



**QUALITAS ALIMENTARIA
PROYECTO S.L.**

MANUAL FOR OBTAINING THE MULTI-SECTORAL HIGH-RISK FOOD HANDLER CERTIFICATE

-About the Author-

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Academic Background

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-About the Manual-

This training material has been specifically designed for the Multi-Sectoral High-Risk Food Handler Course, available in in-person, online, and distance learning formats, offered by

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OBJECTIVES

This course is aimed at training food handlers, including those in high-risk categories, with the following objectives:

General Objectives:

To train and certify food handlers who, through their professional activities, have direct contact with food during its preparation, manufacturing, processing, production, packaging, storage, transportation, distribution, sale, supply, and service.

Additionally, the course aims to train and certify food handlers whose practices are critical to ensuring food safety and hygiene, particularly those who prepare and handle ready-to-eat meals for sale, supply, or direct service to consumers or groups. It also includes those activities deemed high-risk by the competent health authority based on epidemiological, scientific, or technical data.

Specific Objectives:

The specific objectives of this program are to ensure that all food handlers within the company acquire basic and consistent knowledge on the subject, as well as to secure each worker's commitment to enhancing the company's food safety standards.

In particular, the objectives are as follows:

- Raise awareness among those who handle and process food about the potential hazards of food contamination.
- Understand the causes of foodborne illnesses.
- Apply the necessary preventive measures to avoid food contamination.
- Perform proper cleaning and disinfection of utensils and facilities.
- Maintain adequate personal hygiene and grooming.
- Acquire knowledge of self-control measures to ensure food hygiene, including General Hygiene Plans (GHP) and the Hazard Analysis and Critical Control Points (HACCP) system.
- Comply with current health regulations for food handlers.

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1. REGULATIONS

Training in food hygiene is recognized as one of the fundamental pillars within the food industry; it is essential to ensure the correct application of hygiene requirements at each stage or process, thereby achieving the production of safe food.

This requirement is reflected in Regulation (EC) No. 852/2004 of the European Parliament and of the Council, dated April 29, regarding the hygiene of food products. This is part of what is known as the "hygiene package," which consists of three core acts: the aforementioned Regulation (EC) No. 852/2004 and Regulation (EC) No. 853/2004, aimed at food business operators, and Regulation (EC) No. 854/2004, along with Regulation (EC) No. 882/2004, on official controls. These latter two regulations, directed at competent authorities, were later replaced by Regulation (EU) No. 625/2017, fully applicable since April 29, 2021.

These regulations, which form the "hygiene package," expand upon Regulation (EC) No. 178/2002 on general principles and requirements in food law.

Below, we highlight what Regulation (EC) No. 852/2004 establishes in Chapter XII of Annex II regarding training for food handlers:

Chapter XII. Training

Food business operators must ensure:

1. The supervision and instruction or training of food handlers in food hygiene matters, in accordance with their professional activities.
2. That those responsible for developing and maintaining the procedures based on HACCP principles (Article 5) or applying the guidelines of good hygiene practices have received adequate training in the application of HACCP principles.
3. Compliance with all national legislation requirements regarding training programs for workers in specific food sectors.

Key Takeaways:

- The food business is responsible for the supervision and instruction or training of food handlers, in accordance with their professional activities. This training can be provided by the food business itself, other service providers, or vocational training centers recognized by official agencies.
- Food businesses must ensure that all food handlers have proper training, which must be documented.
- Training is necessary for the proper implementation and functioning of the HACCP system or the application of official hygiene practice guidelines.
- Official health control activities (inspections, audits, etc.) will verify the adequacy of such training. A lack of or inadequate training will result in sanctions or precautionary measures, equivalent to other types of non-compliance.

Food hygiene is the responsibility of everyone in the company who is directly or indirectly involved with food, from managers who must provide the necessary resources (economic, material, motivational) to food handlers who come into direct contact with the food. By understanding food hygiene as a shared responsibility, the company's objectives can be achieved.

Additionally, European regulations not only address mandatory training in food hygiene and safety according to the job role but also outline other food safety responsibilities for operators.

European Regulations for Food Handlers:

- **Regulation (EC) No. 2073/2005** on microbiological criteria for food products.
- **Regulation (EC) No. 1935/2004** on materials and articles intended to come into contact with food.
- **Regulation (EU) No. 1169/2011**, dated October 25, 2011, on food information provided to consumers.

The last regulation includes requirements for mandatory allergen labeling, identifying substances or products causing allergies or intolerances, voluntary additional information, and labeling of allergens in non-packaged foods. Food businesses, including those that sell non-packaged foods (e.g., prepared meals for consumers such as bars, restaurants, school cafeterias, hospitals, etc.), must indicate any ingredient or processing aid listed in Annex II of this regulation.



2. FOOD

To begin, we will discuss a series of aspects and concepts about food, as well as some of the most important characteristics that define them and their relationship with our overall diet. It is essential to differentiate between eating, feeding, and nourishing oneself.

- **Eating** is simply the act of putting food in your mouth.
- **Feeding** is a voluntary and conscious act, influenced by a series of criteria and opinions tied to knowledge about food, beliefs, or religion, which shape what we buy, how we cook it, and how we consume it. In other words, feeding begins at the supermarket when we select our groceries and ends when we start eating.
- **Nourishing**, on the other hand, follows feeding and depends on one's dietary intake; it is an involuntary act involving a series of processes and reactions within our bodies over which we have no control.

It is also important to understand the difference between food and nutrients.

- **Food** refers to the diverse components that are part of our diet and that we ultimately consume or ingest. These are composed of nutrients and excipients.
- **Nutrients** are substances contained within food that are utilized by our bodies for various functions. To obtain nutrients, food must usually undergo the physiological process of digestion. Nutrients can be classified as:
 - **Energy-providing nutrients:** Carbohydrates and lipids.
 - **Building nutrients:** Proteins and water.
 - **Regulating nutrients:** Vitamins, minerals, and water.
- **Excipients**, on the other hand, are substances in food that do not enter the bloodstream after digestion. Instead, they remain in the digestive system and are eliminated in the form of waste. These substances are responsible for the structure and form of food. One type, fiber, is particularly important for maintaining health.

Foods can be classified in various ways. Based on their nutritional content, they can be grouped into food charts, pyramids, or wheels. These tools provide information about the amounts (servings) needed from each food group to achieve a balanced diet. Simply "eating everything" is not enough to stay healthy; it's crucial to understand how much of each food group is required. For reference, see the **NAOS Pyramid** (Strategy for Nutrition, Physical Activity, and Obesity Prevention).



NAOS Pyramid¹

¹ <http://www.naos.aesan.mssi.gob.es/csym/piramide/>

The Importance of Food

Food is essential for life, providing all living beings with the energy and nutrients necessary for the formation, growth, and preservation of their tissues. A proper diet must be sufficient, complete, adequate, and as varied as possible.

However, like all living matter, food can decompose. This happens when its original structure is altered by various factors, which can be classified into three categories: physical, chemical, or biological causes.

Among these, biological causes are the most significant, as they involve the growth and proliferation of microorganisms.

Food

Raw materials can become contaminated through water, air, soil, or other food products, as well as during processing.

Contamination

Below are definitions outlined in the Spanish Food Code (Código Alimentario Español, CAE):

- **Altered Food:** Any food that, during its production, preparation, handling, transportation, storage, or possession, and due to unintended causes, has undergone changes in its organoleptic characteristics, chemical composition, or nutritional value, rendering it unsuitable or less suitable for consumption, even if it remains non-toxic.
- **Contaminated Food:** Any food containing pathogenic microorganisms, chemical or radioactive substances, toxins, or parasites capable of causing or transmitting diseases to humans or animals.

Everyone has the right to access safe food.

3. HIGIENE ALIMENTARIA

The term "**hygiene**" originates from Greek, meaning healthy or good for health. Its modern definition encompasses the knowledge and techniques individuals must apply to control factors that impact or could potentially impact health negatively.

Hygiene is primarily about preventing harmful effects, that is, taking anticipatory measures to minimize risks.

Food hygiene refers to the set of measures necessary to ensure the safety of food from production to its arrival at the consumer's table. Achieving hygienic food requires the commitment of the entire organization (management and food handlers). It covers all stages following primary production, including preparation, handling, sale, and consumer delivery — essentially "from farm to table."

When hygiene fails, the result is food contamination, which can lead to foodborne illnesses in those who consume the affected products.

In the food industry, the costs of poor hygiene practices can include:

- Outbreaks of food poisoning, potentially resulting in death.
- Loss of employment.
- Hefty fines, legal costs, and possible imprisonment.
- Business closure or loss of reputation.
- Compensation payments to food poisoning victims.
- Complaints from consumers and staff.
- Returns of spoiled goods.
- Reduced work motivation, lower productivity, higher staff turnover, and decreased profits (affecting wages and bonuses).

The Role of Food Handlers in Food Hygiene

Proper training for food handlers plays a special role in food hygiene. But who qualifies as a food handler?

A **food handler** is any individual who, through their professional activities, participates in the food chain during the preparation, production, transformation, processing, packaging, storage, transportation, distribution, handling, sale, supply, or service of food.

4. FUENTES DE CONTAMINACIÓN

Contamination refers to the presence of any biological (bacteria, molds, viruses, parasites), physical, or chemical agent in food that could negatively affect the health of the consumer. The most common type of contamination is bacterial, but other sources or causes must also be considered.

Types of Food Contamination

1. Physical Contamination:

This occurs when foreign objects, materials, or particles are introduced into food.

Examples include:

- Pieces of gloves, bandages, clips, buttons, earrings, or other objects.
- Debris such as flakes of paint, fragments of broken light fixtures, or screws.

2. Chemical Contamination:

This can have diverse origins:

Biological Origin:

- Natural substances in food (e.g., solanine in potatoes, cyanide in bitter almonds, toxic mushrooms).
- Mycotoxins produced by certain molds, which, at high concentrations, can cause cancer and damage to the liver, kidneys, and other organs.
- Biointoxication from consuming live bivalve mollusks containing biotoxins synthesized by certain marine algae and diatoms.
- Histamine poisoning from fish like tuna or mackerel due to improper storage at elevated temperatures.

