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Opinion Article

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FOOD ADDITIVES FROM A SCIENTIFIC AND REGULATORY PERSPECTIVE

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Discussion

From a public health perspective, it is fundamental to understand the nature of food additives, the scientific frameworks used to evaluate their safety, their technical rationale, the conditions under which they are authorized and regulated, and their impact on international food trade. Such knowledge is critical to demystifying misconceptions, often rooted in collective beliefs, that may cause consumer mistrust. Addressing this subject through a technical, evidence-based approach strengthens public trust in the national food supply, and in the regulatory controls established to safeguard food safety.

In this context, this article approaches food additives from both scientific and regulatory perspectives, grounded in the fundamentals of food chemistry and technology, international standard-setting processes, and the institutional expertise of the Superintendency of Health Regulation (SRS) as the competent authority.

The SRS is responsible for granting product commercialization for prepackaged semi-processed and processed foods. This is achieved through a conformity assessment process, which includes a review of food additives across various categories, subject to marketing authorization, ensuring compliance with applicable regulatory frameworks.

Keywords: food additives, risk analysis, Codex Alimentarius, innocuity, sanitary regulation

This assessment aims to provide a comprehensive overview of the risk analysis framework conducted by the Codex Alimentarius Commission, the scientific advice provided by the Joint FAO/WHO Expert Committee on Food Additives (JECFA), and current international regulatory instruments. Furthermore, it examines how these elements contribute to regional regulatory harmonization regarding food additives, supporting legitimate objectives such as protection of public health, prevention of deceptive consumer practices, and facilitation of trade.

As consumers, we are daily presented with a diverse array of food options that have undergone adapted technological treatments or processes, to ensure their marketability and safe consumption. These products enter our kitchens and become a staple of our diets and our families'. Frequently, in our pantries, cupboards or refrigerators, we find foods exhibiting vibrant and uniform colors, stable textures, distinct flavors, and extended shelf lives; even when they originate from distant countries or continents. It is at this moment—facing product packaging—

when questions may arise that lead us to reflect on the depth of the science encapsulated within each product, or, in many cases, we attempt to answer through speculation.

These questions include:

How does a food product maintain vibrant colors over time?

By what means is shelf life extended without compromising safety?

How can a product be dispensed from a pressurized container?

What mechanisms prevent the caking of particles in powdered products or phase separation in liquid foods?

How is the stability of pulp-containing beverages maintained, or flavors preserved after processing?

How is carbonation achieved in beverages, or the stability of emulsions such as sauces and dressings, ensured?

The answers to these inquiries converge on a common element: the use of food additives.

Throughout history, humanity has demonstrated resilience and ingenuity to face diverse challenges. One of the earliest challenges in nutrition was food preservation.

Historical evidence indicates that practices such as salting and drying emerged as natural responses to this necessity, based on empirical observation and ancestral knowledge. These practices, now recognized as fundamental principles of food chemistry, are grounded in the control of water activity as a mechanism to prevent food spoilage. Over time and with societal development, this challenge has evolved and gained complexity, expanding toward the warranty of ensuring global food security.

Within this context, scientific knowledge and sanitary regulation have enabled the establishment of measures aimed at protecting consumer health. This has led to informed decision-making that facilitates the controlled use of food additives to ensure the food safety of products intended for consumption.

What are Food Additives?

At international level, a food additive is defined as any substance not normally consumed as food by itself, or not normally used as a typical ingredient of food, whether or not it has nutritive value. Its intentional addition to food for a technological purpose—including organoleptic properties—in the manufacturing, processing, preparation, treatment, packing, packaging, transport, or holding of such food, results or may be reasonably expected to result (directly or indirectly), in it, or its by-products, becoming a component of or

otherwise, affecting the characteristics of such food.

It is important to note that this definition does not include contaminants or substances added to foods for the purpose of maintaining or improving nutritional qualities (FAO & WHO, 2025).

Functional classes, definitions, and technological functions

To facilitate the identification of food additives and ensure regulatory clarity, the International Numbering System for Food Additives (INS) was established. This system serves as a harmonized nomenclature, and provides an alternative to using the specific chemical name of each additive.

It should be emphasized that the inclusion of an additive in the INS does not imply its endorsement by the Codex Alimentarius Commission for its use as food additive. The list may include substances that have not yet been evaluated by the Joint FAO/WHO Expert Committee on Food Additives (JECFA), or that are not currently standardized (Codex Alimentarius Commission, 2025).

In accordance with the Class Names and the International Numbering System for Food Additives (CXG 36-1989), food additives are currently categorized into 22 categories based on their functional class, as presented below.

