Food Safety and Hygiene

EGPC Guidelines

EGPC Ass. Chairman for HSE Word

Dear Colleagues,

I am delighted and proud to share with you Food Safety and Hygiene Management Guideline which represent the culmination of long time of hard work from dedicated team of professionals in this field.

Food safety is a very critical aspect to workforces in Oil & Gas sector that often unnoticed until crisis occurs. Diseases related to food are major contributors to project morbidity and can have significant and adverse impacts on workforce productivity.

This guideline deals with the practical measures and scientific disciplines taken to make certain that food products served to our workforce are safe, free from contamination and do not pose any risk to public health through compliance with food legal requirement and international standards. These recommendations shall be enforced to all oil & gas companies.

I am confident that extraordinary instance of collaboration among the members of all oil & gas sector will have a long lasting effect on the petroleum industry for many years to come, possibly extending beyond our country's boundaries in the near future.

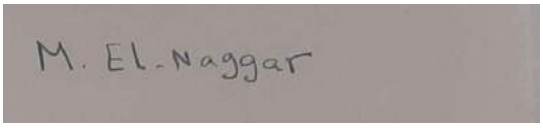
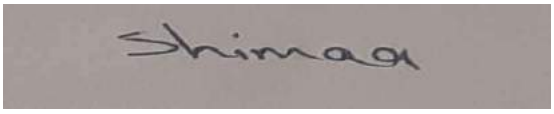
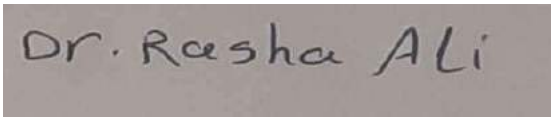
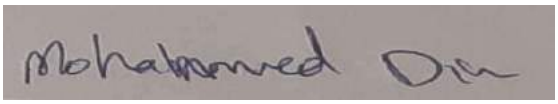
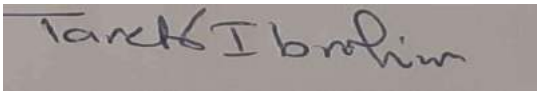
Chemist / Ehab Mohamed Ali

Assistant CEO for Safety and Environment

ACKNOWLEDGMENT

The Egyptian General Petroleum Corporation extends its sincere thanks and appreciation to the esteemed members of the committee, consisting of specialized workers in HSE from EGPC and the Petroleum Projects and Technical Consultation Company (Petrojet), who have made commendable efforts in the preparation of "EGPC Food Safety & Hygiene Management Guideline ". Many thanks to Dr. Mostafa Mohamed Moheb - Occupational Safety and Public Health Consultant for his invaluable effort and support. And special thanks to Dr/ Maha Hussien El-Gamal, HSE Director - EGPC for its effort in translation of this guideline from English language into Arabic.

EGPC Committee

HSE General Manager - EGPC Eng./ Mahmoud El-Naggar	
HSE Director - EGPC Dr/ Shimaa Sayed Kassem	
HSE Director - EGPC Dr. Rasha Ali Mohamed Ali	
HSE Director - EGPC Chemist. Mohamed Diaa Al-Din Abu Al-Oyoun	
HSE Director - EGPC Eng. Tarek Ebrahim	

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1. Introduction

1.1 General

Food Safety Management system Implementation guidelines proposed to be used as EGPC food safety guideline which directs and give the information to EGPC Companies to comply with the Egyptian local regulations and the international standards from the GHP up to ISO 22000 the food safety management system through ensuring that the process of the food service is controlled through the supply chain.

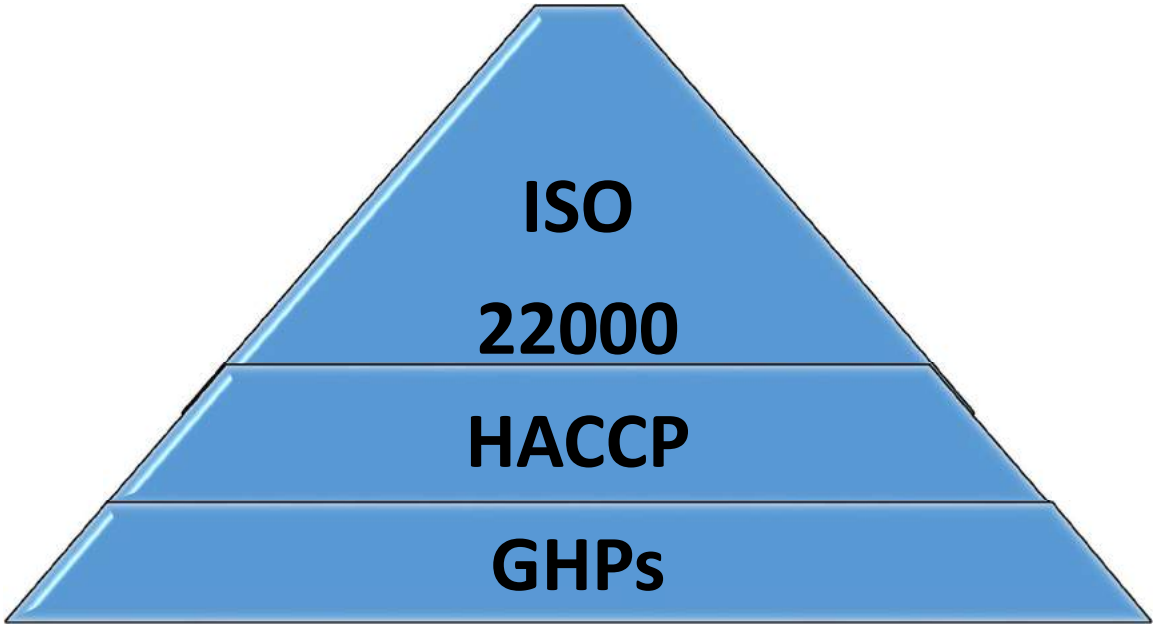
This guideline specifies principals for a food safety to enable the organization that is indirectly involved in the food chain to plan, implement, operate, maintain and assurance that food will not cause an adverse health effect for the employees when it is prepared and/or consumed in accordance with its intended use, providing products and services that are safe, in accordance with their intended use; and to demonstrate compliance with applicable statutory and regulatory food safety requirements; also, to evaluate and assess mutually agreed food safety requirements and to demonstrate conformity with them; to effectively communicate food safety issues to interested parties within the food chain.

This applies to substance (ingredient), whether processed, semi-processed or raw, which is intended for consumption, and includes drink, and any substance which has been used in the manufacture, preparation or treatment of "food", sequence of the stages in the production, processing, distribution, storage and handling of a food and its ingredients, from primary production to consumption, avoiding food safety hazard (biological, chemical or physical) agent in food with the potential to cause an adverse health effect.

Before implementing these food hygiene practices in any operational activities, relevant staff should conduct a hazard analysis, based on the preliminary information, to determine the hazards that need to be controlled. The degree of control shall ensure food safety and, where appropriate, a combination of control measures shall be used.

Pre-requisite programs should be in place to create a safer working environment and reduce the risk of foodborne illnesses, considering: construction, lay-out of buildings and associated utilities; lay-out of premises, including zoning, workspace and employee facilities; supplies of air, water, energy and other utilities; pest control, waste and sewage disposal and supporting services; the suitability of equipment and its accessibility for cleaning and maintenance; supplier approval and assurance processes (e.g. raw materials, ingredients, chemicals and packaging); reception of incoming materials, storage, dispatch, transportation

and handling of products; measures for the prevention of cross contamination; cleaning and disinfecting; personal hygiene; product information/consumer awareness; others, as appropriate. Prioritizing cleanliness, personal hygiene, and proper food storage and handling will contribute to the overall well-being of everyone involved.



1.2 Scope

This document provides a framework of general principles for producing safe and suitable food for consumption by outlining necessary hygiene and food safety controls to be implemented in primary production, processing, , preparation, storage, servicing operation and transport of food, and where appropriate, specific food safety control measures at certain steps throughout the food preparation chain

This document is applicable for all EGPC Companies including the upstream, mid-stream and the downstream companies including the service companies and production companies

1.3 Objectives

- Identify the essential principles of food hygiene applicable throughout the food chain (including primary production through to the final consumer) to achieve the goal of ensuring that food is safe and suitable for human consumption;
- Recommend an HACCP-based approach & ISO 22000 as a means to enhance food safety;
- Indicate how to implement those principles and provide the guidance.

1.4 Definitions

Acceptable level: A level of hazard in a food at or below which the food is considered to be safe according to its intended use.

Assessment: An objective evaluation or estimation.

Audit plan: A description of the activities and arrangements for an audit (e.g. time schedule, auditor name, department/activities/topics to be audited).

Audit program: Arrangements for a set of one or more audits planned for a

Auditor: A person with the competence (specifically educated and trained/qualified) to conduct an audit.

Certification: A third-party attestation that specified requirements relating to the FSMS have been fulfilled. The certificate is granted by a certification body after a certification audit.

Cleaning: The removal of soil, food residues, dirt, grease or other objectionable matter.

Codex Alimentarius Commission: Organization that develops international food standards, guidelines and related texts such as codes of practice under a Joint FAO/WHO Food Standards Program. The main purposes of this program are to protect the health of consumers, ensure fair trade practices in the food trade, and to promote coordination and harmonization of all food standards work undertaken by international governmental and non-

Contaminant: Any biological or chemical agent, foreign matter or other substance not intentionally added to food that could compromise food safety or suitability.

Contamination: The introduction or occurrence of a contaminant in the food or food environment.

Control measure: Any action or activity that can be used to prevent or eliminate a hazard or reduce it to an acceptable level.

Control:

- When used as a noun: The state wherein correct procedures are being followed and any established criteria are being met.
- When used a verb: To take all necessary actions to ensure and maintain compliance with established criteria and procedures.

Corrective action: Any action taken when a deviation occurs in order to re-establish control, segregate and determine the disposition of the affected product if any and prevent or minimize reoccurrence of the deviation.

Critical Control Point (CCP): A step at which a control measure or control measures, essential to control a significant hazard, is/are applied in a HACCP system.

Critical limit: A criterion, observable or measurable, relating to a control measure at a CCP which separates acceptability from unacceptability of the food.

Deviation: Failure to meet a critical limit or to follow a GHP procedure.

Disinfection: Reduction by means of biological or chemical agents and/or physical methods in the number of viable microorganisms on surfaces, in water or air to a level that does not compromise food safety and/or suitability.

Establishment (premises): Any building or area in which food is handled and the surroundings under the control of the same management.

Expert: A person who has acquired knowledge and skill through study and practice in a particular field, and is recognized as a specialist who can be helpful in fact-finding or problem-solving.

External consultant: A person, not employed by the organization, who is hired to provide professional advice in a particular area (e.g. management, audit, technology). Consultants usually work for a consultancy form or are self- employed. Their clients (organizations) purchase their services (outsourcing). The external consultant should have the appropriate competencies in the FSMS area.

Flow diagram: A systematic representation of the sequence of steps used in the production or manufacture of food.

Food business operator (FBO): The entity responsible for operating a business at any step in the food chain.

Food Handler: Any person who directly handles packaged or unpackaged food, equipment and utensils used for food, or surfaces that come into contact with food and that is expected, therefore, to comply with food hygiene requirements.

Food hygiene: All conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain.

Food safety: Assurance that food will not cause adverse health effects to the consumer when it is prepared and/or eaten according to its intended use.

Food suitability: Assurance that food is acceptable for consumption according to its intended use.

FSMS manual: A non-mandatory document in which the food safety policy of the organization is stated and its FSMS is described.

Good Hygiene Practices (GHPs): Fundamental measures and conditions applied at any step within the food chain to provide safe and suitable food.

HACCP Plan: Documentation or set of documents, prepared in accordance with the principles of HACCP to ensure control of significant hazards in the food business.

HACCP System: The development of a HACCP plan and the implementation of the procedures in accordance with that plan. CXC 1-1969 6

Hazard analysis: The process of collecting and evaluating information on hazards identified in raw materials and other ingredients, the environment, in the process or in the food, and conditions leading to their presence to decide whether or not these are significant hazards.

