT: dichlorodiphenyltrichloroethane; HCB: hexachlorobenzene; MSG: monosodium glutamate; PAHs: polycyclic aromatic hydrocarbons; PCBs: polychlorinated biphenyls; PFAS: per- and polyfluoroalkyl substances; POPs: persistent organic pollutants.

Song (2024) highlights important factors to prevent and stop risky exposure to food contaminants: identifying sources and outcomes, developing methods to identify them, and researching their formation pathways.

Updating and strengthening a legal framework aligned to the changing needs of the agricultural systems is one of the main efforts made by governments to face the challenges in matters of food contaminants, and public health. To develop and instate regulatory frameworks for food contaminants Codex Alimentarius Committee (CAC), World Health Organization (WHO), European Union (EU), Environment Protection Agency (EPA), and U.S. Food and Drug Administration (FDA), exist (Duan et al., 2025; FAO, 2022).

The Codex Committee on Contaminants in Foods (CCCF) has the faculty to establish or ratify the maximum levels allowed on contaminants, review the reference levels, and address all issues related to contaminants and toxic substances of natural origin in food and feed, identified as N° 3, 5, 8, 9, and 10 in Table 1. The CCCF is also responsible for preparing the priority list of contaminants for evaluation by JECFA (Joint FAO/WHO Expert Committee on Food Additives) (FAO/OMS, 2025).

Novel and relevant standards for the regulation of contaminants in food were identified in the 18th Session of the Codex Committee on Contaminants in Foods, which took place in Bangkok, Thailand, from June 23 - 27, 2025 (FAO/OMS, 2025).

As described by Jos Gallego et al. (2018), there are some hazards for the innocuity of food that do not have specific regulations or, if existent, they exist for specific food groups; thus, making it imperative to evaluate the exposure to these hazards and risk management, to implement adequate measures. A priority list of emerging contaminants was established for evaluation by JECFA. Substances such as dioxins, arsenic, thallium, and per- and polyfluoroalkyl substances, scopolamine, ochratoxin A, ethylene oxide, and 2-chloroethanol, as well as cadmium and lead, in yerba mate (Posnick Robin & Abt, 2025).

The importance of updating the guidance on data analysis for the development of maximum levels, and for improved data collection since these actions, represent an effort to support nations and guarantee valid statistics (Codex Alimentarius Committee, 2025).

Marín Sillué et al. (2021) state that mycotoxins are affected in different climate settings. Scientific evidence states a geographic factor in the incidence of mycotoxins making it necessary to implement different strategies to stop their growth.

There was also a revision of the code of practice for the prevention and reduction of aflatoxin contamination in peanuts, and for aflatoxin B1, present in raw materials and feed, to improve their quality and innocuity. At the same time, there was space to discuss sampling plans and numeric performance criteria for total aflatoxins and ochratoxin A, as well as the maximum level and associated sampling plan for total aflatoxins in ready-to-eat peanuts. The latter, being suspended due to incongruency in data presented, and the length of the time used by the Global Environment Monitoring System (GEMS) / Food Contamination Monitoring and Assessment Programme (FAO/WHO, 2025).

It was promoted during the CCCF18 to establish maximum limits for some contaminants through harmonization among the participants. An example of this need is maximum levels for lead in herbs and spices, to reduce restrictions in their trade (Raza et al., 2025).

Based on the mentioned, among the regulatory standards identified in the CCCF18, it is necessary to continuously update the regulatory guidelines for contaminants in food considering the JECFA risk evaluations, as well as the emerging risks, the evolution of agricultural systems, and their new challenges. It is worth mentioning how harmonization must consider and promote international trade. Ultimately, the need for current valid date was highlighted next to building capacity in terms of sampling and analysis, as the foundations of the regulations for contaminants in food.

To comply with the mentioned needs from the CCCF18 results, it is necessary that governments and their regulating systems focus on:

•Increase analysis performance capacity (infrastructure of laboratories and validation methods), to strengthen monitoring systems, oversight and detection of contaminants in food in different products (Elenwo et al., 2025).

•Submit new valid data in the Global Environment Monitoring System (GEMS) / Food Contamination Monitoring, and Assessment Programme (FAO/WHO, 2025), that count with geographic representation, for the evaluations performed by JECFA and the establishment of maximum levels.

•Evaluate priority on emerging contaminants to include them in vigilance plans and food monitoring systems.

•To promote regulatory harmonization continuously through participation in the Codex Alimentarius committees, ensuring that international standards reflect the reality of countries despite their disparities in terms of availability, resources, infrastructure, and application capacity. (Duan et al., 2025).

The analysis and conclusions from the CCCF18 are fundamental tools so countries, through their authorities, and in line with current regulations, adopt and implement control measures to prevent, detect, and manage contaminants in food to protect public health.

On the same token, all parties in the agronomic systems should work together, including academia and industry, to reduce existent gaps in food innocuity by designing and implementing intervention strategies, based on recent trends and patterns of contaminants in food (Duan et al., 2025).

Finally, to strengthen compliance in technical standards all parties should promote systematic generation of reliable data, consolidate vigilance and monitoring systems key for the establishment, and review and harmonize measures for contaminants in food. It is also important to continue strengthening relationships with experts and international regulatory authorities to boost technical cooperation, aiming for a regulatory framework harmonized with the highest international standards.

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