Non-Biological Origin:

- Cleaning, disinfecting, and pest control products.
- Heavy metals (e.g., mercury, cadmium, copper, lead).
- Pesticide residues.
- High doses of food additives (e.g., nitrates and nitrites in cured meats).

3. Biological Contamination:

Biological contaminants can be:

- **Macroscopic:** Visible to the naked eye, such as insects or rodents.
- **Microscopic:** Not visible to the naked eye, including bacteria, viruses, molds, and yeasts.

Preventing Contamination

To prevent food contamination, it is essential to maintain good hygiene practices during all stages of food handling, from production to consumption. Additionally, it is crucial to avoid **cross-contamination**, which occurs when pathogens from one food transfer to another through:

- Direct contact:** For example, raw food touching cooked food.
- Indirect contact:** Through contaminated utensils, surfaces, machinery, or hands.

5. TOXIINFECCIONES ALIMENTARIAS

Food serves as a favourable medium for the growth and reproduction of microorganisms. Consuming food or water contaminated by certain microorganisms can result in various illnesses in humans.

A foodborne illness is an acute condition characterized by gastrointestinal symptoms. Initial symptoms typically occur within hours or days after ingesting food contaminated with pathogenic microorganisms or their byproducts (toxins). In some cases, the clinical presentation may be extraintestinal, such as brucellosis, typhoid fever, or botulism.

Below are the main types of foodborne illnesses to understand how these pathogens can reach us:

Foodborne Infections

These occur when the microorganism grows in the food, and after ingestion, it develops in the consumer, either through infection, toxin production within the body, or a combination of both. Example: **Salmonellosis**.

Bacterial Intoxications

These occur when the microorganism produces toxins in the food before ingestion, and these toxins cause illness. Example: **Staphylococcus aureus** and **Clostridium botulinum** intoxications.

Foodborne Infections

Diseases caused by microorganisms such as brucellosis, typhoid fever, or tuberculosis. The organism multiplies within the tissues of animals or people consuming the contaminated food.

Foodborne Infestations

Diseases caused by parasitic forms at specific stages of their life cycle, such as anisakiasis or trichinosis. The food acts as a vehicle for the parasite, which multiplies in the tissues of the infected individual.

Brote alimentario

A **foodborne outbreak** is when two or more individuals exhibit symptoms after consuming the same contaminated food. An analysis of the food should confirm its role as the source of the symptoms.

Common symptoms include nausea, vomiting, diarrhoea, headache, and fever. Pathogenic bacteria responsible for these illnesses often do not alter the appearance, smell, taste, or colour of the contaminated food, making contamination difficult to detect visually.

Essential Elements for a Foodborne Illness:

- **Causal Agent:** Usually bacterial.
- **Food Medium:** Must support bacterial growth.
- **Susceptible Individuals:** Those who consume the contaminated food.

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Key Factors Contributing to Foodborne Illness:

- **Temperature:** Improper food storage or preparation.
- **Time:** Prolonged exposure at favorable temperatures for bacterial growth.
- **Humidity:** High moisture content in food promotes microbial growth.
- **Acidity (pH):** Foods with neutral pH are more prone to contamination.

5.1. CAUSAL AGENTS

In most foodborne illnesses, the causal agents are bacteria, but they can also include organisms such as protozoa, viruses, or parasites.

These germs can reach food through various routes, including:

- a) **Contact with Raw Foods:** Foods like meat, fish, eggshells, and vegetables may carry germs from their origin. For instance, in slaughterhouses, germs from the intestines of infected animals can spread to the carcasses.
- b) **Food Handlers:** Germs can be transmitted directly through hands contaminated with microorganisms from the body (e.g., mucus, faeces) or indirectly through respiratory droplets expelled when speaking, coughing, or sneezing.
- c) **Contaminated Objects:** Tools, surfaces, equipment, and cloths that have been improperly cleaned or exposed to insects or contaminated air can harbour microorganisms.
- d) **Dust and Dirt:** Germs can be transported through air currents or dry sweeping and settle on unprotected food.
- e) **Animals and Insects:** Flies, cockroaches, and rodents can transfer germs from excrement or garbage to food, or they may carry pathogens themselves.

Understanding these pathways is essential to implementing effective preventive measures and reducing contamination risks in food handling and preparation.

A. Foodborne Illnesses of Bacterial Origin

➤ SALMONELLOSIS

Foodborne illness caused by *Salmonella sp.*, the most common bacteria in foodborne infections.

Main Characteristics:

- Short bacilli, Gram-positive, non-sporulating, and with flagella (motile).
- Optimal growth temperature: 38°C.
- Heat-sensitive: destroyed at 60°C within 15–20 minutes.
- No growth at temperatures below 7–8°C.
- Reside in the intestines of vertebrates and insects (feces).

Disease:

- **Symptoms:** Appear 6–48 hours after consumption. Include nausea, abdominal pain, diarrhea, drowsiness, moderate fever, and dehydration (thirst). In severe cases, it can invade the bloodstream (**septicemia**) and lead to coma.
- **Duration:** 1–7 days, though it can be fatal for the elderly, children, or immunocompromised individuals.

- **Carriers:** Both sick and healthy individuals.

Typically presents as small family outbreaks, where cross-contamination is the primary cause. Generalmente se manifiesta en forma de pequeños brotes familiares donde la contaminación cruzada es la principal causa.

Foods Involved

- **Eggs** or raw foods made with eggs, such as mayonnaise or similar sauces.
- Proper heat treatment is essential.
- **Meat:** Poultry and mammals.
- Contamination often occurs due to intestinal flora.
- **Milk:** From infected or carrier animals.
- **Vegetables and Greens:** Contaminated through irrigation with wastewater.

➤ LISTERIOSIS

Listeria monocytogenes is an intracellular bacterium that causes listeriosis, a foodborne infection with a high mortality rate.

Main Characteristics:

- Small, Gram-positive bacillus, non-branching, and facultative anaerobic.
- Does not form capsules or spores.
- Can proliferate at temperatures between 1°C and 45°C and in high salt concentrations.
- Resistant to nitrates and acidity.
- Exhibits mobility at approximately 30°C but is immobile at 25°C.

Disease:

Listeria infection is a foodborne bacterial disease that can be extremely severe for pregnant women, individuals over 65, and those with weakened immune systems.

Symptoms: Symptoms may appear a few days to over 30 days after consuming contaminated food. Common symptoms include fever, chills, muscle aches, nausea, and diarrhoea.

If the infection spreads to the nervous system, symptoms may include: headache, neck stiffness, confusion or altered alertness, loss of balance and seizures.

➤ STAPHYLOCOCCAL INTOXICATION

Foodborne intoxication caused by enterotoxins from *Staphylococcus aureus*. It is the second most common cause of foodborne illnesses after salmonellosis.

Main Characteristics of the Bacteria:

- Small, spherical, Gram-positive bacteria, immobile, grow in clusters.
- Facultative anaerobe.
- Optimal growth temperature: 37°C, can grow down to 8°C.
- Tolerates low water activity (Aw) and grows in relatively high salt levels.
- Resides on human skin and mucous membranes, primarily in the mouth, nasal passages, skin lesions, and hair. Also found in vertebrate animals.

Symptoms in Pregnant Women and Newborns

During pregnancy, the infection may cause mild symptoms in the mother. However, the consequences for the baby can be devastating, **such as stillbirth or death shortly after birth.**

In newborns, signs of listeriosis can be subtle but may include: poor appetite, irritability, fever, vomiting and difficulty breathing.

Foods Involved:

- Soft cheeses (e.g., feta, Brie, Camembert).
- Refrigerated ready-to-eat foods (e.g., hot dogs, cold cuts, pâtés, spreadable meat pastes), unless heated to an internal temperature of 73.9°C (165°F) or brought to a boil before serving.
- Refrigerated smoked seafood (e.g., nova-style, smoked salmon, smoked herring, jerky), unless cooked.
- Raw (unpasteurized) milk.

Toxins:

- 30% of strains produce enterotoxins.
- Highly heat-resistant: they survive boiling for up to 30 minutes.

Disease:

- Symptoms: Primarily gastrointestinal, including significant vomiting, abdominal pain, diarrhea, and headache. Fever is uncommon.
- Duration: 1–2 days, with very low mortality rates.
- Most Vulnerable Individuals: Children, the elderly, and immunocompromised individuals.
- Carriers: Both sick and healthy individuals (40–50% of healthy people are carriers).

Foods Involved:

- Cooked foods handled by carriers.
- Cured cooked meats (e.g., cold ham).
- Milk: contaminated from animals.
- Sauces (e.g., mayonnaise, cocktail sauce) and pastries.

➤ **CLOSTRIDIUM PERFRINGENS**

Main Characteristics:

- Large, Gram-positive, immobile, spore-forming bacillus.
- Strict anaerobe, does not require oxygen.
- Optimal growth temperature: 37–45°C.
- Highly heat-resistant spores (can survive boiling).
- No growth or toxin production occurs at a pH below 4.5.
- Found in the digestive tract of animals and in soil.

Toxins:

- Produces a toxin that is temperature-sensitive.

Disease:

- **Incubation Period:** 8–22 hours.
- **Symptoms:** Gastrointestinal issues and fever.
- **Duration:** 1–2 days, with low mortality rates.
- **Most Vulnerable Individuals:** Children, the elderly, and immunocompromised individuals.
- The toxin can cause necrotic enteritis or gas gangrene.

Foods Involved:

- Raw or partially cooked meat.
- Meat that is cooled slowly and later lightly reheated. This pathogen germinates and reproduces easily during the cooling process.
- Poorly prepared cold cuts.

➤ **CLOSTRIDIUM BOTULINUM**

Foodborne intoxication caused by neurotoxins from *Clostridium botulinum*.

Main Characteristics:

- Large, Gram-positive, motile, spore-forming bacillus.
- Strict anaerobe, does not require oxygen.
- Optimal growth temperature: 25–37°C.
- Highly heat-resistant spores (can survive boiling).
- No growth or toxin production occurs at a pH below 4.5.
- Found in soil.

Botulinum Toxin:

- Highly toxic neurotoxin (lethal).
- Absorbed in the small intestine, enters the bloodstream, and affects nervous tissue.
- Heat-sensitive, destroyed at 80°C for 10 minutes.

This pathogen can survive cooking in spore form; however, the toxin is destroyed by heat when applied at the specified temperature and duration.