Hazard: A biological, chemical or physical agent in food with the potential to cause an adverse health effect.

Indicator: Measurable variable used to monitor progress toward a goal.

Input/output data: Inputs are the information or data received by a process or system. Outputs are the data or information sent from it. For example, the results of internal audits are one type of input data used for a management review.

Monitor: The act of conducting a planned sequence of observations or measurements of control parameters to assess whether a control measure is under control.

Prerequisite program: Programs including Good Hygiene Practices, Good Manufacturing Practices, as well as other practices and procedures such as training and traceability, that establish the basic environmental and operating conditions that set the foundation for implementation of a HACCP system.

Primary Production: Those steps in the food chain up to and including storage and, where appropriate, transport of outputs from primary source.

Procedure: A step-by-step sequence of activities that must be followed to correctly perform a task. A step-by-step sequence of activities that must be followed to correctly perform a task.

Procedure defines:

- Which process, task, work or activity
- How it should be done
- By whom (responsibility/authority)
- The resources required
- The documented information, as necessary
- All the specific features of a process: inputs, outputs, responsibility, activities

Record: A control document stating results achieved or providing evidence of activities performed (e.g. audit report, meeting report, surveillance of temperature, monitoring at CCPs and/or for an OPRP, microbiological analysis results).

Significant hazard: A hazard identified by a hazard analysis, as reasonably likely to occur at an unacceptable level in the absence of control, and for which control is essential given the intended use of the food.

Step: A point, procedure, operation or stage in the food chain, including raw materials, from primary production to final consumption.

Validation of control measures: Obtaining evidence that a control measure or combination of control measures, if properly implemented, is capable of controlling the hazard to a specified outcome.

Verification: The application of methods, procedures, tests and other evaluations, in addition to monitoring, to determine whether a control measure is or has been operating.

1.5 General Principles

- A written food safety management plan and procedure which addresses those risks, based on Hazard Analysis and Critical Control Points (HACCP) principles, shall be put in place, implemented and maintained.
- Appropriate training of food staff shall be implemented and recorded

- It is essential that management and staff do certain checks regularly. These should include: making sure fridges, chilled display equipment and freezers are working properly; ensuring staff are fit for work and wearing clean work clothes; and confirming that food preparation areas are clean and disinfected and there are plenty of handwashing and cleaning materials available.
- All food contractors shall have the required licenses.
- Food safety and suitability should be controlled using a science-based preventive approach, for example a food hygiene system. GHPs should ensure that food is produced and handled in an environment that minimizes the presence of contaminants.
- Properly applied prerequisite programs, which include GHPs, should provide the foundation for an effective HACCP system.
- Each FBO should be aware of the hazards associated with the raw materials and other ingredients, the production or preparation process, and the environment in which the food is produced and/or handled, as appropriate to the food business.
- Depending on the nature of the food, food process, and the potential for adverse health effects, to control hazards it may be sufficient to apply GHPs, including, as appropriate, some that require more attention than others, as they have a greater impact on food safety. When the application of GHPs alone is not sufficient, a combination of GHPs and additional control measures at CCPs should be applied.
- Control measures that are essential to achieve an acceptable level of food safety, should be scientifically validated.
- The application of control measures should be subject to monitoring, corrective actions, verification, and documentation, as appropriate to the nature of the food product and the size of the food business.
- Food hygiene systems should be reviewed to determine if modifications are needed. This should be done periodically and whenever there is a significant change that could impact the potential hazards and/or the control measures (e.g. new process, new ingredient, new product, new equipment, new scientific knowledge) associated with the food business.

- Appropriate communication about the food and food process should be maintained among all relevant parties to ensure food safety and suitability across the entire food chain.

1.6 Roles & Responsibilities

1.6.1 Top Management Commitment

Fundamental to the successful functioning of any food hygiene system is the establishment and maintenance of a positive food safety culture acknowledging the importance of human behavior in providing safe and suitable food. The following elements are important in cultivating a positive food safety culture:

- Commitment of the management and all personnel to the production and handling of safe food;
- Leadership to set the right direction and to engage all personnel in food safety practices;
- Awareness of the importance of food hygiene by all personnel in the food business;
- Open and clear communication among all personnel in the food business, including communication of deviations and expectations.
- The availability of sufficient resources to ensure the effective functioning of the food hygiene system.

Management should ensure the effectiveness of the food hygiene systems in place by:

- Ensuring that roles, responsibilities, and authorities are clearly communicated in the food business;
- Maintaining the integrity of the food hygiene system when changes are planned and implemented;
- Verifying that controls are carried out and working and that documentation is up to date;
- Ensuring that the appropriate training and supervision are in place for personnel.
- Ensuring compliance with relevant regulatory requirements.
- Encouraging continual improvement, where appropriate, taking into account developments in science, technology and best practice.

- Acknowledge that food products are most delicate goods on the market, for they are exposed to the risks like inadequate storage, wrong temperature levels, poor air quality, humidity, light and other factors influencing the quality and safety. The examples corroborating this are: with no optimal temperature, bacteria grow uncontrollably, and the light directly influences the quality of a fresh product. Likewise, without proper storage, goods become perishable. Therefore, every storage room has to be equipped with control units which report temperature levels at any time.

1.6.2 Catering Supervisor

Catering supervisor provides a safe working environment, adhering to Occupational Health and Safety, and Food Safety Environmental procedures, and ensuring they are always understood and practiced by the team.

Catering Supervisor Duties & Responsibilities

Responsibilities for this position include:

- To adhere to relevant Health, Safety and Hygiene legislation/guidelines
- Conduct weekly site inspection of all food premises to identify any issues leaks, stuck doors, missing ceiling panels, burnt out light bulbs and makes arrangements with other departments to have issues corrected
- Monitor and take corrective action to ensure compliance with food safety.
- Ensures all catering storage areas are kept clean and organized
- Plan and execute catered events as needed, from start to finish
- May assist coworkers during staffing shortages
- Determines when and whether to call employees in to cover staffing needs.
- To direct and supervise a small team of Catering Assistants in their day to day duties
- To be responsible for the identification of personal and team training needs
- To provide efficient counter service, ensuring the presentation of food is maintained to the highest standard, adhering to portion control guidelines
- Ensures that all set ups and products meet and exceed client expectations

- To ensure all financial regulations are adhered to
- To take weekly closing food stocks in Units

Catering Supervisor Qualifications

- University degree Business/Management would be preferred
- HACCP, ISO 22000 certification
- Attended supervisory food safety training such as level 3 and level 4 supervising food safety training
- 4 years in catering / food services
- 4 years in a leadership position

Skills for Catering Supervisor

- Leadership
- Operating an efficient cost effective program
- Internet
- MS Office
- Outlook

1.6.3 Catering Chef

Catering chef provides support to catering food service operations as the head catering chef: develops and supervises a culinary team that ensures consistency and quality across all catered events through training and coaching.

Catering Chef Duties & Responsibilities

Responsibilities for this position include:

- Supervise and participate in the production, preparation, and presentation of all foods to ensure that a consistent quality product is produced which conforms to all established standards
- Coordinate, plan, participate, and supervise the production, preparation and presentation of food for all catered functions
- Assist in menu planning, pre-costing and post-costing

- Perform recipe and menu planning by ensuring recipes are built to specification, maintaining inventory and production standards, and ordering specialty food items for menus
- Promote effective employee and staff relations by evaluating, leading, motivating, coaching, and providing corrective action
- Contribute to effective employee and staff relations by providing input on scheduling needs
- Comply with and enforce sanitation regulations and safety standards
- The Chef directly supervises kitchen personnel with responsibility for hiring, discipline, performance reviews and initiating pay increases
- Reporting to the catering supervisor

Skills for Catering Chef

Desired skills for catering chef include:

- Sanitation
- Food cost controls
- Presentation
- Food and catering trends with a focus on quality
- Principles and practices within the food profession
- Builds a diverse workforce
- Reporting to the catering supervisor
- Ensure health and safety standards are met by establishing and delivering food safety and hygiene programs and performing real-time training for staff
- Frequently twist/bend/stoop/squat, reach/work above shoulders, lift/carry/push/pull objects that weigh up to 10 pounds
- Occasionally lift/carry/push/pull objects.
- Knowledge and maintenance of all costs
- Provide operational analysis to the catering supervisor

Qualifications for catering chef

- May require passing a cooking and technical skills test
- Must have experience working in a catering or banquet setting
- Must have an extensive knowledge of cooking methods, cooking line, and pastry
- Ideal candidates will possess High School education, preferably a culinary degree, and two to three years in a related position with this company or other organization(s)
- Supervisory skills and excellent interpersonal skills
- Menu innovation.
- Two years of culinary/kitchen management experience
- Attended supervisory food safety training such as level 3 and level 4 supervising food safety training

1.7 Food Safety Culture

It is important for supervisors to adopt the "What if?" line of thought. The alternative line of thinking, "It has never happened here, so it is of no consequence to my business", will only lead to disaster. If something goes wrong supervisors must inform managers immediately. Food safety management involves a degree of lateral or creative thinking involving not only management but all employees in the food business. Creative thinking techniques are designed to generate new ideas. These new ideas will occur when two or more ideas are accidentally or deliberately combined when they have never been combined before. Creative thinking techniques provide the method for combining ideas in ways which may not normally occur. This combination generates a truly original idea which may contribute to food safety.

Involving all levels of staff will help lead to the development of a behavior-based food safety culture. A culture may be defined as "the way we do things around here". The "we" refers to managers, supervisors and junior employees alike. Everyone in the business should be encouraged to help in the development of a food safety culture. If the management team are seen to be learning then the employees are more likely to take to learning – but this will only happen with strong leadership.

There is little excuse for a supervisor to have less food safety training than a subordinate. Likewise if a subordinate has had experience of food safety in a previous form of employment then he or she should be encouraged to part with that knowledge. Team or brigade meetings are useful vehicles to discuss hygiene topics such as protective clothing, reporting of illness, etc. However, the supervisor must ensure that they practice what they preach too. Food handlers will be motivated, develop self-esteem, and be better learners if they have a better understanding about when they are doing a task and why they are doing it.

1.8 Regulations & other Requirement

- National Food Safety Authority Law No. (1) of 2017 – Egypt, and its executive regulations issued by Prime Minister's Decision No. (412) of 2019.
- Decision of the Board of Directors of the National Food Safety Authority No. (11) of 2020 regarding the rules for implementing food safety requirements in food establishments – Egypt.
- Decision of the Health Minister No. (458) of 2007 regarding the maximum limits and requirement for drinking water.
- Recommended International Code of Practice – General Principles of Food Hygiene
- The Hazard Analysis and Critical Control Point (HACCP) system and guidelines for its application
- ISO 22000: The food safety management system.

2. Food Hygiene & Safety

2.1 Good Hygiene Practices

2.1.1 Premises Construction & Equipment

A well-planned layout and the use of satisfactory building materials are essential to achieve high standards of hygiene. The size of the premises must facilitate efficient operation and the site must be large enough to accommodate possible future expansion.

The site shall have sufficient services, i.e. electricity and gas, water supply and effluent disposal, and be accessible for delivery and waste disposal. It should not be liable to flooding or unacceptable contamination from chemicals, dust, odor or pests. Potential for noise emissions should be considered if there are nearby residential premises.

To achieve a satisfactory design, the following principles should be considered:

- Clean and dirty processes must be separated to minimize the risk of contamination. Color coding may be used. Where possible:
    - work areas should be segregated into pre-cook and post-cook; and
    - A separate area should be provided for de-boxing and unwrapping raw materials.
- Workflow should be linear and progress in a uniform direction from raw material to finished product (from dirty to clean). This is essential to minimize risk of cross-contamination. Distances travelled by raw materials, utensils, food containers, waste food, packaging materials and staff should be minimized;

- Facilities for personal hygiene and disinfection of small items of equipment should relate to working areas and process risks; where appropriate, suitable facilities must be provided for temperature, humidity and other controls;
- The premises must be capable of being thoroughly cleaned and, if necessary, disinfected at the end of production;
- Insects, rodents and birds must be denied access and harborage; yard surfaces and roads within the boundary of the premises must have a suitable impervious surface with adequate drainage, and provision made for refuse storage; and
- Suitable provision must be made for staff welfare, including cloakroom and, if necessary, canteen and first-aid facilities.