Table 1. Classification of food additives

Functional Classes of Food Additives	Definition	Technological Purposes
1. Acidity regulator	A food additive used to control the acidity or alkalinity of a food	Acidity regulator, acidifier, acid, alkali, base, buffering agent, pH adjusting agent
2. Anticaking agent	A food additive that reduces the tendency of food particles to adhere to one another	Anticaking agent, antisticking agent, drying agent, dusting agent.
3. Antifoaming agent	A food additive that prevents or reduces the formation of foam	Antifoaming agent, defoaming agent

Functional Classes of Food Additives	Definition	Technological Purposes
4. Antioxidant	A food additive that prolongs the shelf life of food by protecting it against deterioration caused by oxidation	Antioxidant, antioxidant synergist, antibrowning agent
5. Bleaching agent	A food additive (non-flour) used to decolorize food; it does not include pigments	Bleaching agent
6. Bulking agent	A food additive which adds volume to a food without significantly contributing to its energy value	Bulking agent, filler
7. Carbonating agent	A food additive used to provide carbonation to a food	Carbonating agent, gasifying agent
8. Carrier	A food additive used to dissolve, dilute, disperse, or otherwise physically modify another additive or nutrient without altering its technological function	Carrier, carrier solvent, nutrient carrier, diluent, encapsulating agent
9. Color	A food additive that adds or restores colour to a food	Colour, decorative pigment, surface colourant
10. Colour retention agent	A food additive that stabilizes, maintains, or intensifies the colour of a food	Colour retention agent, colour fixative, colour stabilizer, colour adjunct
11. Emulsifier	A food additive which forms or maintains a uniform emulsion of two or more phases in a food	Emulsifier, plasticizer, dispersing agent, surface active agent (surfactant), crystallization inhibitor, density adjusting agent, suspending agent, clouding agent
12. Emulsifying salt	A food additive which rearranges proteins in processed foods to prevent fat separation	Emulsifying salt, emulsifying salt synergist, melting salt
13. Firming agent	A food additive which maintains or confers firmness and crispness to fruits and vegetables, or interacts with gelling agents	Firming agent
14. Flavour enhancer	A food additive which enhances the existing taste and/or odour of a food	Flavour enhancer, flavour synergist
15. Flour treatment agent	A food additive added to flour or dough to improve its baking quality or colour	Flour treatment agent, flour bleacher, flour improver, dough conditioner, dough strengthening agent
16. Foaming agent	A food additive which makes it possible to form or maintain a uniform dispersion of a gaseous phase in a liquid or solid food	Foaming agent, whipping agent, aerating agent
17. Gelling agent	A food additive which imparts texture to food through the formation of a gel	Gelling agent

Functional Classes of Food Additives	Definition	Technological Purposes
18. Glazing agent	A food additive which, when applied to the external surface of a food, imparts a shiny appearance or provides a protective coating	Glazing agent, sealer, coating agent, surface-finishing agent, polishing agent, film-forming agent
19. Humectant	A food additive which prevents food from drying out by counteracting the effects of a dry atmosphere	Humectant, moisture-retention agent, wetting agent
20. Packaging gas	A food gas introduced into a container before, during, or after filling, to protect the food from oxidation or spoilage	Packaging gas
21. Preservative	A food additive which prolongs the shelf life of food by protecting it against deterioration caused by microorganisms	Preservative, antimicrobial preservative, antimycotic agent, bacteriostatic agent, fungistatic agent, mold inhibitor, antiyeast agent, antimicrobial synergist
22. Propellant	A food gas which expels a food from a container	Propellant

Source: self-elaboration

Source: CODEX ALIMENTARIUS COMMISSION, 2025a. Class Names and the International Numbering System for Food Additives CXG 36-1989. [online]. Rome, Italy: FAO. Available at: https://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252Fstandards%252FCXG%2B36-1989%252FCXG_036e.pdf

It is pertinent to note that such classification is utilized for labeling and consumer information purposes (FAO, 2026), constituting a mandatory requirement in accordance with current Central American Technical Regulations regarding labeling.

International context

Having clarified the definition of food additives, let us address a common question:

Who determines whether a substance may be used, under specific conditions, as a food additive?

This question leads us to the Codex Alimentarius Commission, which is defined as the governing body of the Food Standards Program established by the Food and Agriculture Organization of the United Nations (FAO), and the World Health Organization (WHO). This Commission, comprised of 188 member countries, and one member organization, is mandated to protect consumer health and ensure fair practices in the food trade, through the establishment of standards, guidelines, codes of practice, and other related texts.

The various regulatory instruments issued by the Codex Alimentarius Commission are established by

consensus of its entire membership, where available scientific and technical evidence, plays a fundamental role in the standard-setting process.

To this end, countries—including El Salvador—may present arguments regarding the progress of specific work items, in light of consumer health protection, and the guarantee of fair practices in international food trade.

These regulations have been recognized by the World Trade Organization (WTO) as a scientifically justified reference, being accepted for the evaluation of national measures and regulations, within the framework of the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement).