Disease:

Incubation Period: Typically 18–36 hours.

Symptoms:

- Initial symptoms: Nausea, vomiting, and diarrhea, along with fatigue, headache, dizziness, vertigo, vision disturbances, and voice issues.
- Later symptoms: Persistent constipation, blurred vision, difficulty swallowing and speaking, and muscle weakness.
- Fever is absent; in fact, body temperature may drop below normal.
- Severe cases: Paralysis of involuntary muscles, progressing to the respiratory system and heart, leading to death from respiratory or cardiac failure.
- The most severe symptoms can last up to 10 days.
- **Death:** Occurs 3–6 days after consuming contaminated food.
- **Antitoxin:** Can prevent death in some cases.
- **Duration:** Variable.

Foods Involved:

- Meat products, fish, cheese.
- Non-acidic preserves, such as milk bricks.

During growth, this bacterium produces gas. A swollen container of preserved food is a clear indication of contamination and must be discarded.

➤ **ESCHERICHIA COLI O157:H7**

E. coli bacteria normally reside in the intestines of humans and animals. While most strains of this bacterium are harmless, some produce toxins that can cause diarrhea. The *E. coli* strain O157:H7 can lead to severe diarrhea and kidney damage.

Symptoms:

- Begin 12 hours to 3 days after ingestion. Initial symptoms include abdominal pain and watery diarrhea, which often progresses to bloody stools. In healthy adults, the condition is self-limiting and resolves within eight days.
- Up to 15% of cases (primarily in children) can develop hemolytic uremic syndrome (HUS), leading to kidney failure and hemolytic anemia.
- In elderly individuals, thrombotic thrombocytopenic purpura has been observed, with mortality rates reaching up to 50%.

Foods Involved:

- Foods contaminated with fecal matter from carrier animals.
- Commonly associated with undercooked ground meats (e.g., hamburgers, sausages) and unpasteurized contaminated juices.
- Milk.

➤ **CAMPYLOBACTER JEJUNI**

Symptoms:

- Appear 2 to 5 days after consumption. Common symptoms include diarrhea, abdominal pain, fever, and occasionally bloody stools.
- Duration: 7 to 10 days.

Foods Involved:

- Raw or undercooked poultry.
- Unpasteurized milk.

➤ **BACILLUS CEREUS**

Symptoms:

- Develop between 8 and 24 hours after consuming contaminated food.
- Include abdominal pain, diarrhea, and vomiting.
- Fever is rarely reported.
- Recovery is rapid, typically within 24 hours.

Foods Involved:

- Cooked foods that have not been kept hot (> 65°C) or have not been cooled quickly if intended for later consumption.
- Unpasteurized milk, undercooked and poorly stored meats, vegetables, fish, rice, cereals, baked goods, potatoes, broths, and creams.

f) **Foodborne Illnesses of Viral Origin:**

Food serves only as a vehicle for transport to humans since viruses require living cells to multiply.

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| ➤ VIRUS NORWALK: Found in the feces of infected individuals. Transmitted via the fecal-oral route, poor hygiene practices, and consumption of contaminated foods such as shellfish harvested from polluted waters and vegetables irrigated with wastewater. Not eliminated through cooking. Symptoms usually appear 24 to 48 hours after consumption. Causes vomiting, diarrhoea, abdominal pain, headaches, and hypothermia. | ➤ HEPATITIS A: The most common foodborne illness caused by a virus. Humans are the primary source. Transmitted via the fecal-oral route, poor hygiene practices, and consumption of contaminated foods, such as shellfish harvested from polluted waters. Symptoms can appear 3–6 weeks after infection and include flu-like symptoms, jaundice (yellowing of the skin and eyes), and dark urine. |
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g) **Foodborne Illnesses of Fungal Origin: Molds**

Molds are multicellular filamentous fungi whose growth on the surface of food is usually easily recognizable due to their woolly or velvety appearance.

They tend to thrive in environments hostile to bacteria, especially in dry or acidic conditions. Molds commonly grow on fruits, vegetables, bread, jams, and yogurt.

Some molds secrete a mycotoxin when conditions are unfavorable. This toxin affects the organism that consumes it. The damage occurs chronically, as the organism gradually accumulates the toxins, and symptoms appear years later. It is now well-established that these toxins cause cancer, particularly liver cancer.

h) **Foodborne Illnesses of Parasitic Origin: Infestations.**

Parasites are a group of very small organisms characterized by living at the expense of other living beings.

TREMATODES:

Trematodes, also known as flukes, are flatworms that parasitize various parts of the body, such as the liver, lungs, or intestines, depending on the species. Their life cycle often involves intermediate hosts, such as mollusks, and they can infect humans through the consumption of contaminated water or improperly cooked food, such as fish or aquatic plants.

- **CESTODIASIS OR TAENIASIS:** This condition has almost disappeared thanks to the industrialization of pork production, the decline in home slaughter practices, wastewater treatment, and veterinary inspections.

NEMATODES:

- **ANISAKIOSIS O ANISAKIDOSIS:** Anisakis simplex is a nematode whose life cycle involves infestation of fish (commonly cod, hake, salmon, saury, mackerel, and anchovies), cephalopods (squid, cuttlefish), and marine mammals. It resides in the digestive tract of live fish. Upon the death of the fish, it migrates to the muscles and viscera. Humans are accidental hosts and become infected by consuming contaminated fish and cephalopods that are inadequately cooked or raw (e.g., marinated, pickled, smoked, or salted) containing live anisakis larvae. Once ingested, it can cause two conditions:
 - **Anisakiasis o Anisakidosis:** The larva attaches to the mucosa, causing inflammation. In some cases, it penetrates the mucosa and migrates to other organs. The gastric form presents with vomiting, diarrhea, nausea, and abdominal pain. It may cause digestive obstructions. Cases have been reported involving other organs, such as the lungs, liver, and pancreas.
 - **Allergic Reaction to Anisakis:** Symptoms vary, ranging from simple hives to skin rashes on the face, hands, feet, and throat. In severe cases, it can lead to anaphylactic shock.

Preventive Measures (Royal Decree 1420/2006):

To prevent anisakis parasitosis in fish products supplied by establishments serving food to end consumers or groups, the following measures have been established:

- Thermal treatment above 60°C, or
 - Freezing for a minimum of 24 hours at -20°C.
- **TRICHINOSIS:** Trichinosis is a parasitic disease caused by *Trichinella spiralis*. Humans become infected by consuming meat or meat products from pigs, wild boars, or horses that are infested with the parasite. main symptoms: gastrointestinal issues, muscle pain, thirst, sweating, chills, weakness, prostration and fever.

As a **preventive measure**, there is an official veterinary inspection of all meat intended for consumption. Therefore, meat or meat products without a guarantee of origin should not be consumed; they must come from authorized establishments.

5.2. CONDITIONS AFFECTING THE GROWTH OF MICROORGANISMS IN FOOD

Microorganisms require certain environmental conditions to grow and multiply. These conditions influence the speed and extent of microbial development in food, directly impacting its safety and shelf life.

Below are the primary factors that affect the growth of microorganisms (bacteria, molds, and yeasts) in food:

1. **Temperature:** The most dangerous temperature range for food storage is between **+5°C and +65°C (danger zone)**, with the optimal growth range being between +30°C and +40°C. In refrigeration, between 0°C and +5°C, bacteria multiply very slowly but do not die. In freezing conditions, at temperatures below -18°C, bacteria remain dormant. Above +65°C, bacteria begin to die.

2. **Moisture, Water Activity (Aw):** They prefer foods with high moisture content, such as meat, fish, poultry, milk, etc. Proliferation is faster in liquid foods than in solid foods. However, they can grow in foods with lower moisture content and, of course, survive in dry environments for some time until they find the moisture needed to multiply. Molds and yeasts are capable of surviving and multiplying in foods with very low moisture content, such as flour, cereals, nuts, etc.
3. **pH (Acidity):** Microorganisms have an optimal pH range for growth, with most bacteria thriving in near-neutral conditions (pH 6–7). Acidic environments (pH < 4.5) generally inhibit bacterial growth but may allow molds and yeasts to thrive.
4. **Oxygen Availability:** Depending on the species, bacteria can grow in the presence of oxygen (aerobic) or in its absence (anaerobic).
5. **Nutrient Availability:** Microorganisms need nutrients to grow, which they obtain from food. High-protein and high-carbohydrate foods are particularly susceptible to microbial contamination.
6. **Time:** Bacterial growth depends on the time food is kept at a temperature that allows multiplication (hence the importance of expiration dates). Under suitable conditions, cell division occurs every 15–30 minutes.

Certain bacterial species (e.g., *Clostridium*) have the ability to protect themselves when external conditions are unfavorable. They do so by forming **spores**, which act as an outer shield, allowing them to survive for years.

Viruses, on the other hand, are microorganisms composed of a single type of nucleic acid. They can only multiply inside living cells. They cannot cause alterations in food because they cannot grow in it; they only use it as a transport medium.

Once the main factors that promote the persistence and/or growth of microorganisms in food are understood, preventive measures can be established.

5.3. PREVENTIVE MEASURES

A. PREVENT FOOD CONTAMINATION

To prevent food contamination, good hygiene practices must be maintained throughout all stages following its primary source, including preparation, processing, packaging, storage, transportation, distribution, and sale to the consumer.

Although some foods are contaminated from their origin, it is more common for contamination to occur during later stages due to poor handling or improper maintenance of the food.

Cross-contamination is one of the most frequent causes of foodborne illnesses. It occurs when pathogens are transferred from one food, typically a raw product, to another ready-to-eat food through utensils, equipment, surfaces, machinery, clothing, or hands.

Types of Cross-Contamination:

- **Direct Cross-Contamination:** Occurs when a contaminated food comes into "direct contact" with uncontaminated food. Examples:
 - Cooked food coming into contact with raw food.

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- Poor placement of food in the refrigerator.
- Ready-to-eat food contacting thawing water from raw chicken, meat, or fish.
- **Indirect Cross-Contamination:** Occurs when contaminants are transferred from one food to another via hands, utensils, equipment, tables, cutting boards, etc. For example, using the same knife to cut raw chicken and then roasted chicken without sanitizing it contaminates the cooked food with germs from the raw one.

To prevent food contamination, maintain a strict separation between initial storage and preparation of raw materials and the final handling and storage of prepared foods.