2.1.2 The Construction of Food Premises

It is essential that the correct materials are chosen for all internal finishes and that they are properly fixed or applied. Materials should be non-toxic, durable and easy to maintain and clean. Flaking paint, for example, from ceilings and walls is a potential physical contaminant of food. Gaps or holes in walls and ceilings allow pest entry and harborage, and act as dirt traps. Uncovered light fittings pose the risk of glass contamination of food

Ceilings

Suspended ceilings are advantageous as horizontal pipework and services can be concealed in the ceiling void. They are normally constructed from a metal lattice incorporating cleansable

panels. Aluminum backed and faced fiberboard has proved successful in many food factories. Flush-fitting ventilation grilles and lighting will often be provided.

Solid ceilings should be well insulated (to prevent condensation and mould growth), smooth, fire-resistant, light-colored, and coved at wall joints. Finishes should be washable. A non-flaking emulsion may be suitable. Special attention must be paid to ceiling finishes above heat and/or steam-producing appliances such as ovens, sinks and retorts. Canopies and separate extraction units may be fitted in these areas. Ceiling height will vary depending on the type of operations being carried out but should be high enough to provide satisfactory working conditions and allow the installation of equipment.

Walls

Smooth, impervious, non-flaking, durable, light-colored wall surfaces are required which must be capable of being thoroughly cleaned and, if necessary, disinfected. Dark colored wall surfaces do not reflect light and dirt is more difficult to see. Internal solid walls are preferable to those with cavities.

When constructing factories, it can be advantageous to use modular buildings, of standard dimensions, with the actual production areas built inside the external structure, leaving clear walkways outside these areas, but within the overall structure. The 'building within the building' can be fabricated from modular panels of the type used for cold-store construction.

Wall surfaces in use include resin-bonded fiberglass, ceramic-faced blocks, plastic paneling, epoxy resin, glazed tiles with water-resistant grouting and rubberized paint on hard plaster or

sealed brickwork. Some paints incorporate a fungicidal additive. Galvanized steel, aluminum and stainless steel are also used, and plastic sheeting is popular. Wall or floor stops are needed to prevent doors damaging wall surfaces, and wall corners should be protected. Crash rails should be used if trolleys are likely to damage wall surfaces, although large, angled fillets to the wall-floor junctions can also prevent trolley impact.

Pipework and ducting should be bracketed at least 150mm from walls to facilitate cleaning. All lagging to pipes must be smooth and impervious. Pipes passing through external walls must be effectively sealed to prevent the ingress of pests.

Windows and doors

Any windows should either be fixed on north-facing walls to reduce glare and solar heat gains, or treated with solar film to counteract heat gain. Openable windows are required to improve ventilation and reduce condensation. Cleansable, well-fitting fly-screens must, where necessary, be fitted to opening windows. Windows should be constructed to facilitate cleaning and any internal window sills should be sloped to prevent their use as shelves.

Doors should have smooth, non-absorbent surfaces capable of being thoroughly cleaned. They should be tight-fitting and self-closing. Door handles and finger-plates should be

capable of disinfection. Swing doors with kick-plates are preferable to handles. External doorways should, where necessary, be proofed against the entry of insects, and metal kick-plates should be provided to prevent gnawing by rodents. Clear plastic strips can be used to protect openings.

Floors

Regard must be had to initial cost, durability, performance and safety. In food premises, floors should be durable, non-absorbent, anti-slip, without crevices and capable of being effectively cleaned. Where appropriate they must be resistant to acids, grease and salts and should slope sufficiently for liquids to drain to trapped gullies or channels; a slope (or 'fall') of 1 in 60 is the minimum recommended. The junctions between walls and floors should be coved.

Suitable flooring includes epoxy resin, granolithic (concrete incorporating granite chippings), welded anti-slip, vinyl sheet and slip-resistant ceramic or quarry tiles. Untreated concrete is unsuitable as it is porous, dusty and difficult to clean.

Cardboard or sawdust should not be placed on floor surfaces as it absorbs grease, moisture, bacteria and dirt. Sawdust can be blown onto food and cardboard causes a trip hazard.

Services

These include gas, electricity, water supplies, drainage, lighting and ventilation.

Gas supplies

Supply pipes should always be mounted clear of the floor and never too close to other pipes as to restrict access for cleaning. Flexible connections, to facilitate removal of equipment for cleaning purposes, are recommended.

Electrical supplies

Adequate numbers of power points should be available for all electrical equipment. Cut-out switches for power circuits should be accessible and separate from lighting and ventilation supplies, so that cleaning can take place in safety. Separate cut-out switches should be provided for refrigeration equipment.

Controls should be fixed clear of equipment to avoid becoming dirty or wet during cleaning. Removable electrical components assist cleaning and are advantageous. Surface-mounted electrical wiring should be protected by waterproof conduits. All switches should be flush-fitting and waterproof (especially in production areas).

Water supplies

Cold water supplies for use with food, for cleaning equipment or surfaces or for personal hygiene must be potable (of drinking water standard). They should not be fed via an intermediate tank unless chlorinated; mains supplies are preferable.

Water heating provisions should be able to supply hot water at a target discharge temperature of 60°C, although higher system temperatures may be required to avoid Legionnaires disease. In this case, mixer taps will be needed to avoid scalding. In hard water areas, provision for softening should be made.

Non-potable water must be conveyed in identifiable systems which have no connection with, nor any possible reflux into, the potable water system. An external water supply should always be available.

Drainage

Premises should have an efficient, smooth-bore drainage system. Drains and sewers should be adequate to remove peak loads quickly without flooding. Sufficient drains should be installed to facilitate effective cleaning of rooms by pressure jet cleaners or other means. Channels or trapped gullies may be used. Grease traps, if fitted, should be large enough to allow adequate time for fat to separate and should be emptied regularly.

The direction of flow should be from clean areas to dirty areas. Toilets should feed into the system after food rooms. Inspection chambers should be placed outside food rooms but if interior location is unavoidable they must be airtight, i.e. triple seal, and bolt down. All drainage systems must be provided with sufficient access points to allow rodding in the event of blockages. Petrol interceptors may be required for yard drains. Drains should be constructed to inhibit the harborage and movement of vermin. All external rainwater fall-pipes should be fitted with balloon guards to prevent rodent access. Circumference guards should be fitted around all vertical pipes fastened to walls, to prevent rodents climbing up them.

Ventilation

Sufficient ventilation must be provided to produce a satisfactory, safe working environment and to reduce humidity and temperatures which would encourage condensation and the rapid

multiplication of bacteria. Condensation encourages mold growth and the multiplication of bacteria and drips onto food. Normally, ambient temperatures should be below 25°C. Natural ventilation often needs supplementing by mechanical ventilation to ensure effective air circulation and adequate air changes.

You cannot rely on open windows. Extract ventilation should always flow from a clean to a dirty area. Its function is to prevent excessive heat buildup, condensation, dust, steam, and to remove odors and contaminated air. The source of input air must always be checked to ensure contaminants are not brought in to food rooms. Steam-producing equipment, such as cookers, boilers and blanchers, should be provided with adequately-sized canopies. Provision of lower heat-emitting equipment such as pressure vessels and microwave ovens, and upgrading insulation on ovens will reduce heat production.

Lighting

Suitable and sufficient lighting must be provided throughout food premises, including store rooms, passageways and stairways, so that employees can identify hazards and carry out tasks correctly.

Artificial lighting is often preferred to natural lighting because of problems of solar heat gain, glare, shadows and flying insects entering open windows. Recommended illumination levels are as follows: 150 lux in storerooms and 500 lux in preparation areas. Fluorescent tubes, fitted with diffusers to prevent glare and product contamination in the event of breakage, are recommended.

Handwashing facilities

Adequate facilities for handwashing and drying should be provided wherever the process demands. In particular, a suitable number of basins or troughs should be sited at the entrance of food rooms to ensure all persons entering wash their hands. Washbasins must be easily accessible, should only be used for washing hands and should not be obstructed. All basins and troughs, preferably made of stainless steel, should be connected to drains by properly trapped waste pipes. Washbasins should be clean and provided with hot and cold water, liquid soap, drying facilities and a sign indicating that they are for handwashing only. They should not be used for any other purpose. A clean nailbrush may also be provided. Mixer taps are preferable so hands can be washed under warm running water. Non-hand operable infrared taps are preferred as they reduce the risk of cross-contamination. Hand washbasins should be sited to avoid water from the washing of contaminated hands spraying onto uncovered ready-to-eat foods.

Cleaning and disinfection facilities

Where appropriate, adequate facilities for the cleaning and disinfection of utensils, crockery, cutlery, glasses and equipment should be provided. These facilities will normally be constructed from stainless steel. Twin sinks are preferable to facilitate washing and

disinfecting/rinsing. Sinks should be freestanding so that they can be removed easily after unscrewing the lower trap joint, freeing the waste pipe. 'Sterilizing' sinks and units should be capable of operating at 82°C.

Separate sinks must be provided for food preparation and equipment washing if the volume demands it. In small operations the same sink may be used if there is no risk to food safety. Exclusive food sinks may be provided with cold water only. Washing machines should not be sited in kitchens as this will involve bringing soiled and contaminated laundry into the kitchen. In the case of small nursing homes and guest houses this may even involve bedding and towels contaminated with body fluids. Laundry rooms should always be kept separate from kitchens to avoid the risk of contaminating food.

Sanitary conveniences and washing facilities

All new premises should be provided with adequate staff sanitary accommodation, adequately ventilated and lit. They should be kept clean and tidy. Rooms containing sanitary conveniences must be readily accessible but must not communicate directly with a room where food is processed, prepared or eaten. Internal wall and floor surfaces should permit wet cleaning sanitary accommodation should be self-closing and clearly illustrate the sex of the user. Suitable and sufficient washing facilities must be provided at readily accessible places. In particular, facilities must be provided in the immediate vicinity of every sanitary convenience and supplied with clean, hot and cold or warm water, liquid soap and appropriate drying facilities.

Cloakrooms and lockers

Adequate accommodation for outdoor clothing and footwear, not worn by the staff during normal working hours, must be available. Such articles must not be stored in a food room unless in suitable cupboards or lockers provided only for this purpose. Adequate facilities for drying wet clothing should also be provided. Cloakrooms must be kept clean and tidy as scraps of food and other materials may attract cockroaches and rodents.

The storage and disposal of waste

Waste disposal systems must be planned, along with other services, when food premises are designed. Refuse collectors should not have to enter food rooms or dining areas.

Waste food should be kept separate from paper and cardboard packaging. In some instances, waste may be stored under refrigeration pending collection, for example, bones in butchers' shops. It is preferable for all waste food to be removed from food premises

At least daily and general refuse to be removed at least twice a week. Accumulations of refuse in food rooms are illegal, attract pests and encourage the multiplication of bacteria. They create odors, prevent effective cleaning and expose food to risk of microbiological and physical contamination. Suitable, impervious, easy-to-clean containers with foot-operated lids should be provided in food rooms. Disposable plastic sacks are also ideal. Regular emptying of internal waste bins is important, even if the bins are not full. This will reduce unpleasant odors, maintain adequate capacity and minimize bacterial multiplication and insect problems, for example, from maggots.

Hazards that result from poor waste storage include: the attraction/multiplication of pests; the contamination of food (microbiological, chemical or physical); and the multiplication of bacteria.

Suitable facilities must be provided for the storage of waste externally, prior to removal from the establishment. Dustbins or bulk containers are commonly used, although skips and compactors are more appropriate for food factories. Compactors vary from units similar to a large dustbin to refuse-sack compactors and skip rams.

Dustbins should be stored clear of the ground, for example, on tubular steel racks, to facilitate cleaning and removal of spillages. All receptacles should be capable of being cleaned and provided with suitable tight-fitting lids or covers to prevent insects, birds and rodents gaining access. Overflowing bins attract pests.