In its article 1, this agreement expressly states that, for the purpose of harmonizing sanitary and phytosanitary measures to the greatest extent possible, WTO member countries shall base their food safety measures on standards, guidelines, and recommendations, developed by the Codex Alimentarius Commission. These include provisions on food additives, veterinary drug and pesticide residues, contaminants, methods of analysis and

sampling, as well as codes and guidelines on hygienic practices.

Furthermore, the agreement on Technical Barriers to Trade (TBT) recommends that relevant international standards, guidelines, or recommendations be used for the establishment of technical regulations, standards, and conformity assessment procedures. Under this premise, it is understood that such measures do not constitute unnecessary obstacles to trade, if they are based on international standards.

In this sense, the Standards and Related Texts of the Codex Alimentarius Commission are fundamental to ensure that substances, used as food additives for a specific technological purpose, do not pose a risk to consumer health, and that use restrictions are scientifically grounded to avoid limiting trade beyond what is strictly necessary.

Establishment of provisions for the use of food additives

The Codex Alimentarius Commission establishes use provisions and Maximum Permissible Levels (MPLs) for food additives across various food categories,

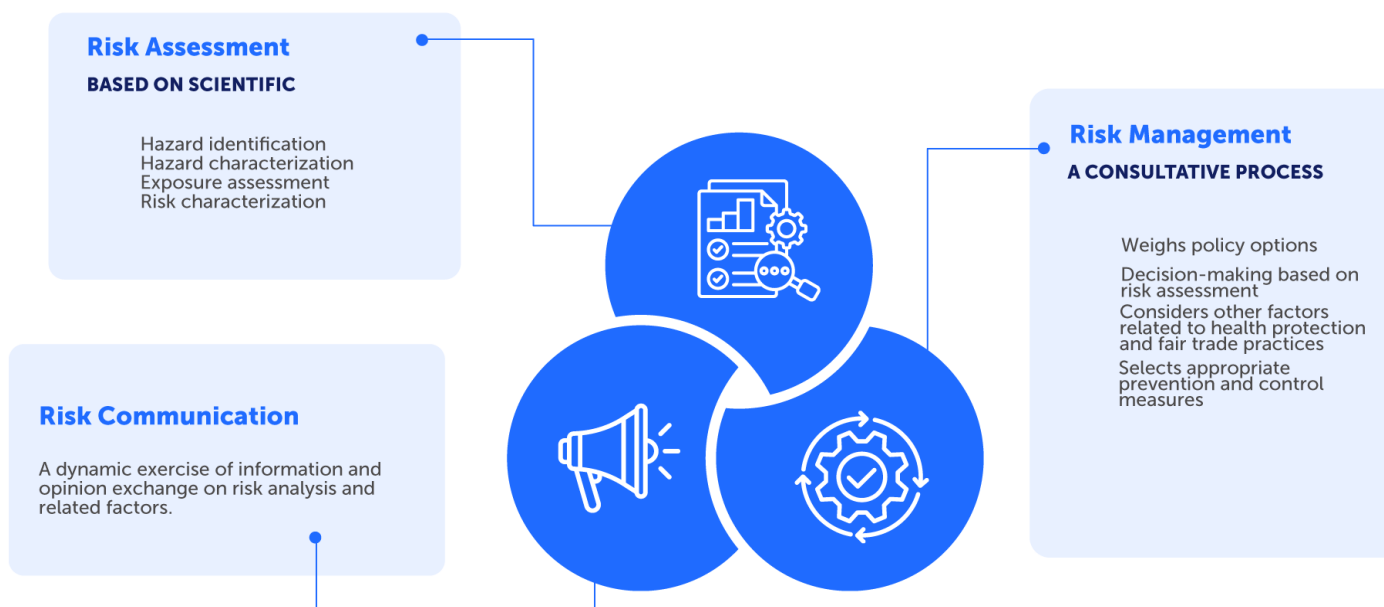
through a specialized committee known as the CCFA (Codex Committee on Food Additives).

This committee is one of the ten general subject committees created by the Commission to achieve its objectives. Furthermore, it is responsible for developing priority lists of food additives for risk assessment by the Joint FAO/WHO Expert Committee on Food Additives (JECFA) (FAO and WHO, 2025).

Based on the application of the Risk Analysis Framework, utilized by the Codex Alimentarius Commission, use provisions applicable to various functional classes of food additives (for diverse food categories) are established periodically.

Risk analysis in the field of food safety constitutes a process integrated by three interrelated elements: risk assessment, risk management, and risk communication. These must be conducted in a documented, consistent, and transparent manner.