B. DESTRUIR LOS GÉRMEENES CONTENIDOS EN LOS ALIMENTOS

As mentioned earlier, germs may be present in food from its origin or as a result of contamination during handling.

Germ destruction can be achieved through various agents, such as heat, which, when applied in a controlled manner, will eliminate microorganisms in food. Common heat treatments include:

- **Blanching:** A brief cooking process for vegetables before dehydration or freezing. Only affects the surface of the food.
- **Boiling or Cooking:** Exposes food to temperatures around 100°C for 5 minutes, destroying microorganisms but not spores.
- **Pasteurization:** Sufficient to inactivate potential pathogenic microorganisms but not spores. Requires additional preservation methods such as refrigeration.
 - **Low Pasteurization:** 60–70°C for 30 minutes.
 - **High Pasteurization:** 70–80°C for 20–30 seconds.
- **Sterilization:** Applies heat above 100°C for varying times, eliminating all microorganisms, including spores. Examples include milk sterilization at 120°C for 20 minutes or ultra-high temperature (UHT) treatment at 135°C for 1 second.

General Rule: For effective treatment, the internal temperature of the food must reach at least 75°C at some point.

C. PREVENT GERM MULTIPLICATION

- Control temperature, humidity, and pH to inhibit the growth of existing microorganisms.

6. FOOD HANDLING

High-risk foods are those that, due to their nature, composition, or culinary preparation methods, have two main characteristics: they are excellent mediums for bacterial colonization and multiplication, and they spoil easily. Some examples of high-risk foods include:

1. **Egg-based dishes** prepared without intense heat, such as omelets and scrambled eggs.
2. Preparations involving **raw egg**, especially mayonnaise and its derivatives. Always use pasteurized eggs.
3. **Minced meat dishes**, such as hamburgers.
4. **Poultry and game products.**
5. **Fresh fish.**
6. **Shellfish**, particularly mollusks.
7. **Milk and dairy products**, such as fresh cheeses and cream.
8. **Pastry products.**
9. **Salads and salad-based dishes** containing creams.

6.1. RAW MATERIAL RECEPTION

First and foremost, suppliers must be carefully selected to ensure they are authorized and capable of delivering raw materials in optimal hygienic conditions.

Guidelines to follow during the reception of raw materials include:

- Verify and retain documentation that certifies their origin.
- Ensure that cold transport is carried out using the appropriate vehicle for the food: insulated, refrigerated, or frozen trucks.
- Check the condition of the products upon arrival: labeling, temperature, placement in the truck, packaging, and containers. The latter should show no signs of deformation, breakage, or rust, and frozen products should be intact and free of frost.
- Inspect the external quality characteristics of unpackaged products.
- Identify and isolate products with anomalies from the rest of the batch.
- Never place goods directly on the ground.
- Inspect the hygiene of the truck and the transporter.
- Perform on-site inspections of the supplier's facilities.

6.2. STORAGE

General Guidelines for All Types of Food

Proper storage prevents time loss, cross-contamination, and premature food spoilage. The following guidelines ensure correct storage practices:

- Separate food from other products and group them based on:
 - o Nature (dairy, eggs, meat, fish, etc.).
 - o State (raw, cooked, or ready-to-eat).
 - o Storage requirements (refrigerated, frozen, or non-refrigerated).
- Arrange items to prevent cross-contamination. Keep food off the floor and away from walls to promote air circulation, allow cleaning, and prevent contamination from footwear or the ground.
- Regularly inspect stored food and remove defective items (moldy, damaged packaging, etc.).
- Ensure product rotation according to "expiration dates" and "best before dates." Apply the FIFO system: first in, first out.
- Storage areas must be isolated from external elements and adequately protected against pests and animals.
- Set aside a clearly marked, isolated area for unfit products or returns.
- Packaged products not fully consumed, intermediate products, and final stored products should be covered, preferably transferred to plastic containers with lids. Label them with the product description and the date of preparation, freezing, or similar.

Non-Refrigerated Storage:

- Non-refrigerated foods should be stored in a cool, ventilated, and dry place.

Refrigerated Storage:

Refrigeration preserves food by reducing microbial activity through lowered temperatures.

Guidelines for refrigerated storage:

- Ideally, use separate chambers for different food groups. If not, allocate separate zones within the same chamber. Set the temperature according to the most sensitive food.
- Store food in clean, covered containers.
- Regularly check and record temperatures.
- Place cooked or ready-to-eat foods at the **top of the refrigerator**.
- Place raw foods at the **bottom of the refrigerator** to prevent juices from contaminating ready-to-eat foods, which require extra care.
- Avoid storing cardboard or wood inside refrigeration units.

PRODUCT	MAXIMUM TEMPERATURE
GENERAL FOOD	
Refrigerated food products	As indicated by the manufacturer on the label, generally between 0°C and 5°C.
Ultra-frozen food products	Below -18°C.
MEAT	
Meat	7 °C
Offal (organs, stomachs, etc.)	3 °C.
Poultry/rabbit meat	4 °C.
Minced meat and minced meat preparations	≤2°C.
Meat preparations (e.g., hamburgers, skewers)	Between 2°C and 7°C (depending on the raw material and species).
Frozen minced meat and meat preparations	Below -18°C.
FISH	
Fresh fish products	At temperatures close to the melting point of ice (0°C).
Live bivalve mollusks	At temperatures that do not negatively affect their safety and viability. They must be alive.
Frozen fish products	≤-18°C.
Fish products frozen in brine	≤-9°C.
PREPARED MEALS	
Refrigerated meals	≤8°C if consumed within 24 hours of preparation.
Refrigerated meals	≤4°C if consumed after 24 hours of preparation.
Hot meals	≥65°C.
PASTRY/BAKERY	
Pastry, bakery, confectionery, and dessert products	Between 0°C and 5°C.

Frozen Food

The best freezing process is one that happens as quickly as possible. This minimizes the size of ice crystals formed in the product, preventing damage to the food's structure. Standard household freezers are not designed to freeze fresh products effectively, as the process is too slow.

How to Properly Thaw Food: Thawing should always be done in the refrigerator, in a location where dripping cannot contaminate other foods, or in the microwave. Another option is to defrost food during the cooking process, such as frying, boiling, or baking.

Never thaw food at room temperature, and avoid refreezing food that has already been thawed. These practices can lead to contamination and result in nutritional and textural losses in the food.

6.3. PREPARATION OF RAW MATERIALS FOR DISH PREPARATION (CHOPPING, CUTTING, FILLETING, CLEANING, RINSING...)

It is important that establishments have a dedicated area exclusively for the preparation and cleaning of raw materials, preferably climate-controlled. If such a space is not available, these operations and food preparation can be performed in the same area, provided they are done at different times and the surfaces and tools that come into contact with food are cleaned and disinfected between tasks.

Using separate equipment and utensils for raw and cooked products is recommended. If this is not possible, all equipment and surfaces must be thoroughly cleaned and disinfected when handling different types of food, both raw and cooked.

6.3.1. PESCADO

Fish and seafood are often infested with anisakis parasites. These parasites die during cooking at temperatures between 60°C and 70°C. If preparing raw fish (e.g., marinated or pickled), freezing the fish at -18°C for 24 hours is the only way to ensure no live parasites remain.



Scrape the shells of shellfish before cooking, as they may be contaminated with microorganisms or algae residues.

Fish and shellfish should be stored refrigerated, gutted, and scaled.

6.3.2. MEAT

When using minced meat, hygiene must be strictly maintained. Mince meat in perfectly clean machines and use it immediately. Grinding increases the risk of contamination by exposing more surface area.

Grinders, cutting boards, knives, and other utensils used with raw meat must not be used for other raw or cooked foods without prior cleaning.

6.3.3. EGG PRODUCTS

Follow these guidelines:

- Use packaged mayonnaise that has undergone heat treatment and store it in the refrigerator after opening.
- If manually preparing mayonnaise, always use pasteurized eggs.
- Always add vinegar or lemon juice to lower the acidity of the product to a pH of 4.2.
- Store for a maximum of 24 hours after preparation, always refrigerated.
- If mixed with other foods, ensure those foods are cold

6.3.4. FRESH EGGS

If using fresh eggs, they must be heat-treated to at least 75°C, and the following recommendations should be observed:

- Check the expiration date.
- Discard eggs with cracks, breaks, or visible faeces.
- Avoid condensation forming on the shell when stored in the refrigerator.

To check egg freshness:

- Place them in a container of water. The fresher the egg, the less it floats.
- Crack the egg open. If the egg stays compact and gel-like, it is fresh.
- If, after boiling, the yolk is green on the outside, it only means the cooking process was excessive.

Always wash hands after handling eggs.

6.3.5. FRUITS AND VEGETABLES

Fruits and vegetables are susceptible to contamination by pathogens and foreign substances.

Microbiological Risks Include:

- Molds (toxins).
- *Listeria monocytogenes*.
- *Clostridium botulinum* (toxins).
- Fecal contamination (organic fertilizers).
- *E. coli* O157:H7.



Unlike pathogens in meat or fish, which are eliminated during cooking, those in fruits and vegetables may remain because they are often consumed raw. Follow these steps for cleaning and disinfecting:

1. **Cleaning:** Wash the surface under cold running water for at least two minutes, scrubbing thoroughly with your hands or a brush to remove any attached debris. Remove inedible parts.
2. **Disinfecting:** Soak in a solution of potable water and disinfectant to eliminate surface microorganisms. Rinse with plenty of potable water, preferably running water, to ensure thorough removal.

Disinfectants: Use only authorized products for disinfection, following the manufacturer's recommended dosage and application time. If using hypochlorite (bleach), ensure the label specifies its suitability for disinfecting food products or drinking water.

6.4. PREPARATION OF COLD DISHES

The preparation of cold dishes requires strict hygiene conditions and must be carried out as quickly as possible, considering that no heat treatment will be applied to destroy pathogenic microorganisms.



1st Products should be removed from refrigeration units only as they are needed to ensure their temperatures are maintained.

2nd Once prepared, cold dishes must be stored in refrigeration at a maximum temperature of 5°C until serving.

6.5. PREPARATION OF HOT DISHES

Cooking allows us to kill most microorganisms that could be dangerous if ingested. However, improper cooking can actually promote the growth and reproduction of microorganisms. The correct temperature must reach all parts of the food, especially the center.