The refuse area must have a well-drained, impervious surface which is capable of being kept clean. Standpipes, hoses and, possibly, high-pressure sprayers should be provided for cleaning purposes. Covered areas to protect refuse from the sun and rain are recommended. Satisfactory provision should be made for the disposal of liquid food waste such as oil. Refuse areas should be secure and not be too far from food rooms to discourage their use but they should not be too close to encourage flies to enter the food rooms. They should not be sited next to the main food delivery entrance. Covered ways between refuse areas and food rooms are useful to protect staff against inclement weather.

Perimeter areas

It is recommended that a concrete path, at least 675mm wide, abutting the external walls should be provided around all food buildings. This removes cover for rodents and enables early signs of pests to be discovered, for example, rodent droppings. Paths should be kept clean, free of vegetation and inspected regularly. A smooth band of rendering, around 450mm, at the base of external walls will discourage rodents from climbing. Whenever possible, a perimeter fence should be constructed around food premises to deter unauthorized entry. Areas within perimeter fences must be kept clean and tidy. Rubbish, old equipment and weeds must not be allowed to accumulate or provide harborage for insects or rodents.

Kitchen design

The layout of a well-designed commercial kitchen has three main characteristics:

- Clearly identified and separated flows; defined accommodation, specific to the purposes allocated; and economy of space provision (commensurate with good hygiene practice).
- The unit should also afford management personnel easy access to the areas under their control and good visibility in the areas which have to be supervised. Space is needed for management function and for equipment such as telephones and computers.

Flows

Four separate flows need to be considered: the food being produced; personnel; containers, utensils and equipment; and waste/refuse. Product flows should be subdivided into high-risk and contaminated (raw food) sections. Clear segregation should be maintained between the two. As far as practicable, flows should be in one direction without backtracking or crossover from 'dirty' to 'clean' or from 'low-risk' to 'high-risk'.

Accommodation

Accommodation should be sized according to operational need when at maximum production. Essentially, the working areas, stores, the equipment and its relative spacing should all be determined and laid out to suit the operation.

Areas should be allocated according to environmental compatibility; hot functions with hot, dirty with dirty, wet with wet, dry with dry, defined overall by segregation between high-risk and contaminated food handling. Equipment required for specific functions should be grouped and accessible, in order to avoid excessive walking and the temptation to take short cuts. Washbasins should be strategically located to ensure that operatives entering food preparation areas wash their hands.

Size

There should be a minimum of circulation and dead space, commensurate with the efficient functioning of the unit. Size should be neither too small nor too large; there are penalties in the over-provision of space as much as there are problems with too small a provision.

In catering, the size of the kitchen can only be determined when its exact purpose and function have been defined. Items to take into consideration include:

- The state of raw materials, for example ready prepared or not; the extent of the menu and number of sittings; the equipment used, for example microwave ovens; and the amount of dishwashing. Disposable plates, etc. may be used.
- Where both raw and ready-to-eat foods are to be prepared, it is important that physical separation is achievable; if this is not possible then operations should be scaled down to a level whereby this is achievable.

2.1.3 The Design and Construction of Equipment

The hygienic design of equipment is necessary to comply with legislative requirements, avoid product contamination and to facilitate cost-effective cleaning and, if necessary, disinfection.

Poorly designed equipment, which cannot be dismantled, may be un-cleanable, incapable of being chemically disinfected and may result in product contamination by pathogenic bacteria. Even if equipment can be dismantled, unhygienic design may make cleaning and disinfection prohibitively expensive.

Machinery

New machinery used for preparing and processing foodstuffs carries a CE marking and must be designed and constructed to avoid health risks and in particular:

- Contact materials of foodstuffs must satisfy the conditions set down in the relevant directives. Machinery must be designed and constructed to facilitate cleaning;

- All surfaces and joints must be smooth, without ridges or crevices which could harbor organic materials; projections, edges and recesses should be minimal. Continuous welding is preferable. Screws and rivets should not be used unless technically unavoidable; contact surfaces must be easily cleaned and disinfected. The design of internal surfaces, angles, etc. must allow thorough cleaning;
- Cleaning residues must drain from equipment surfaces, pipework, etc., there must be no retention in voids; the design should prevent organic accumulations or insect infestation in un-cleanable areas, e.g. by the use of castors or sealed bases; and lubricants must not come into contact with any product.

Construction materials

Materials in contact with food must be non-toxic, non-tainting and constituents from their surfaces must not migrate into the food or be absorbed by the food in quantities which could endanger health. Materials must have adequate strength over a wide temperature range, a reasonable life, be corrosion and abrasion resistant and be easily cleaned and disinfected. In most meat plants, the use of wood is forbidden except in rooms used for the storage of hygienically packed fresh meat.

The most widely used material is food-grade stainless steel. Some plastics may be suitable, but must be approved for food use. Aluminum should be avoided, as should copper and zinc. Handles of knives, brushes and other equipment should all be made from cleansable materials such as polypropylene or high-density stainless steel.

Surfaces should be smooth, non-porous, continuous, non-flaking and free from cracks, crevices and pits. Surfaces will need to retain a satisfactory finish throughout their life including anticipated abuse and normal wear and tear. Poor surfaces harbor grease, dirt and bacteria and are difficult to clean and disinfect. They may also result in physical contamination. Equipment that is damaged, chipped, cracked and pitted may need to be replaced. Temporary repairs with string or tape are unacceptable. Joints should be made by welding or continuous bonding to reduce projections, edges and recesses to a minimum. Soft wood is unsuitable as it is porous, cracks and splinters and is difficult to clean.

Equipment exterior

The external surfaces of equipment must avoid ledges and dust-traps; for example, round legs are preferred to rectangular. It is important to avoid recessed corners, sharp edges, unfilled

seams, uneven surfaces and hollows and projecting bolt heads, threads, screws or rivets that cannot be cleaned. Inaccessible spaces, pockets and crevices where product may accumulate must be absent.

Fixing and siting of equipment

Equipment must be sited so that there is sufficient space to facilitate access to all external and internal surfaces and, where required, to allow for rapid dismantling and reassembly. Machinery may be mounted on coved, raised platforms of concrete to facilitate cleaning. Where necessary, additional space may need to be provided. The bases and lower parts of machines, including motors and gears, may be difficult to clean and consequently collect dust and spillages which make ideal breeding sites for insects. Skirting or cover plates tend to trap dust.

Where practicable, and with due regard for safety, equipment can be mobile to facilitate its removal for cleaning. Gas and electricity supply pipes should be flexible and capable of being disconnected to facilitate cleaning. This will also enable adjacent wall surfaces and the floor to be effectively cleaned.

Drainage

All pipelines, vessels and equipment should be self-draining, not only to enable liquid deriving from foodstuffs to be discharged but also for cleaning and rinsing fluids. U-bends are fitted to sinks, toilets, etc. to stop odors and pests from the drains getting into food rooms.

The cleaning of equipment

All operating instructions and procedures must be clearly communicated to the equipment users and cleaners. The equipment should be capable of being cleaned and, if necessary, disinfected safely, thoroughly and rapidly without the need for skilled fitters and specialized

tools. If dismantling is necessary this must be achieved relatively easily, as should reassembly.

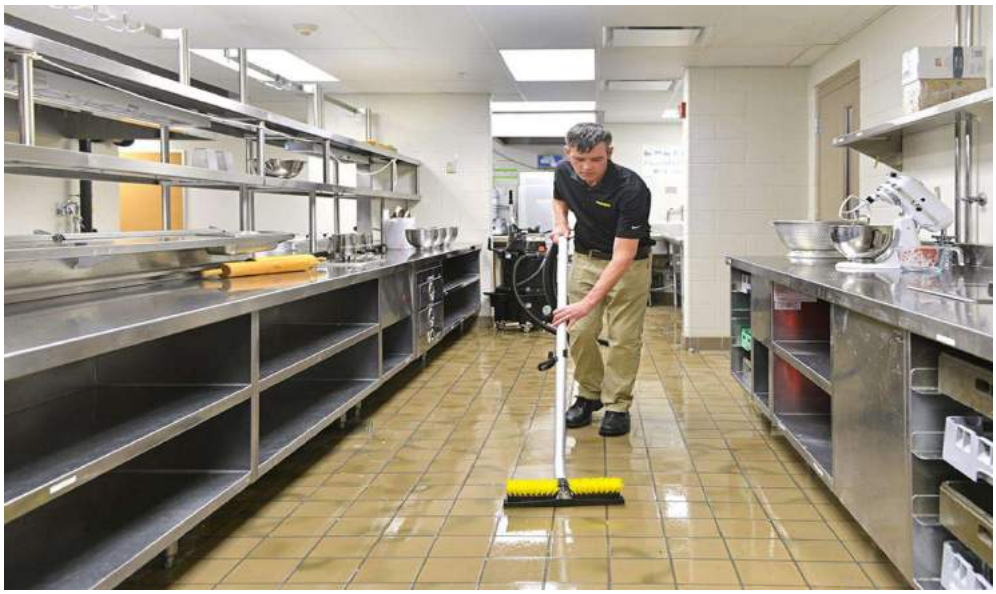
Sharp edges are a serious hazard for cleaners. A reluctance to clean equipment because of poor design will result in a lowering of hygienic standards. Hinges should be capable of being taken apart for cleaning. Angle-iron is difficult to clean and tubular construction is preferred. Open ends to tubular legs must be sealed.

2.1.4 Maintenance of Premises and Equipment

Supervising maintenance

There should be close supervision of external contractors to ensure that they work safely and do not expose food to contamination. External contractors must complete a visitor's medical questionnaire. The supervisor should check that contractors' working areas are screened off from food production. Contractors should ensure that they do not leave equipment or materials like wiring and metal waste that could result in physical contamination of food. The work areas should be carefully checked before food production can be resumed.

Cleaning



The supervisor should ensure that the premises and equipment cleaning schedules are fully implemented, and that external cleaning contractors' work standards are monitored. It is important that equipment be adequately cleaned to ensure that it works efficiently and does not show unnecessary wear.

Routine monitoring

The supervisor should conduct daily checks for obvious defects in premises and equipment, for example:

- Damaged fly screens or leaking pipes and taps; damaged cables and defective electric plugs; and missing light covers.
- The supervisor will need to train food handlers about what to look for, what needs checking, and how to report faults.

Planned maintenance

When organizing a maintenance program, the supervisor should identify the equipment or areas of the premises to be maintained, the actual work needed, the frequency of maintenance and the competencies of people to do it. Suppliers of food processing equipment must provide the food business operator with accurate information on recommended products and methods of cleaning, disinfecting and rinsing - as well as operation and maintenance. Only competent and properly trained contractors should be allowed to carry out work in food

premises, for example, for electrical or gas appliance maintenance. The supervisor should monitor the correct implementation of planned maintenance, and take corrective action if any.

Inspections and tests

There is a legal requirement for some food processing equipment like steam and pressure appliances to be periodically tested. Specialist engineering inspection companies are usually employed to carry out tests on such equipment

The Institution of Electrical Engineers recommends that electrical food processing equipment in factories and catering outlets are more frequently inspected than electrical appliances in offices and domestic premises. For example, due to heavy usage, portable appliances like food mixers should be formally inspected every month and given a combined inspection and test every six months. Supervisors will monitor that periodic planned testing, such as portable appliance testing (electrical items), is carried out, that records are completed for each test and check that follow up maintenance is completed.