Figure 1. Synthesis of the risk analysis process employed by the Codex Alimentarius Commission



Source: FAO and WHO, 2025. Codex Alimentarius Commission Procedural Manual. Thirtieth edition. [online]. Rome: FAO. Available at: <http://dx.doi.org/10.4060/cd4216es>

In this regard, the CCFA may endorse maximum use levels for additives for which JECFA has established specifications for identity and purity, and has completed a safety assessment, leading to the definition of health-based guidance value, specifically the Acceptable Daily Intake (ADI).

To this end, differences in dietary exposure, and regional or national consumption habits of the evaluated foods, are also considered (FAO and WHO, 2025).

The CCFA, in its capacity as the institution responsible for risk management, establishes maximum use levels for food additives with the objective of ensuring that the total intake of an additive, from all dietary sources, does not exceed the ADI established by JECFA.

Within this framework, maximum levels may be based on requirements proposed by Codex Member States, following the application of methodologies that verify compatibility with the previously determined ADI. Once use provisions are agreed upon an international level, they are incorporated into the General Standard for Food Additives (GSFA), which is updated following each annual session of the Codex Alimentarius Commission.

Debunking myths: are food additives good or bad?

Generally speaking, the word “additives” is often associated with the concept of “chemicals” in food, which frequently leads consumers to interpret them as artificial, synthetic, or even hazardous or toxic substances.

This perception can be influenced by alarmist headlines, unsubstantiated comparisons between “natural” and “chemical,” and messaging aimed at creating a generalized misconception, detached from their true nature and intended use.

However, these interpretations differ significantly from how food additives function in practice, the processes by which they are authorized, and the management efforts undertaken at both international and national levels, to ensure that food does not pose a risk to consumer health.

It is pertinent to note that these substances are intentionally added to food and constitute tools which effect depends on their composition, and their interaction with the corresponding food matrix. For their evaluation, international experts convene in specialized forums to analyze, based on consumption data, potential exposure to these substances, and determine the concentration that a person can ingest

daily, throughout their lifetime, without representing a health risk.

Based on this analysis, a Maximum Level (ML) is established, defined as the highest concentration of an additive that the Codex Alimentarius Commission has determined to be functionally effective in a food, or food category, and has agreed to be safe.

This dose is expressed in milligrams (mg) of additive per kilogram (kg) of food and, generally, does not correspond to the optimum, recommended, or habitual use level (Codex Alimentarius Commission, 2025b).

Consequently, it is evident that the presence of food additives does not imply that a food is of lower quality or that it poses a health risk. For example: preservatives inhibit microbial growth, antioxidants delay spoilage, stabilizers ensure uniformity, and emulsifiers allow for the integration of ingredients. In this sense, the use of additives in accordance with approved provisions allows food to be offered safely, suitably, and with quality to the consumer, remaining stable throughout its shelf life.

Furthermore, it is often assumed that food additives are used without oversight. However, in El Salvador, the SRS is responsible for conducting conformity assessments regarding their use, in accordance with the Central American Technical Regulation RTCA 67.04.54:18.

This verification is performed both during the marketing authorization (sanitary registration) process, and through risk-based post-market surveillance actions.

When the use of additives is supported by a robust regulatory framework based on scientific evidence, they play a fundamental role in food safety and quality. Nevertheless, it is the consumer's responsibility to monitor consumption frequency and make informed decisions when purchasing food, especially in cases of potential allergic reactions to certain substances.

Participation of the SRS in the development of provisions for food additives

The SRS, in its capacity as the competent authority, participated in the 55th Session of the Codex Committee on Food Additives (CCFA55), held in March 2025 in Seoul, South Korea.

This participation represented a significant milestone in the strengthening of the national regulatory framework regarding food additives, as well as for the development of technical capacities, and the positioning of the SRS as a leading sanitary authority.

In this context, the SRS contributed to the formulation of provisions based on scientific evidence, ensuring the harmonization of national technical requirements with international standards.

Furthermore, the SRS served as a co-author in the drafting of the following document: "Discussion Paper on the Working Practices and the Engagement Plan to Avoid Divergence Between the GSFA, Commodity Standards, and Other Related Codex Texts," alongside China (lead author), and other member countries. This achievement marks El Salvador's first participation in the leadership of a global regulatory project in this field.

Additionally, as the competent authority, the SRS provided comments on the draft updates to the General Standard for Food Additives (GSFA), evaluating more than 30 food additives for various food categories, as well as the draft Standard for Baker's Yeast. Moreover, it is noteworthy that the technical information gathered during this international session constitutes a fundamental input for the updating of Annexes A and B of the Central American Technical Regulation RTCA 67.04.54:18 (Processed Foods and Beverages. Food Additives), within the framework of initiatives driven by the Central American Commission on Food Additives.

The continued participation of SRS in Codex represents strategic opportunities to strengthen the national regulatory framework, protect public health, and facilitate food trade in El Salvador.

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