Temperatures for Proper Cooking:

- **Grilled meat products:** 70°C. If the interior is slightly raw, it likely has not reached 70°C at the center.
- **Pre-cooked foods for frying:** 70°C. Many of these are frozen and fried directly without thawing. If the interior remains cold, it likely has not reached 70°C.
- **Egg products, poultry or game meat, minced meat, or any food requiring reheating:** 75°C. Always use pasteurized eggs and ensure the food is fully cooked inside.
- **Cooked foods to be served cold or reheated:** These should be cooled to 4°C within two hours. It is recommended to use blast chillers instead of refrigerators or fridges with other already refrigerated foods. If no blast chiller is available, cool the container in which the food will be stored in a cold water bath before placing it in refrigeration equipment.
- **Reheated foods:** 70–100°C and kept above 65°C. It is recommended that reheating temperatures exceed 70°C, preferably around 100°C.

Frying Food: Frying involves immersing food in oil at a specific temperature for a certain time. It is important to note that oils degrade due to poor or excessive use during frying. The use of highly degraded oils not only poses a health risk but also reduces the quality of fried foods in terms of flavor and smell.

Guidelines to Prevent Accelerated Oil Degradation:

- Do not mix different types of oil or combine new and old oils.
- Do not exceed the maximum frying temperature of 180°C.
- If oil is reused, filter it to remove carbonized toxic residues from previous frying.
-

6.5.1. Acrylamide: Foods and Risks. Mitigation Measures

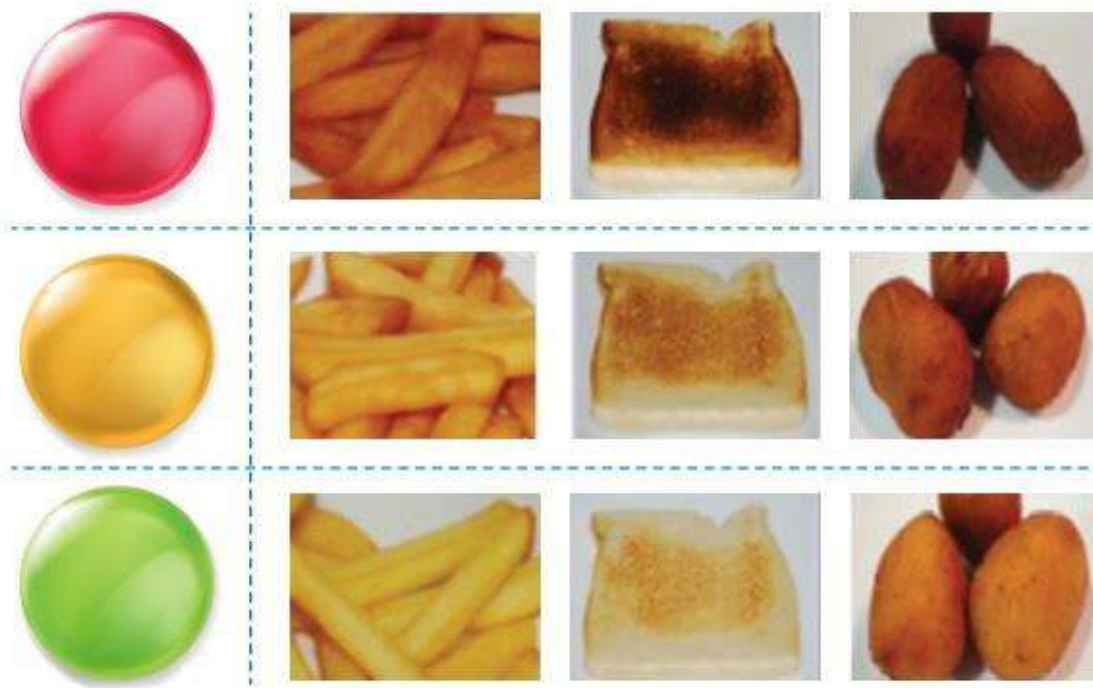
Acrylamide is a substance formed in starchy foods (e.g., tubers, cereals, and their derivatives) during cooking, frying, roasting, or other thermal treatments at temperatures above 120°C with low humidity. It forms naturally at high temperatures without the addition of any chemical substance.

The **Maillard reaction**, a chemical interaction between sugars and amino acids, causes foods to brown and become more appetizing while primarily forming acrylamide.

The **International Agency for Research on Cancer (IARC)** has classified acrylamide as a "probable human carcinogen." These effects have been demonstrated in experimental animal studies. However, studies in humans provide limited and inconsistent evidence regarding the relationship between acrylamide and cancer.

The **European Food Safety Authority (EFSA)** has proposed hygiene practices for food handlers to reduce acrylamide levels in foods intended for consumers. These practices can also be applied at home by individuals.

Regulation 2158/2017 sets benchmark values for detecting acrylamide in food products.



Foods at Risk of Acrylamide Formation

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According to European Regulation 2158/2017, foods at risk of forming acrylamide at high temperatures include:

- a) French fries, other fried cut products, and crisps made from fresh potatoes.
- b) Potato-based products such as crisps, snacks, and savory biscuits.
- c) Bread.
- d) Breakfast cereals (except porridge).
- e) Bakery products, including pastries, cakes, cookies, rusks, cereal bars, scones, cones, wafers, yeast rolls, gingerbread, savory biscuits, crispbread, and bread substitutes. Savory biscuits in this category are dry baked cereal-based products.
- f) Coffee: roasted or instant (soluble).
- g) Coffee substitutes.
- h) Infant food and cereal-based food products for infants and young children.

EXAMPLES OF ACRYLAMIDE MITIGATION MEASURES IN THE PREPARATION OF FRENCH FRIES AND DERIVATIVES

1. Use **potato varieties low in sugar** (consult your supplier).
2. Store potatoes at temperatures above **6°C**.
3. Choose **large potatoes**, as smaller ones tend to have higher sugar content.
4. Wash and soak potato strips for **30 minutes to two hours in cold water**, or blanch them for a few minutes in hot water. Rinse before frying and drain thoroughly to avoid prolonged frying times.
5. Use **oils that allow quick frying** at the lowest possible temperatures.
6. Fry at the lowest possible temperatures, and in any case, below **175°C**.
7. Maintain oil quality by regularly skimming and filtering.
8. Use **colour charts** with optimal combinations of colour and low acrylamide levels to guide staff during food preparation.

These practices help reduce acrylamide formation and ensure safer and healthier food production.

6.6. PRESERVES

When using canned foods, the following guidelines should be observed:

- Only use **commercially produced preserves**.
- Clean the outside of the can before opening it.
- Ensure the can is in good condition (free of rust, dents, or swelling).
- Transfer any unused portions to a clean, sealable container and store them in the refrigerator.
- If any anomaly is detected with the can or its contents, discard the product.

6.7. PACKAGING

The design and materials of packaging must provide triple protection:

- **Chemical:** Preventing or selectively allowing the passage of certain gases (e.g., oxygen, water vapor).
- **Physical:** Protecting against light, dust, dirt, and mechanical damage.
- **Biological:** Preventing the entry of microorganisms and insects.

The materials used for packaging must not react with the food and should be exclusively designated for "**food use**", sourced from industries with proper health registration.

The gases used in packaging must be authorized for this purpose, ensuring the safety of the packaged food.

Packaging materials must not contain pathogenic microorganisms or those that could spoil the food. Strict control of the packaging process is essential, from the storage of packaging materials to the final distribution of the packaged product.

6.8. LABELING

Labeling is the only way consumers can identify a product and associate it with a company. The primary purpose of correct labeling, in addition to complying with current regulations, is to ensure that consumers have accurate and complete information about all ingredients and allergenic substances present in the products they consume. This enables them to make informed decisions based on their needs and avoid risks from potential adverse reactions.

Mandatory Information on Food Labels

1. Information about the identity, composition, properties, or other characteristics of the food.
2. Information to protect consumer health and ensure the safe use of the food, including:
 - a) Composition-related properties that may harm the health of certain consumer groups.
 - b) Shelf life, storage conditions, and safe usage instructions.
 - c) Health effects, including risks and consequences of harmful or hazardous food consumption.
3. Nutritional information, including details for consumers with special dietary needs.

Accessibility and Presentation of Mandatory Information

- For all foods, mandatory food information must be easily accessible and prominently displayed. It should be:
 - Clearly visible, easy to read, and, where applicable, indelible.
 - Not obscured, hidden, or interrupted by any other text, image, or material.
- For packaged foods, mandatory food information must appear directly on the packaging or on a label attached to it. It can also be provided through other means, as long as the same level of information is guaranteed, and there is evidence that the average consumer can understand it and that such means are widely used.
- For non-packaged foods, it is only mandatory to indicate the presence of ingredients or processing aids that may cause allergies or food intolerances.

Prohibition of Misleading Labeling: Labeling must not mislead consumers regarding the composition or presentation of food products.

Non-Packaged Products

1. Meat (Carcasses and Half-Carcasses): Must bear the veterinary inspection stamp from the slaughterhouse, which should remain intact until the piece is sold.
2. Rabbits and Poultry: Must carry the veterinary inspection mark.
3. Mollusks: Live or fresh mollusks must be packaged in yellow mesh bags with a label ensuring they have undergone purification.

Documentation: these products, along with fresh fish, must be accompanied by the corresponding sanitary documentation.

Food labeling in Spain is currently regulated by **Royal Decree 1334/1999**, dated July 31, which approves the General Standard for Labeling, Presentation, and Advertising of Food Products. This decree incorporates the provisions of EU legislation and applies to food labeling intended for both end consumers and collective entities such as restaurants, hospitals, and canteens.

The decree specifies the mandatory information that must accompany food products. For packaged food products, unless otherwise specified, the following details must be included:

Mandatory Specifications

1. The **sales name** of the product.
2. The **list of ingredients**.
3. The **quantity of certain ingredients** or ingredient categories.
4. The **alcohol content** for beverages with more than 1.2% alcohol by volume.
5. The **quantity and net quantity** (drained weight).
6. The **minimum durability date** or **expiration date**.
7. **Special storage** and usage conditions.
8. **Instructions for use**, if necessary for proper consumption.
9. Identification of the company:
 - o The name, trade name, or brand of the manufacturer, packer, or a vendor established within the European Union, and, in all cases, the company's address.
10. The **batch number**.
11. The **country of origin** or **place of provenance**.
12. The **health mark**.
13. Substances or products that may cause **allergies or intolerances**, as specified in **Regulation 1169/2011**.
14. For beverages with more than 1.2% alcohol by volume, the **acquired alcohol content**.
15. **Nutritional information**.