2.1.5 Food supply and services

An effective documented checking system should be in place for selecting suppliers and dealing with deliveries. This will assist in demonstrating due diligence, should the need arise, and ensure that deliveries meet the agreed specification. Deliveries should only be accepted from approved suppliers. All deliveries should be checked before storage. The delivery vehicle should be clean and, if necessary, refrigerated. All outer packaging should be in good condition and not be discolored or contaminated, e.g. from bird droppings, blood from raw meat, contaminated water or soil from raw fruit and vegetables. Where contamination of packaging is likely, it should be removed prior to storage. Food should be of a good quality and suitably labeled and date coded. It should have sufficient shelf life to enable it to be used. Chilled food should be delivered below 5°C and frozen food at/or below -18°C. Food should be checked with a calibrated probe thermometer and details recorded. Satisfactory deliveries should be moved to storage within 15 minutes of unloading. If high-risk food is delivered in an unrefrigerated vehicle, it should usually be rejected. However, in certain circumstances involving very short journeys the temperature of the food should be checked, if it is below 8°C it may be accepted. Food from unapproved sources, unsatisfactory delivery vehicles, out of date, damaged packaging, showing evidence of pests, or chilled food above 8°C or frozen food above -15°C should be rejected and the supplier notified. Alternative suppliers may be required if there are serious or frequent problems and

rejections. Raw food and high-risk food should be completely segregated to avoid risk of contamination. Non-food items, especially chemicals, and strong-smelling foods which may cause taint problems should normally be delivered separately. Delivery records should be completed for foods that are accepted or rejected including details of any checks undertaken, e.g. temperature. The delivery area should be kept clean and tidy and someone should always be available to accept deliveries

The contractor shall undergo the following steps:

- At before being added to the bidder list shall undergo an evaluation for the presence of the basic needs for the GHP.
- After being added to the bidders list shall be in shows a good performance his previous contracts at the same service at the same sector at the tendering process.
- During the service provision shall undergo a continuous evaluation for the performance against the performance and the HSE KPIs previously identified during the tendering phase.
- At the end of the service shall be evaluated for the overall performance to be added to the blacklisted or medium service providers or best service and recommended providers this shall be reported to EGPC.

Figure 1: Contractors Management

Incoming Materials and Suppliers

- The control of the safety of incoming food and food contact material is one of the most challenging areas for any food business. The most important criteria is evidence that the supplier has implemented a food safety management system and provides detailed food safety information to the business if requested
- Only raw materials and other ingredients that are fit for purpose should be used.
- Incoming materials including food ingredients should be procured according to specifications, and their compliance with food safety and suitability specifications should be verified where necessary.
- Supplier quality assurance activities, such as audits, may be appropriate for some ingredients.
- Raw materials or other ingredients should, where appropriate, be inspected (e.g. visual examination for packages damaged during transportation, use-by-date and declared allergens, or temperature measurement for refrigerated and frozen foods) for appropriate action before processing.

- Where appropriate, laboratory tests could be conducted to check food safety and suitability of raw materials or ingredients. These tests may be conducted by a supplier that provides a Certificate of Analysis, the purchaser, or both.

- No incoming material should be accepted by an establishment if it is known to contain chemical, physical or microbiological contaminants which would not be reduced to an acceptable level by controls applied during sorting and/or processing where appropriate.
- Stocks of raw materials and other ingredients should be subject to effective stock rotation. Documentation of key information for incoming materials (e.g. supplier details, date of receipt, quantity etc.)
- Critical suppliers: the suppliers of high risk ready-to-eat foods are critical, because there is no further step in the kitchen that will reduce or eliminate the hazard, if present. The level of control for suppliers of these foods should be enhanced with detailed food safety criteria established should be maintained monitored and verified. For example, the purchase of oysters, cooked meats and fruit/ vegetables to be served raw and unpeeled.

2.1.6 Purchasing

- Preparing an approved supplier list. All suppliers shall be licensed as follow:
    - HACCP and food hygiene certificate.
    - Health certificates for the supplier's work team.
    - License certificate to work in foodstuffs.
    - Calibration certificate for the refrigerator of the food transport vehicle (valid and approved by an accredited calibration body).

- Slaughter and suitability certificates for permanently fresh meat, fish and poultry.
- Certificates of supplied food origin.
- Quality manual for food.

- Determining appropriate order size.

2.1.7 Transportation

Food must be kept safe at all times including during transportation. **To keep food safe, regulation says that food must be protected from temperature abuse and contamination during transportation.** Food must be from an inspected supplier, with proper labels, documentation or tags. Vehicles used to transport food must meet the requirements set out in the Egyptian Regulation. If a vehicle is transporting foods at improper temperatures or in a way that food can become contaminated.

Foods commonly associated with food poisoning: seafood, meat, poultry, ready-to-eat foods, eggs and egg products, milk and dairy products, frozen foods and fresh produce.

Protection from Contamination

- Protect food from contamination during transport by keeping foods in original packaging; storage boxes are single use only and should not be reused
- Store fresh produce and ready-to-eat food in an area of the truck away from raw meats, poultry and seafood

- Protect food from insects, rodents or rodent droppings, bird droppings, chemicals, dirty water, waste products, toxic materials, dirty equipment, etc.

Vehicles used for transporting foods that need to be kept cold or frozen must be equipped with a working refrigeration unit.

Refrigerated foods must be at 4°C / 40°F, or less during transportation

Frozen foods must remain frozen during transport (-18°C / 0°F).

The refrigeration unit must be running at all times, even during delivery while the vehicle is stopped or parked.

Food Transport Vehicles

- Vehicle must be clean, in good repair and must be equipped with a working refrigeration unit
- Food should not be stored in the cab of the vehicle (front seat)
- Food transportation vehicles should be checked for cleanliness, and properly working refrigeration equipment before going on the road
- Clean truck storage area before loading if any food products have leaked or spilt

2.1.8 Receiving

- All food licenses required shall be revised.
- Ensure fresh appearance of raw materials (intact, without bruises/spots, patches, shriveled etc.).
- Ensure raw materials are free from any no off odor, spoilage, putrefaction and fungal (frothy) growth.

- Chilled and frozen products shall be received at correct temperature. If there are any signs of thawing or temperature abuse (e.g. water droplets inside the pack etc.) the product shall be discarded.
- Raw materials are free from any physical impurities (e.g. dirt, dust, stones, wood, and signs of infestation, pest or their remains, metal pieces or any other foreign matter).
- Packaging and pack seals shall be intact and without leakage, dents, puffing or rusting signs
- Raw materials shall be under 'best before'/'expiry' or 'Use by' date.
- Ensure labeling of the products.
- Ensure the Government slaughterhouse stamps on the raw meat delivered as follow:
    - The stamp contains important data, including the date of slaughter, meaning the day of slaughter, meaning on Saturday you will find number (1), Sunday (2), until Friday number (7). This means that when you buy meat on Thursday, for example, you are supposed to find number (6) on the stamp. Other than that, there is no slaughter today.
    - The stamp also contains the secret mark, the slaughterhouse code number, and the type of Slaughtered animal.
    - The circular stamp is used for young meat (under 5 years), and this is the highest quality. The square stamp is used for old meat (over 5 years), and this is of lower quality than young meat. Goats are always sealed with the square stamp.
    - The purple stamp is for imported meat (Sudanese, for example).
    - Veal meat does not have a seal because it is forbidden to be slaughtered in slaughterhouses.

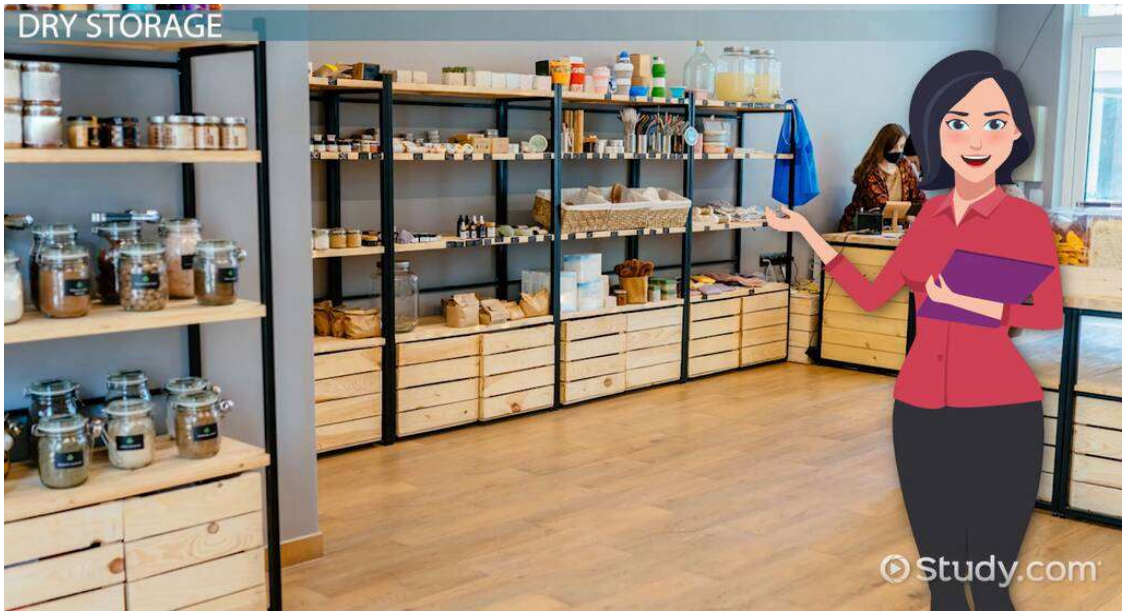
- Emergency slaughtered animals (Awared meat) has eight-sided red seals. Awared is any animal that has had an emergency accident or is on the verge of death without the cause being pathological. These are sold as meat at a lower price.

2.1.9 Storage

All food items have recommended storage procedures that include temperature, shelf life and place of storage.

The three main types of storage are:

Dry Storage



- The dry stores shall be kept clean and free of garbage and food scraps.
- **Temperature:** Keep storerooms cool, dry and well ventilated. The temperature should be between 10°C and 20°C. The cooler, the better. Temperature has more to do with how long well-dried foods store than anything else. The storage lives of most foods are cut in half by every increase of 18°F (10°C). There is probably a limit as to how far this statement can be taken, but a reasonable expectation of shelf life may be extrapolated from room temperature down to freezing. No doubt, the inverse could also be considered true. Cool storage reduces respiratory activity and the degradation of enzymes; it reduces internal water loss and inhibits the growth of decay producing organisms, and in some foods such as fruits and root crops, it slows the production of ethylene, a naturally occurring ripening agent. As part of maintaining optimal temperature, it is suggested that adequate ventilation should be provided (some air exchange rate is absolutely essential). In addition, the storeroom should be free of un-insulated steam and water pipes, water heaters, transformers, refrigeration condensing units, steam generators or other heat producing equipment.. This includes: Preserved or dry goods or canned, bottled, bagged or boxed items, cakes and biscuits.
- **Humidity**: Ideally, storage areas should have a humidity level of 15% or less. Unless the storeroom is located in the desert, consider air conditioning or dehumidification during the most humid times of the year. A second option is to use moisture impervious packaging. Ideally, there is no reason not to use both. Maintain stored foods in their original packages whenever possible. Most packaging is designed for

the food it contains and will remain in good condition for their given shelf-life in the absence of temperature and humidity abuse. For instance, the cardboard box will help cushion jars and other glass containers from breakage. If original packaging is not practical, maintain the food in airtight containers, primarily to prevent the entry of insect and rodent pests and keep out other contaminants. To take this to another level, consider oxygen as a major threat to the quality of food. The chances are that moisture-proof packaging is also airtight. The less head gas (<2% O2) in a package, the longer its shelf life is maintained.

- **Sunlight:** Avoid storing foods in direct sunlight. Sunlight promotes oxidation and the subsequent loss of the food's nutritional value and quality. Fat-soluble vitamins, such as A, D, E and K are particularly sensitive to light degradation. It is far better to block sunlight on windows and skylights and rely on artificial illumination for the time the storeroom is in use.
- **Storage for Risk Reduction:** Store dry foods at least six inches off the floor and at least 18 inches away from outer walls to reduce the chances of condensation brought on by temperature differences between the container and the surface against which it rests, as well as to facilitate cleaning and pest control activities. In the absence of rapid turnover of bulk palletized storage, consider placing the clean pallets on racks or blocks at least four inches (six inches is preferable) off the floor. This seemingly insignificant procedure goes a long way in preventing the harborage of pestilence, particularly rodents. It is also suggested that a 2-ft. ceiling clearance be maintained to avoid high temperatures at the ceiling. Set aside an area that is designated for damaged or rework products. Torn containers should be taped or otherwise secured to prevent entry of contaminants and prevent further spillage.
- Do not store economic poisons, cleaning supplies and other non-food items in the same storeroom as food without some physical barrier that separate the two. I am also a strong proponent of storing look-alike condiments and other ingredients, such as salt and sugar, in spatially separate locations within a storeroom to avoid interchanging these products.

- **Vermin:** To prevent the entry of insects, rodents and birds into the storeroom, doors and windows should be rodent and insect-proofed and kept closed whenever possible. Any opening to the outside should be sealed and all structural cracks and crevices promptly repaired. Bait boxes, if needed, should be regularly monitored and any damaged bait boxes and spilled bait should be carefully cleaned up and removed. If fumigation is absolutely essential, rely only on experienced licensed control operators. Along these lines, the exterior of the building in which the storeroom is located should be maintained free of fire hazards, pest infestations and to preclude any security problems.

- **Food Rotation**: Date all foods and food containers. Stored foods cannot get any better than what originally went in, but they can certainly get worse. The first food in should be the first food out: FIFO. It takes a bit of imagination and craft to position foods within a storeroom to best implement this principle. Keep a handy and readily visible record of the "use by" and "sell by" dates of the received foods and the shelf life in general.

Refrigerated Storage

First, some basic tips on getting the most out of your fridge space on a daily basis:

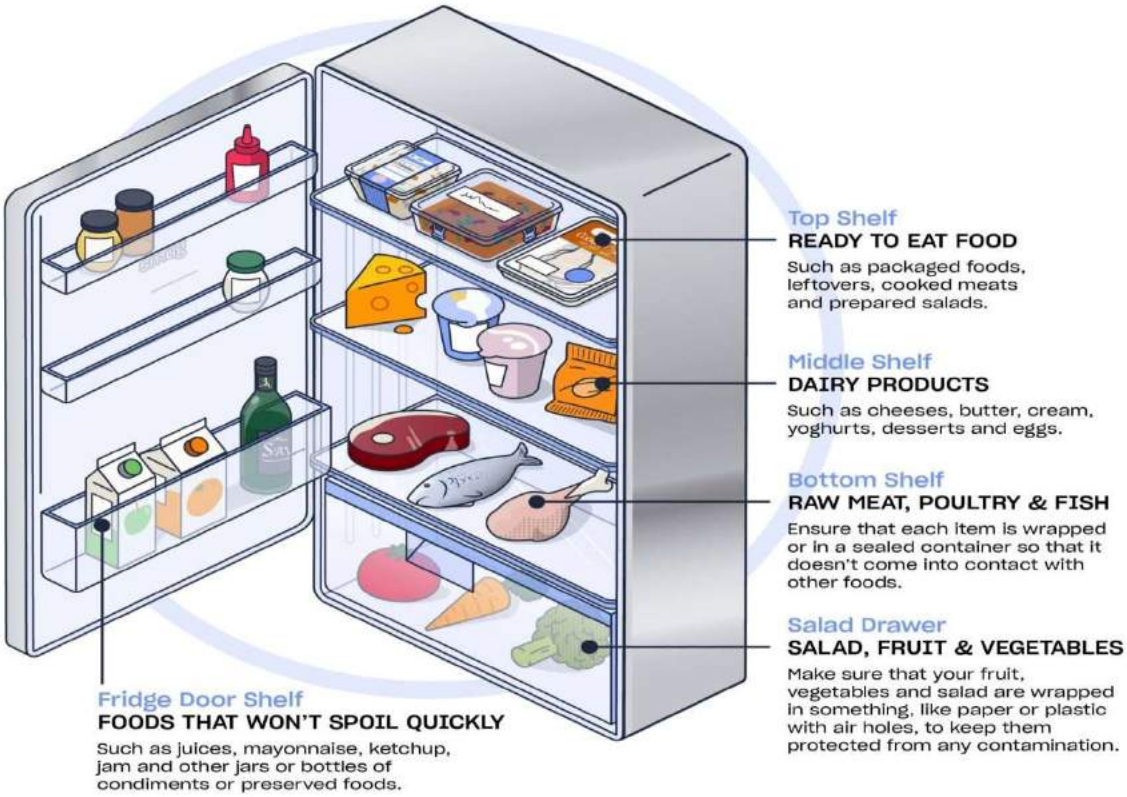
- **Get a fridge thermometer.** There are a number of things that can cause your fridge to break down or lose power: electrical shorts or surges, clogged ventilation, et cetera. So it's possible that even with your temperature dial adjusted to the correct position, your fridge might be far warmer than it should be. A simple dial thermometer helps you monitor things to ensure that you're never caught in the dark.
- **Transfer food to smaller containers.** Air is the enemy of most foods and can increase their rate of spoilage. By transferring them to smaller containers, you not only minimize air contact, but you also help keep your fridge organized and easy to navigate.
- **Label everything.** As soon as you transfer food into a smaller storage container, label the container, using permanent marker on masking tape, with the date of storage as well as what's inside. As much as I promote good science, there are some things that simply aren't worth experimenting with; creating life inside your refrigerator is one of them.

- **Prevent drippage.** To avoid messes and dangerous cross-contamination, always store raw meat on a plate or tray to catch any drips.
- **Keep fish extra cold.** It's best to use fresh fish immediately, but if you must store it, wrap it in plastic, and sandwich it between two ice packs on a tray to ensure that it stays at 32°F (0°C) or colder until ready to use. (Don't worry—because of dissolved solids in its cell structure, it won't freeze until well below 32°F.)

There are three overriding factors to consider when deciding what to store where in the fridge.

- **Food safety** is of utmost importance. Fridges keep food fresh for longer, but that doesn't mean that harmful bacteria can't multiply to dangerous levels given enough time. To minimize risk, here's a rule of thumb: The more likely it is that a food could make you sick, and the higher the final temperature you intend to cook it to, the lower in the refrigerator it should be stored, both to keep it cooler and to prevent cross-contamination.
- **Temperature** varies throughout your refrigerator, with, as mentioned earlier, either the very back of the bottom shelf or the back of the top shelf, near the vent, being the coldest spot, depending on the model. For maximum storage life, your refrigerator should be set to hold a minimum temperature of 34°F (1°C) in these spots. No part of your refrigerator should rise above 39°F (4°C).
- **Humidity** plays a role in the freshness of vegetables. The crisper drawers in the bottom of your refrigerator are designed to prevent fresh cold air from circulating into them. Vegetables naturally emit a bit of energy as they go about their normal energy cycles, heating up the space in the drawer, thus enabling it to retain more moisture. Moist air can help prevent vegetables from shriveling or drying out. Crisper drawers have a slider that controls the ventilation so that you can adjust the moisture level inside the drawer. The key is to maximize it, up to just below the point that moisture would start beading up on the vegetables' surfaces.

Control measures



- Meats, seafood, dairy products, poultry, eggs, cooked or prepared foods, chilled foods, vegetables and some fruits should be refrigerated.
- All food items should be kept between 0 – 4°C. Temperatures outside this range encourage food spoilage and high bacteria growth, leading to possible food poisoning outbreaks.
- Refrigerators should be cleaned and sanitized on a regular basis.
- Maintain correct temperature by using internal thermometer to cross check temperature.
- Place all products above floor level on suitable shelving to allow air to circulate and cool all products.
- Prevent cross-contamination by providing item-specific storage areas, e.g. dairy section, raw meat section, seafood section.
- Food should be cooled as rapidly as possible to prevent food spoilage before being refrigerated.
- Label and date all food items to aid in correct stock rotation.

- Always observe use by dates.

Freezer Storage

Here are some tips for better freezer storage: Highly perishable and short shelf life food products can be stored in a freezer to extend their shelf life.

- Keep your vents clear. Make sure you don't stack food against the air vents, or you'll strain the freezer, greatly reducing its efficiency and efficacy.
- Freeze flat. Wide, flat shapes freeze faster and can be stacked more efficiently than bulky packages. Freeze meats and liquids in a single layer in vacuum-sealed packages or freezer bags. Not only will this help you organize your freezer space, it'll also greatly cut down on defrosting time.
- Label everything! All packages should have the contents and dates written on them. Nobody likes to play the frozen-mystery guessing game.
- Freezers should be kept at a temperature of -18°C or below.
- Meat, poultry, seafood and cooked or prepared foods can be frozen.
- Frozen poultry should be tightly wrapped in cling wrap and stored at -18°C.
- Frozen fish should be tightly and individually wrapped and stored at -18°C.
- Items stored in paper, cardboard or tins should not be stored in a freezer, because defrosting will cause paper products to breakdown and become soggy and tins to corrode.
- Freezers should be cleaned and sanitized on a regular basis.
- To maintain correct temperature of freezers. Use thermometers to cross check operating temperature.
- All food items should be adequately chilled prior to freezing.
- All items should be completely covered or wrapped in cling wrap so as to prevent ‘freezer burn’. Freezer burn is when temperatures below zero draw moisture out of exposed or incorrectly wrapped items. This causes food spoilage.
- Apply stock rotation to all products stored this way.

- Thaw frozen meat carefully under refrigeration.
- Frozen meats will not keep indefinitely for example:
    - Beef will keep 9–12 months at -18°C.
    - Veal & Lamb will keep for 6 months at -18°C.
    - Poultry will keep for 4–6 months at -18°C.
- Never freeze spoiling meat, poultry or seafood. You should tell your supervisor and dispose of such damaged food items.
- Do not freeze fresh fruit. This destroys the fruit by causing the flesh to swell and become mushy and inedible once thawed.

Using stored items

- The Stock Rotation System (First In – First Out) should be used for stored food. This involves the following steps.
- Mark a date on all newly received goods.
- Goods that are received into stock must be packed behind or underneath stock items already in stock. This is to ensure that older stock is used first.
- Pack all stock above floor level to reduce the likelihood of pest infestation.
- The purpose of this system is to make sure that no stock is ever allowed to spoil. Spoiled stock is wasted stock. Waste means higher costs and lower profits.

2.1.10 Preparation

The following instructions shall be implemented

- ***Sorting or cleaning***
    - Sort all raw materials (e.g. grains, fruits & vegetables etc.) and remove undesirable/spoiled parts before use.
    - Sieve all dry, powdered raw materials (e.g. flour, powdered sugar) before use.
    - Strain all liquid raw materials (e.g. syrups etc.) before use.
- ***Washing***

- Only potable water is used for washing of food products.
- Uncooked, ready-to-eat fruits & vegetables are disinfected with 50 ppm chlorinated water before cutting, peeling or serving.
- Wash water is not re-used for washing equipment, utensils, containers or food products.

- ***Thawing of food products***
  - The best way to safely defrost meat is on a plate or a rimmed baking sheet in the refrigerator. Be aware that it'll probably take longer than you think: Allow at least overnight for thin items. In emergencies, thinner foods can be rapidly defrosted by placing them in a bowl of cold water under a slowly running tap, or, better yet, placed on an aluminum tray or pan, which will very quickly transmit energy from the room to the food. Steaks will defrost about 50% faster on an aluminum tray than on a wooden or plastic cutting board. Turn them over every half hour or so as they thaw. Do not try to defrost large items rapidly; the risk of dangerous bacteria growing on the exterior before the interior defrosts is too great.
  - Only required portion of the food is thawed at a time
  - Products from which melt-water is released are kept in a drip tray at the bottom of the refrigerator
  - Thawed products are used immediately and not refrozen or kept in Chiller

The frozen chicken is directly placed in the sink to be thawed. The chicken should be sealed in a plastic bag, placed in a container and then thawed under running water.

2.1.11 Cooking of food

- Food shall be cooked thoroughly with temperature reaching at least 70 °C.
- Salads/ garnishes/uncooked ready-to-eat foods shall be prepared from thoroughly washed raw materials.
- Processing/cooking shall be done in clean and hygienic area.
- Clean equipment and utensils shall be used for cooking/processing.
- Separate equipment and utensils shall be used for veg. & non-veg. products.
- Frying oil/fat shall be changed immediately when there is color change, visible fouling and scum formation.
- Processing of food/handling/serving shall be done in covered areas.
- Cook food thoroughly by keeping to the required cooking time and temperature to kill any harmful germs in the food.
- Cook meat including chicken and other poultry thoroughly.
- Use a food thermometer to check the internal temperature of large cuts of meat, poultry and other dishes when cooking and reheating.
- Ensure that the internal temperature of meat reaches at least 75°C.
- Cook liquid foods such as soup, gravies and sauces thoroughly to a complete boil.