6.9. TRANSPORTATION

The primary goal of transportation is to maintain the required temperature according to the type of products being transported.

Special vehicles for the transport of perishable goods must be **isothermal, refrigerated, freezing, or heated**, depending on their ability to handle different types of food. They must be equipped with an appropriate device for measuring and recording the interior temperature of the cargo area, placed in a visible location, and adjustable via a thermostat.

The containers or loading areas of the vehicles must be made of materials that allow for easy cleaning and disinfection.

Inside the vehicles, the load must be arranged to ensure proper **air circulation**. It is prohibited to transport people, animals, or products that could contaminate food or transmit strange odors or flavors.

The refrigeration or heating equipment must not be turned off during transportation, and the doors should be kept open for the shortest possible time.

6.10. DISTRIBUTION AND SALE

All products that require refrigeration by regulation must be kept in appropriate refrigeration units.

They should be displayed and stored with adequate separation between each type or group of products.

For bulk sales of products permitted under applicable regulations, the labeling information of the original packaging must be retained until the product is fully sold. This ensures proper identification of the product at all times and allows the information to be provided to consumers upon request.

Self-service sales of unpackaged products are prohibited, except for fruits with hard, inedible peels.

When handling and selling unpackaged foods intended for direct consumption (e.g., cold cuts, cheeses, pastries), appropriate tools such as tongs, single-use gloves, or other instruments must be used to avoid hand contact.

While some foods may arrive at the distributor or retailer already contaminated, the spread or introduction of germs to other foods, as well as their multiplication, depends on:

- Storage conditions (separation between products, temperature, duration, etc.).
- Cleaning and disinfection of premises, utensils, and cutting equipment.
- The hygiene of the personnel handling the products.

6.11. WASTE MANAGEMENT

Food waste is a source of contamination as it promotes the growth of germs and attracts insects and rodents.

Trash bins must:

- Be easy to clean and made of waterproof material.
- Have a lid, a pedal, and an automatic closing mechanism.
- Allow the garbage bag to protrude slightly and be securely fixed at the bin's opening to prevent it from bunching inside when waste is thrown in.



The following points should be observed:

- a) Trash bins must remain closed and only be opened when necessary, always using the pedal.

- b) Use plastic bags and replace them when they reach two-thirds of their capacity or at the end of the day.
- c) Clean bins regularly according to the cleaning schedule.
- d) Waste should not be exposed to high temperatures or direct sunlight to prevent fermentation.
- e) Establishments with an isolated, closed, and refrigerated waste room should maintain a temperature below 8°C until the waste is collected by the corresponding service provider.

Always remember to wash your hands after handling waste.

6.12. WATER SUPPLY

All food establishments must have a supply of **potable water**.

- **Public network water** must maintain a minimum level of residual chlorine to ensure disinfection.
- If public network water is stored in tanks or cisterns, the chlorine will evaporate. In such cases, a disinfectant with residual action and safe for potable water must be added. Chlorine meets these requirements and can be easily measured at any point in the water system.
- **Privately sourced water**, such as from a well, must be approved by health authorities for human consumption and must be chlorinated to achieve the minimum level of residual chlorine.

Chlorination should always be carried out using an automatic chlorinator. The chlorine content in tap water should be measured daily to ensure it maintains the minimum residual chlorine level, between 0.1 and 1 ppm.

Ice as a Water Source:

- Ice must be made from potable water.
- Ice suppliers must have a valid health registration.
- Ice must be stored in a way that protects it from contamination, in clean, exclusive-use containers.
- Ice can only be used once.

If nebulizers are used to maintain ambient humidity in display counters, the water must be potable and free of additives.

Spray systems pose a risk of becoming sources of legionellosis. Therefore, they must be disinfected and subjected to periodic controls according to legionella prevention regulations.

7. CLEANING AND DISINFECTION

Cleaning and disinfection must be a dominant feature in all areas of food establishments and industries, especially in food handling areas.

In cleaning and disinfection, three aspects must be controlled:

- The use of **appropriate products**.
- **Correct procedures**.
- **Sufficient frequency**.

7.1. PRODUCTS

The products used for cleaning and disinfection depend on the type of dirt to be removed and the material of the equipment being cleaned. It is essential to adhere to the concentrations, times, and conditions specified by the manufacturer and to use potable hot water.

Can any detergent or disinfectant be used? They must be authorized for use in the food industry. Detergent, disinfectant, and pesticide companies catering to the food industry are excluded from the requirement of registration in the RGSEAA (General Sanitary Registry of Food Companies and Food Products). These products, if they are biocides, may fall under current legislation regarding biocides, which includes a registry focused on the hazards of these substances.

- **Detergents:** Any detergent can be used, provided the establishment archives both the **technical sheet** and the **safety data sheet**. Some products may still carry a health registration number beginning with "37." While this registration is no longer mandatory, it indicates that the product was previously registered for use in food establishments.
- **Disinfectants:** Only disinfectants registered as biocides for **food hygiene (HA)** may be used. These initials (HA) must appear on the product label. The Ministry of Health, Social Services, and Equality provides an online database where such products can be verified (<http://www.mssi.gob.es/ciudadanos/productos.do?tipo=plaguicidas>). In addition to the biocide registration for food hygiene, the establishment must archive the **technical sheet** and **safety data sheet** for these products.
- **Hand soap:** Safety sheets are no longer required for hand soap, as it is classified as a cosmetic under **Regulation (EC) No 1223/2009**, for which only the technical sheet is mandatory.

7.2. PROCEDURES

Once the cleaning and disinfection products are selected, correct procedures must be followed. These procedures differentiate between cleaning and disinfection:

- **Cleaning:** A series of operations to remove visible or microscopic dirt. These tasks are performed using detergents selected based on the type of dirt and the surfaces involved.

- **Disinfection:** A series of operations aimed at temporarily reducing the number of living microorganisms and destroying pathogens to safe levels. Only sterilization can achieve an entirely germ-free environment.

Dirt can hinder the disinfection process. It protects germs from disinfectants and may chemically neutralize the disinfectant in some cases. Therefore, cleaning must always precede disinfection, with both processes followed by rinsing and drying.

Summary of the Cleaning and Disinfection Process

1. Remove food residues.
2. Clean with a detergent and water.
3. Rinse.
4. Disinfect using a disinfectant (bleach is recommended for maximum effectiveness, considering the required contact time).
5. Rinse.
6. Dry.

7.3. FREQUENCY

The frequency should be sufficient to prevent the presence of dust, dirt, and the accumulation of waste and residues. Cleaning frequency will be established based on the type and levels of contamination of raw materials and the microbial growth that may occur throughout the processing stages.

For example:

- Floors, walls, and surfaces near the work area must be cleaned daily.
- Machines and similar utensils must be disassembled, cleaned, and disinfected after use.
- Utensils and machines not used daily must also be washed and disinfected before use.

Cleaning and disinfection operations will be detailed in a cleaning plan or program, specifying for each room, facility, machine, or area:

- When to clean and disinfect: frequency (time and day of the week).
- Personnel responsible for the task and personnel supervising the process.
- Cleaning and disinfection methods to be used.
- Cleaning and disinfection products (characteristics and storage).
- Preparations prior to cleaning (disassembling machinery, using gloves, removing food, etc.).

8. PEST CONTROL: INSECT AND RODENT MANAGEMENT

Insects pose a significant risk of food contamination due to their ability to carry various germs to food. Rats and mice have an extraordinary capacity to contaminate not only the food they eat but also any food they come into contact with as they pass.

Pest control should involve both preventive physical measures and procedures for the elimination or control of these pests.

A) Preventive Physical Measures

Preventing the entry of insects and rodents into storage and food handling areas by:

- Sealing all openings that communicate with the outside, such as ventilation ducts, water and gas pipes, electrical wiring, and drains.
- Installing mesh on windows, swing doors, or washable plastic or other material curtains.
- Keeping the facilities impeccably clean, with no food residues, and ensuring there are no nearby sources of contamination, such as garbage or stagnant water.
- Protecting food and beverages by carefully storing all products (using pallets, ensuring separation and rotation) and covering water tanks with hermetically sealed lids.
- Ensuring that drains are covered and contain water.
- Installing air curtains or maintaining positive air pressure at access points.
- Using ultrasonic repellent devices.



B) Elimination and/or Control by Physical or Chemical Means

- **Physical Means:**
 - Devices such as traps, insect electrocutors, etc., can be used freely as long as they are placed in locations where they will not contaminate nearby food.
- **Chemical Means:**
 - Most insecticides and all rodenticides are toxic to humans. Therefore, their use should always be carried out by specialized personnel registered with the autonomous community. Ensure that they provide their registration number.
 - Only insecticides and rodenticides authorized for use in the food industry may be applied.

The frequency of pest control treatments depends on the type of industry. A surveillance, detection, and control/eradication program should be developed, similar to the cleaning and disinfection program.

9. GENERAL DESIGN OF FACILITIES, MACHINERY, AND UTENSILS

This section outlines the general requirements for facilities, machinery, and sanitary services in food establishments and industries, which help prevent food contamination risks. Specific requirements for each activity are detailed in various Technical-Sanitary Regulations for food industries.

9.1. STRUCTURAL FACILITIES

The premises must have sufficient space and capacity to perform all activities hygienically, ensuring smooth food handling and preparation processes, from raw material reception to obtaining food ready for consumption.

Proper zoning should be implemented to prevent contamination and better organize work:

- Reception and storage of raw materials.
- Preparation area.
- Storage of finished products.
- Storage of non-food products.
- Bathrooms and changing rooms.
- Waste and cleaning storage area.
- Food service or sales area.
- Any additional areas required for the industry, which must always be separated from food handling zones.

The lack of adequate spaces and the proximity of zones that should be properly differentiated are often the cause of significant hygiene problems, posing evident health risks.