- Make sure that fish and other seafood are cooked thoroughly by checking for a change in texture and color.
- Preheat ovens and grills before placing the food item to cook or reheat. If ovens and grills are not preheated, then be mindful that the food will take longer to cook.

Reheating

- It is not preferable to reheat food.
- Only if necessary, reheat food thoroughly by checking that solid foods give off steam, and liquid foods bubble or simmer thoroughly. Ideally, ensure that food is heated to a temperature of 75°C for at least 2 minutes.
- Reheat food only once. Do not repeatedly reheat the food for consumption over a few days.
- You must always reheat food thoroughly and quickly before placing into hot holding. The longer the food takes to warm up e.g. in a slow cooker, the longer it remains in the Temperature Danger Zone.

2.1.12 Holding

Once food is prepared it shall be served as quickly as possible.

- Hot Food – (Foods Cooked and Kept Hot or Re-heated)
    - Hot food shall be held at an internal temperature of 60°C or higher;

- If reheating will be required, heat the food to 74°C;
- Only use heat-holding equipment that can keep food at the proper temperature.

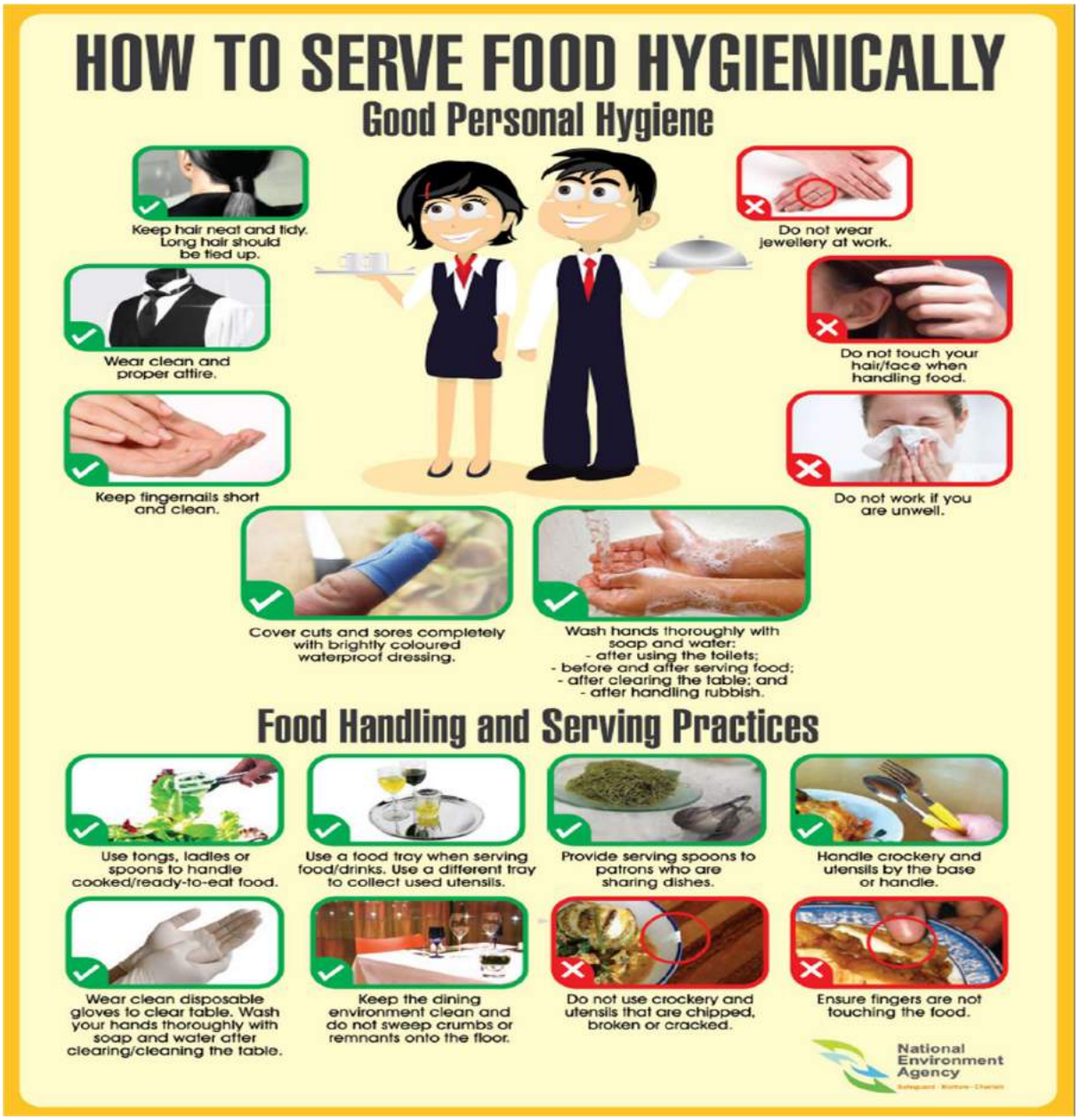
- Cold Food – (Chilled and Prepared Cold Foods)
  - Cold food shall be held at an internal temperature of 5°C or lower;
  - Use only cold-holding equipment that can keep food at the proper temperature;
  - Do not store food directly on ice; whole fruit and vegetables are the only exception.

2.1.13 Display of food

- Sale/display counters shall be intact, clean and properly maintained.
- Floor below & behind the counters and display racks shall be clean.
- The refrigerators shall be clean and without off-odors.
- Spoiled and damaged products shall not be displayed.
- Food products (except whole fruits and vegetables) shall be kept covered at display counter.
- Counter display of cold foods & beverages shall be at 5 °C or below.
- Counter display of hot foods shall be at 60 °C or above.
- Veg. & Non-veg. products shall be properly labelled, displayed separately or physically separated and displayed in separate compartments.
- FIFO (First in First Out), FMFO (First Manufactured First Out), FEFO (First Expired First Out) principles shall be followed.

2.1.14 Serving of food

- Food shall be served in clean and intact utensils or one-time-use disposables.
- Single use/disposable items shall not be re-used.
- Clean and non-toxic material shall be used for packing of food. Printed paper shall not be used for wrapping/storing or serving food.
- Re-usable serving utensils/items shall be washed, cleaned & disinfected after each use.
- All tables and food serving counters shall be kept clean.



2.1.15 Handling unused and leftover foods

- Discard hot foods after two hours if they have not been held at above 60°C.
- Discard cold foods after two hours if they have not been held at below 5°C.
- Food left on plates or on the table shall be discarded promptly.
- Unopened non-refrigerated packages may be saved.

2.2 Operation controls

2.2.1 Time & Temperature control.

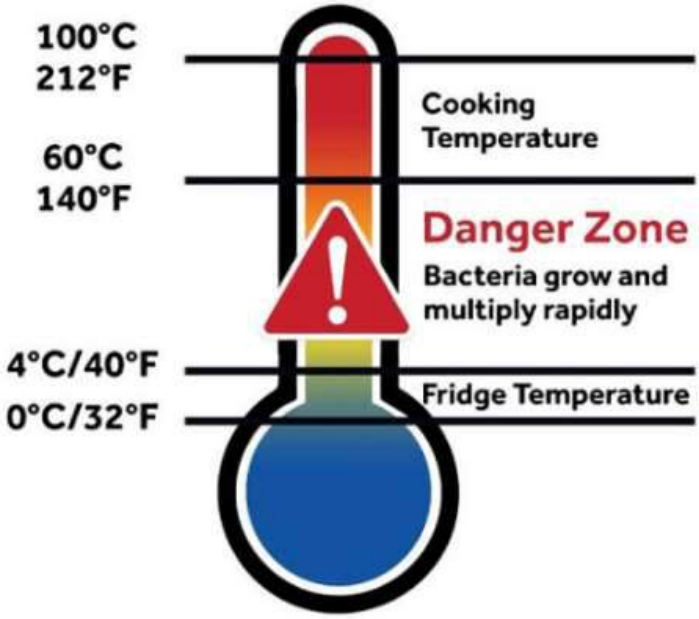
Temperature control

At certain temperatures, microorganisms can multiply very quickly to harmful levels, which increases the risk of food-borne illness. By keeping food at low or high temperatures, we can stop or slow down the growth of these dangerous pathogens.

The temperature range in which pathogens grow most quickly is called the "Temperature Danger Zone". When working with food, it's important to minimize the amount of time that food spends in the Temperature Danger Zone. Temperature control is the most effective method of reducing the growth of harmful pathogens in food.

There are four food temperature zones that are important to know:

1. 60°C / 140°F and above is known as the hot food zone. As a general rule, food should always be cooked to 74°C / 165°F (or more) but must not drop below 60°C / 140°F when being displayed or served.
2. 0°C to 4°C / 32°F to 40°F is the cold food zone and is the normal temperature for most refrigerators.
3. Frozen food is normally held at -18°C / 0°F or lower.
4. This means that the Temperature Danger Zone for food is between 4°C and 60°C / 40°F to 140°F.



Control procedures:

- Control the temperature of food at all stages of production, storage, transportation, and service.
- Different foods have different temperature requirements for chilling, freezing, heating and storing, with high-risk foods like meat, dairy, seafood and eggs subject to the strictest rules.
- You should use thermometers and other devices to monitor and record the temperature of food, and follow the guidelines for the minimum and maximum temperatures for different types of food.
- You should also avoid leaving food at room temperature for too long, as this can increase the risk of bacterial growth and spoilage.
- Moreover, you should thaw, cook, reheat, cool, and freeze food correctly and safely, and avoid cross-contamination between raw and cooked food.

Time control

Food safety is not only affected by the temperature it's stored at, but also by the length of time that it's stored for. While you want to minimize the amount of time food spends in the danger zone, exposure is likely unavoidable. In that case, it's important to be vigilant of time controls, as bacteria grow very quickly within that range. With this in mind, you should:

- Food must always be thawed, cooked, cooled, reheated and served at the correct temperatures in order to minimize the amount of time spent in the Temperature Danger Zone.
- Check temperatures every two hours
- Never leave meat or poultry out of the refrigerator for more than two hours
- Ensure food with a temperature of over 32 degrees Celsius is not left out for more than one hour
- Throw out food that's been in the danger zone for more than four hours

Bearing the importance of time controls in mind is a key component of the day to day activities of anyone working as a food safety and quality professional. People in this role will often find the work to be highly rewarding, rooted in their own personal responsibility for helping to keep the public safe from foodborne illnesses.