- **Ventilation** (natural or mechanical) must prevent airflow from dirty areas (bathrooms, waste) to clean areas (preparation, packaging) to avoid germ transmission.
- Install extractors with filters that are easy to clean and maintain. Filters must be cleaned or replaced frequently, depending on usage.
- **Lighting** must be intense enough to facilitate inspections and detect irregularities. Lamps must be easy to clean and protected to prevent contamination in case of breakage.
- Floors, walls, and ceilings must be made of easy-to-clean, non-toxic, smooth materials without hard-to-reach corners. They must be free from chips, cracks, and grooves where dirt and residues can accumulate, promoting germ and insect proliferation.
- Doors connecting to dirty areas must remain closed and preferably be swing doors.

9.2. PREMISES

- Should be located far from any source of contamination.
- Floors must be impermeable, non-slip, crack-free, easy to clean and disinfect, and slightly sloped (2%) toward suitable drains.
- Walls must be smooth, impermeable, light-colored, and easy to clean.

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- All corners between walls, ceilings, and floors must be rounded.
- Ceilings must prevent dirt accumulation or vapor condensation. They should be smooth, impermeable, and free of exposed pipes or beams.
- All windows and openings must have removable, easy-to-clean mesh screens.
- Lighting (natural or artificial) should not alter food colors and must be protected.
- Ventilation (natural or forced) must be sufficient, with airflow directed from clean to dirty zones.
- Handwashing stations with hot and cold water, non-manual operation, liquid soap, nail brushes, and disposable towels must be available.
- Separate handling areas for raw and prepared foods must exist. If space does not allow this, operations should be performed at different times, with thorough cleaning and disinfection between uses.
- Trash bins must have non-manual operation, hermetic closure, and disposable bags, in sufficient quantity.
- Small establishments with only a griddle or small kitchen must isolate it from other areas. Kitchens must not be passageways.
- Distinct clean and dirty zones must exist, ensuring raw materials, processed foods, and waste do not cross paths (Forward Flow Principle).

9.3. REFRIGERATED AND NON-REFRIGERATED STORAGE

- Walls, floors, and ceilings must be made of impermeable, non-absorbent, smooth, and easy-to-clean materials. Lighting must be protected, and ventilation must be adequate.
- Shelves, trays, hooks, etc., for food storage must be made of durable materials resistant to cleaning and disinfection and kept in perfect condition.
- Pallets (not wooden) must isolate products from the floor by at least 10 cm.
- Storage areas must be protected from sunlight and the entry of insects and rodents.
- Refrigeration and freezing chambers must have thermometers in easily visible locations or temperature recording devices, which must be checked regularly.

9.4. DINING OR SERVICE/SALES AREAS

- Dining areas must be impeccably clean and disinfected, with sufficient waste bins.
- Floors must be smooth and easy to clean. Walls and ceilings do not need to be smooth but must remain in perfect cleanliness.
- Handwashing stations with non-manual operation and full equipment must exist behind the bar, where bar staff serving food are different from kitchen staff.
- For smaller establishments, the kitchen's handwashing station suffices.

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- All food must be protected by display cases, equipped with refrigeration systems for foods requiring cold storage or heating systems for hot foods, with visible thermometers in both cases.

9.5. MACHINERY AND UTENSILS

- All machinery and utensils in contact with food must be made of non-reactive materials, easy to clean, free of damaged parts, and without cracks or crevices that hinder cleaning.
- Never use containers not made of food-grade materials to hold food. Acidic foods can absorb toxic metals, and foods containing oils or alcohol can absorb toxic substances from non-food-grade plastics.
- Machinery components must be easy to disassemble for thorough cleaning.

9.6. SANITARY FACILITIES

- Floors and walls must be smooth, impermeable, and made of materials that allow easy cleaning and disinfection.
- Washbasins must provide hot and cold water, soap, and disposable towels or automatic dryers.
- In areas requiring food handling, non-manual handwashing facilities must be available.
- Ventilation (natural or forced) must be sufficient and separate from food-handling areas to avoid contamination risks.

Solid Waste, a source of contamination and attraction for insects and rodents, must be stored in a designated area until final disposal.

- Temporary storage containers must be smooth, impermeable, and easy to clean, with hermetic lids and pedal operation to avoid manual contact.
- Containers must be cleaned daily.
- Waste must be removed from the premises daily.

10. PERSONAL HYGIENE

10.1. PROPER PRACTICES

La higiene del personal que manipula los alimentos es de máxima importancia para evitar las enfermedades de origen alimentario. Todas las medidas correctas tomadas en la industria de diseño y construcción, maquinaria, limpieza y desinfección, quedarían anuladas por una actuación poco higiénica de los manipuladores durante los procesos de fabricación, distribución o servicio de alimentos

The hygiene of food handlers is critical in preventing foodborne illnesses. All proper measures taken in industry design, construction, machinery, cleaning, and disinfection can be nullified by unhygienic behavior during food manufacturing, distribution, or service processes.

a) Clothing

- Work clothing and footwear exclusively for food handling must be used to ensure the highest level of cleanliness and prevent contamination from external environments.
- Clothing should be light-colored and made from materials that make it easy to verify cleanliness and allow for daily washing.
- Different clothing should be used for other tasks, such as cleaning or waste handling.
- Hair must be clean and secured with a cap, hairnet, head covering, or scarf to prevent contamination by hair or dandruff, which may carry staphylococci from scalp lesions.

b) Hand Hygiene

- Hands are the most critical part of the body for food handlers, serving as potential carriers of germs. Proper handwashing removes dirt and transient flora. Nails must be kept short, unpolished, and clean.

Steps for Handwashing:

1. Wet hands with warm water.
 2. Apply a cleaning agent (soap).
 3. Scrub nails if necessary, using a firm but soft brush.
 4. Massage hands and forearms.
 5. Rinse thoroughly.
 6. Dry with disposable paper or air dryer.
 7. Avoid touching the faucet with clean hands after washing.
- **Gloves:** Wearing gloves does not replace the need for handwashing. Gloves provide no bacterial advantage unless they are smooth, undamaged, and frequently cleaned.

Handwashing is required:

- When switching tasks during work.
- After using the restroom.
- Between handling raw and cooked foods.
- After grooming, eating, smoking, or blowing the nose.
- After handling waste or garbage.
- After handling money.
- Whenever the work environment requires it.

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Nails must always be very short to prevent harboring pathogens, and painted nails should be avoided to prevent the transfer of paint to food.

c) Prohibited Habits and Behaviors

Avoid the following behaviors during food handling:

- Smoking.
- Eating or chewing gum/candy.
- Wiping sweat with hands.
- Speaking directly over food.
- Grooming or scratching.
- Rubbing eyes.
- Tasting food with fingers.
- Handling money.
- Wearing personal items like rings, bracelets, or watches, as they trap dirt and can fall into food.
- Sneezing or coughing near food. Use a disposable tissue to cover the mouth.

Using clean utensils (e.g., tongs, cutters, foil, disposable paper, or plastic wraps) instead of hands whenever possible is the most effective way to reduce food contamination.

10.2. HEALTH STATUS OF THE HANDLER

Individuals with foodborne illnesses or who carry foodborne pathogens should not work in food establishments.

Food handlers must inform their supervisors of any health issues that could contaminate the food, such as:

- Hand injuries or wounds.
- Diarrhea, nausea, vomiting, or fever.
- Abnormal nasal, ear, or eye discharge.

Supervisors must take appropriate measures as these conditions pose a high risk of food contamination.

Carriers of Pathogens:

- Some individuals are visibly ill, while others carry pathogenic bacteria without symptoms (healthy carriers).
- Healthy carriers may have latent infections, be in incubation, convalescence, or chronic phases, and can spread germs through feces or oral/nasal secretions.

Skin Lesions:

- Cuts and wounds are ideal for bacterial growth and must be covered to prevent cross-contamination.
- Cover wounds with colored, waterproof dressings to prevent detachment.
- For hand injuries, gloves are recommended for additional protection.

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11. SELF-CONTROL SYSTEMS: PGH – HACCP

Before developing this section of the manual, let's review some of the terms that will be used:

- **HACCP (Hazard Analysis and Critical Control Points):** A system that identifies specific hazards and the preventive measures to control them.
- **Flowchart:** A detailed sequence of the stages or phases of the process under review, from raw material reception to distribution.
- **Hazard:** The potential to cause harm. Hazards can be biological, chemical, or physical.
- **Preventive measures:** Actions used to eliminate a hazard or reduce its impact to acceptable levels.
- **Critical limit:** A value that separates what is acceptable or safe from what is unacceptable or unsafe.
- **Critical Control Point (CCP):** A point, step, or procedure that can be controlled to prevent, eliminate, or reduce a food safety hazard to acceptable levels.
- **Monitoring:** A planned sequence of observations or measures to evaluate whether a CCP is under control.
- **Corrective action:** Action taken when monitoring a CCP indicates a loss of control, meaning a parameter being monitored exceeds its established critical limit.
- **Verification:** Supplementary tests and procedures to confirm that the HACCP system is functioning effectively.

The development of community regulations and their successive incorporation into national regulations have introduced the requirement for industries to implement self-control systems, which are carried out by the company itself to ensure the safety of its products.

This self-control system is preventive, based on the premise that once the specific risks associated with the production of a particular food are known, monitoring systems can be established along with corrective measures to be applied if deviations from the established limits are detected.

Each self-control system is specific to each food business and varies depending on the processes and food products handled or produced in the establishment.

A self-control system consists of two types of documents:

- General Hygiene Plans (PGH) or Prerequisites.
- HACCP.

11.1. GENERAL HYGIENE PLANS (PGH)

PGH establish specific hygiene programs for a food establishment to properly implement an HACCP system. They form the foundation and prerequisite for developing and implementing HACCP. PGH typically include:

1. Water supply.
2. Cleaning and disinfection.
3. Pest control.
4. Maintenance of premises, facilities, and machinery.
5. Cold chain management.
6. Traceability.
7. Training.
8. Waste management.
9. Good food handling practices.

11.2. HAZARD ANALYSIS AND CRITICAL CONTROL POINTS (HACCP)

HACCP is mandatory under current legislation. When designing and implementing an HACCP system, applicable legislation, as well as official and unofficial guidelines and recommendations, must be reviewed.

Applicable legislation can change rapidly as new critical control needs are identified in the food chain, new products and procedures are developed, and advancements in the sector arise that require regulation.

Steps for Implementing HACCP:

1. **Form an HACCP team:** A multidisciplinary team involving personnel from all areas of the company related to food safety.
2. **Describe the product:** Understand and define the product, including ingredients, preparation process, target consumers, organoleptic characteristics, storage requirements, etc.
3. **Identify intended use:** Define the end consumer and how the product will be used.
4. **Develop a flowchart:** Create a diagram summarizing the phases or stages the product undergoes.

Principles of HACCP:

1. Identify specific **hazards** associated with food production in all its phases, evaluate the likelihood of occurrence, and identify preventive measures for their control. Many hazards can be adequately controlled through PGH.
2. Determine phases, procedures, or operational points that can be controlled to eliminate hazards or minimize their occurrence—**Critical Control Points (CCPs)**.
3. Establish **critical limits** for specific parameters at a given point and in a specific food product that must not be exceeded to ensure CCP control.
4. Establish a **monitoring** system to ensure CCPs are under control through appropriate programs.
5. Establish **corrective actions** to be taken when a CCP is out of control.

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6. Establish **verification** procedures to confirm the self-control system is functioning correctly.
7. Establish a **documentation** system with all procedures and records related to these principles and their application.

Benefits of Implementing HACCP:

1. Preventive control.
2. Increased confidence in product safety.
3. Autonomy in self-control once the system is established.
4. Reduced costs from foodborne illness control.
5. Documented evidence of process control for safety.
6. A common approach to food safety.
7. Assistance in demonstrating compliance with specifications, good practice codes, and/or legislation (for authorities).
8. Provides tools to prevent errors in food safety control that could jeopardize the business's survival.

Once the HACCP system is established, the business owner will have all the necessary information to maintain strict control over their establishment, ensuring the hygienic and sanitary quality of the products produced.

12. EUROPEAN ALLERGEN REGULATION AND CONSUMER INFORMATION

Between 2014 and 2015, the European Regulation 1169/2011 and Royal Decree 126/2015 came into force, governing food information that must be provided to consumers.

According to this legislation, all food industry businesses are required to implement measures aimed at eliminating or minimizing any food safety risks for consumers through the information provided across the food chain.

These measures are classified into three fundamental areas:

a) Labeling

It must comply with the provisions on consumer information, with special emphasis on the 14 types of allergenic ingredients specified, which may form part of the product composition.

b) Allergen Management

Work processes must be established to register and control the presence of allergens in food production and preparation.

A key innovation is that all businesses serving unpackaged or bulk foods are required to provide information on products containing allergens. This includes restaurants, cafes, bars, collective dining facilities, food delivery services, catering companies, and all types of food retailers, including online food sellers.

THE 14 ALLERGENS AND SUBSTANCES CAUSING FOOD INTOLERANCE

EU Regulation 1169/2011 mandates the provision of information on foods containing any of the following 14 allergens:

1. **Cereals containing gluten** (wheat, rye, barley, oats, etc.).
2. **Nuts** (almonds, walnuts, hazelnuts, cashews, pistachios, etc.).
3. **Peanuts** and products made from peanuts.
4. **Lupins** and products made from lupins.
5. **Sesame seeds** and products made from sesame seeds.
6. **Soy** and products made from soy.
7. **Mustard** and derived products.
8. **Celery** and derived products.
9. **Eggs** and egg-based products.
10. **Milk** and dairy products.
11. **Fish** and fish-based products.
12. **Mollusks** and mollusk-based products.
13. **Crustaceans** and crustacean-based products.

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14. **Sulfur dioxide and sulfites**, used as antioxidants and preservatives (e.g., in dried fruits, wine, processed potatoes, etc.).

Additionally, consumers must be informed when there is a possibility that traces of these allergens could have been introduced during handling processes.

Preventing Food Safety Risks Related to Allergen Consumption Prevention involves proper management of food supply and storage, adapting work processes to prevent cross-contamination and providing adequate information to consumers.



Below is a table to assist in evaluating allergens or substances causing food intolerance, as outlined in the regulations:

DEFINITIONS

Allergen: A substance capable of triggering a hypersensitivity reaction in the body.

Food Allergy: The body's response to certain substances. It occurs when the immune system, which is responsible for fighting infections, mistakenly identifies a specific food as a threat. This prompts an exaggerated reaction (allergic reaction) that can result in coughing, stomach pain, nausea, vomiting, hives, swelling, difficulty breathing, throat tightness, or low blood pressure. In mild cases, these effects tend to subside over time; however, in severe cases, they can lead to anaphylactic shock, which may be life-threatening.

Even ingesting a microscopic amount of a particular food can cause severe reactions, making it essential for people with food allergies to completely avoid such foods. This underscores the importance of providing accurate information.

Food Intolerance: The inability to consume certain foods or substances without adverse health effects. It occurs when the body fails to properly assimilate, digest, or metabolize the food. Common symptoms include gastrointestinal discomfort, headaches, dizziness or vertigo, skin rashes, and itching.

Differences: Both food allergies and intolerances can present with similar symptoms, but they are significantly different conditions. Food intolerances are related to the digestive system and its ability to properly process food, which can lead to discomfort. On the other hand, allergies can pose a life-threatening risk as they involve the immune system.

IN A FOOD SERVICE ESTABLISHMENT, CONSUMER INFORMATION ACCORDING TO ROYAL DECREE 126/2015 CURRENTLY INCLUDES:

A. For all **unpackaged foods and beverages**, the **substances causing allergies and/or food intolerances** must be indicated, as per Annex II of EU Regulation 1169/2011. Refer to the Allergen Management Documentation.

B. For **soft drinks** prepared on-site for immediate consumption or dispensed via vending machines, as per Royal Decree 650/2011, the following information must be provided:

- Product name.
- List of ingredients.
- Name or trade name of the manufacturer, packer, or seller, along with their address.

C. Information on fish products at risk of transmitting *Anisakis*, as per Royal Decree 1420/2006:


- **Article 1:** "Owners of establishments serving food to end consumers or collectives (bars, restaurants, cafeterias, hotels, hospitals, schools, residences, company canteens, catering companies, etc.) must ensure that fish products intended to be consumed raw or nearly raw have been previously frozen at a temperature of $-20\text{ }^{\circ}\text{C}$ or below throughout the product for a minimum period of 24 hours. This treatment must be applied to the raw product or the finished product.

The same obligation applies to fish products subjected to a cold smoking process in which the product's core temperature does not exceed $60\text{ }^{\circ}\text{C}$."

- **Article 4:** "Establishments must inform consumers that fish products affected by this royal decree have been subjected to freezing under the established terms. This can be done using appropriate methods, such as posters or menu cards."

An example of an informational poster could read:

"This establishment informs that the fish products affected by Royal Decree 1420/2006 of December 1, concerning the prevention of Anisakis parasitosis, have been frozen under the established terms."

MEDIDAS DE CONTROL DE ANISAKIS EN PESCADO	
	Se informa a los Sres. Clientes: El pescado servido en este establecimiento para su consumo en crudo o prácticamente crudo , ha sido sometido a un proceso de congelación previa igual o inferior a -20°C al menos durante 24 hrs , en cumplimiento del R.D. 1420/2006 de 1 de diciembre sobre la prevención de la parasitosis por <i>Anisakis</i> en productos de la pesca

13. COVID-19 PREVENTION MEASURES

Currently, there is no evidence to suggest that food is a source or a probable transmission route for the COVID-19 coronavirus.

The European Centre for Disease Prevention and Control (ECDC) has stated that while the initial source of infection in China was zoonotic (from an animal), the virus now spreads between people, primarily through inhaling droplets in the air when someone speaks, coughs, sneezes, or exhales. However, transmission through contact cannot be ruled out. For example, the virus may enter through mucous membranes in the nose or eyes if it is present on the hands.

Coronavirus families exhibit low environmental stability. While contaminated surfaces can be a source of transmission, this is likely only during short periods. The infectivity duration depends on factors such as temperature, humidity, and surface conditions.

In laboratory settings, COVID-19 can remain infectious for: up to 3 hours in aerosols, 4 hours on copper surfaces, 24 hours on cardboard and 2–3 days on stainless steel or plastic.

These times are shorter outside laboratory conditions, where viral loads are lower, and factors such as humidity fluctuations, temperature, and sunlight help inactivate the virus.

Proper hygiene practices are sufficient to reduce the risk of COVID-19 transmission. Below is a summary of key hygiene practices covered during this course, applicable to reducing transmission risks:

- **Clean and disinfect surfaces** that come into contact with food or hands (e.g., door handles). In food service establishments, dishwashers operating at temperatures of 82°C are effective for inactivating the virus.
- **Frequent handwashing** with soap and water whenever switching foods or activities.
- **Maintain social distancing** of at least 1.5 meters between workers and customers whenever possible.
- **Use of PPE (Personal Protective Equipment)** by food handlers. In addition to hairnets, footwear, etc., as previously covered, masks and face shields should be worn.
- In enclosed spaces where maintaining social distancing is difficult, it is recommended that both food handlers and customers wear masks.
- **Wash work clothing** at temperatures above 60°C.
- **Cover your mouth and nose** when coughing or sneezing.
- If there is **suspected coronavirus infection**, avoid going to the workplace, inform the food business manager, and consult a primary care physician (GP doctor).

14. RESOURCES TO KEEP OUR TRAINING UPDATED

To comply with health regulations, it is essential to stay up-to-date. Below are links of interest to facilitate and guide online research:

14.1. SPANISH AGENCY FOR CONSUMER AFFAIRS, FOOD SAFETY, AND NUTRITION (AECOSAN)

Links to the sanitary registry of establishments:

http://aesan.msssi.gob.es/AESAN/web/registro_general_sanitario/subseccion/rgsa_empresas_inscritas2.shtml

Link to legislation by food sector:

http://aesan.msssi.gob.es/AESAN/web/legislacion/subseccion/por_sectores.shtml

Within this link, you can find legislation on prepared meals:

<http://aesan.msssi.gob.es/AESAN/web/legislacion/subdetalle/comidas.shtml>

Link to AESAN publications, which often include guides, manuals, etc.:

http://aesan.msssi.gob.es/AESAN/web/publicaciones_estudios/seccion/seguridad_alimentaria.shtml