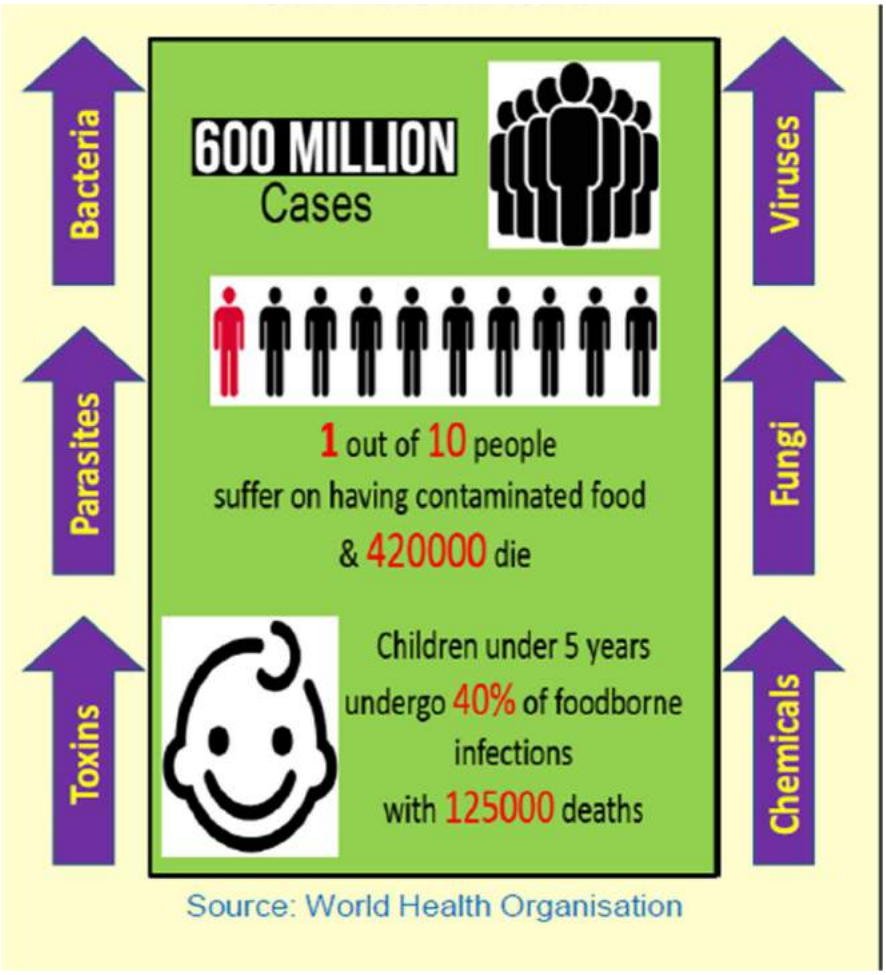
2.2.2 Contamination control.

Illness caused by food consumption occurs either because something in the food causes poisoning; because the food is being used as a 'carrier' for an illness or because the person eating the food develops an allergic reaction to it.

Onset of foodborne illnesses may range from a few hours to days after consuming the contaminated food and can be classified into 2 categories namely, Food Poisoning and Foodborne Diseases.

- Food Poisoning – describes foodborne illnesses that are caused by consuming contaminated food which subsequently lead to symptoms such as vomiting and/ or diarrhea which may at times lead to shock and even death in acute cases.

- Foodborne Diseases – describes foodborne illnesses that occur after consuming food that has been contaminated with a known causative agent (i.e. Micro-organisms (germs) and their toxins, parasites etc.).



Biological contamination

One of the most common types of contamination, biological contamination, refers to the presence of harmful microorganisms such as bacteria, molds, yeasts, viruses, and parasites. Most food poisoning and food-borne illnesses are caused by bacteria so we will look at them first, but there are several other organisms and substances which may contaminate foods.

Bacteria are tiny living organisms; although we commonly refer to them as 'germs' and associate them with dirt, illness and rotting food they are a vital element of life on earth. Bacteria perform many functions which are necessary for our health and the health of the world around us.

'Good' bacteria, properly know as commensal bacteria outnumber the 'bad' (pathogenic) bacteria but because we can't see them we lack awareness of their role in our lives. We can

never, and would never want to, get rid of bacteria altogether. No cleaning product is 100% effective, and none can tell the difference between good and bad bacteria. What we have to do to be hygienic is to clean thoroughly and regularly and ensure that foods are cared for in such a way that harmful bacteria do not get the chance to reach dangerous levels.

Bacterial Growth

Bacteria breed by dividing into two; this means that in the right conditions they can generate large numbers very quickly. They have four requirements for reproduction:

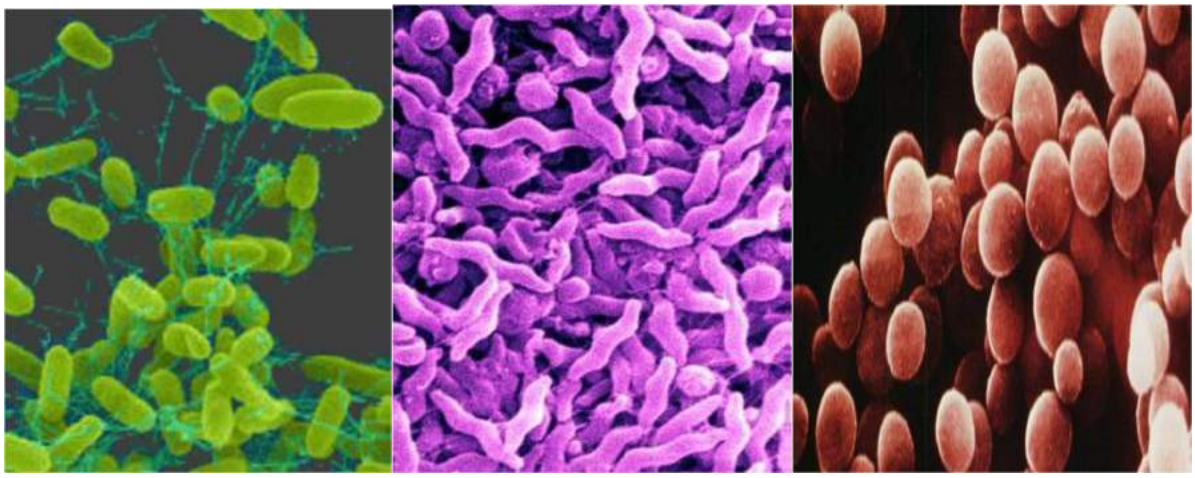
Warmth – bacteria breed best at around 37˚c but can breed successfully anywhere between 5˚c and 63˚c; this temperature range is known as the danger zone

Food – bacteria are not particularly choosy but they are happiest with high protein, moist foods such as meat, fish and dairy products. Soups, stews and stocks can form a particularly good breeding ground

Moisture – like all living organisms bacteria require water to thrive, they can exist without it but they do so in a dormant form and are unable to do anything until they come into contact with water again

Time – given the right conditions bacteria divide every 20 minutes so 1 bacterium becomes over 2 million in 7 hours (bacteria do die so they do not carry on doubling unchecked forever)

- **Some of the most common bacteria contaminants include:**



Campylobacter **–** one of the most common causes of food-borne illness, campylobacter is associated with poultry and contaminated water

***Salmonella* –** found in the guts of animals and humans, notoriously associated with eggs. Salmonella becomes poisonous if given chance to breed

***Staphylococcus Aureus* –** mainly carried on the human body particularly around the nose and throat. Easily passed on by coughing, sneezing and touching

***Listeria* –** carried by soft cheeses, patés and other chilled goods. Listeria can be seriously harmful to vulnerable individuals; for this reason pregnant women are advised to avoid certain foods and the department of health targeted publicity about good hygiene at the elderly

***Clostridium Perfringens* –** this bacteria is particularly good at protecting itself from heat and is regularly identified as the cause of food poisoning outbreaks in hospitals and other care settings where foods are reheated in large quantities

Other Types of Contamination Viruses and Molds

- Viruses and molds are from the same family as bacteria, but they have significant differences. Viruses are smaller and need to be in living tissue to survive so they are commonly transferred on hands contaminated with fecal matter.
- Molds are larger and may be clearly visible on food. Many people dismiss molds as unattractive but harmless, but like bacteria there are ‘good’ and ‘bad’ types. Penicillin is developed from mold and the veins in blue cheeses are edible forms; however, molds are also believed to cause lung cancers as well as serious food poisoning outbreaks.

- **Food spoilage signs**
  - Produce acid and lower the pH of the product
  - Produce a bad smell
  - Change the color of the food
  - Soften the texture of the food.
- **The most common symptoms of contamination are:**
  - Diarrhea.
  - Stomach pain or cramps.

- Nausea.
- Vomiting.
- Fever.

Cross Contamination

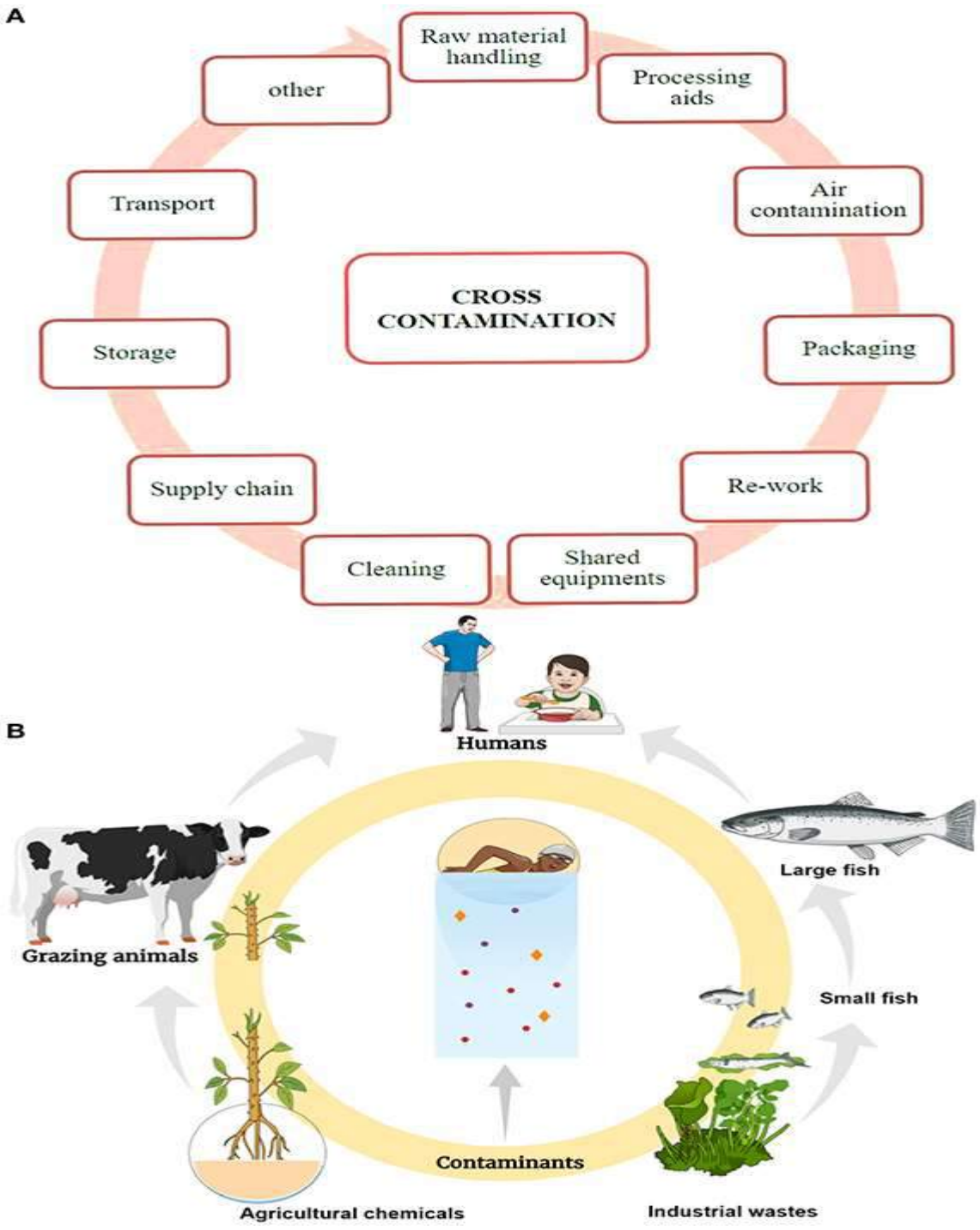


Figure 2: Possible causes of cross contamination

Cross contamination is the process by which bacteria, viruses and molds are spread; there are two types of cross contamination, direct and indirect.

- **Direct cross contamination –** this occurs when two foods are touching, or one food drips on another. If raw foods are stored above cooked foods the risks of cross contamination are high and bacteria may get the chance to breed on foods which are ready for serving to clients.
- **Indirect cross contamination –** this describes the transfer of bacteria between foods by means of a vehicle; most commonly a pair of hands but it could be a knife, chopping board, tea towel, pet or clothing, in fact anything that can touch one food and then come into contact with another.

There are certain types of foods which are commonly associated with the above foodborne illnesses. These are referred to as high risk foods, and extra precautions should be observed when preparing and handling these foods.

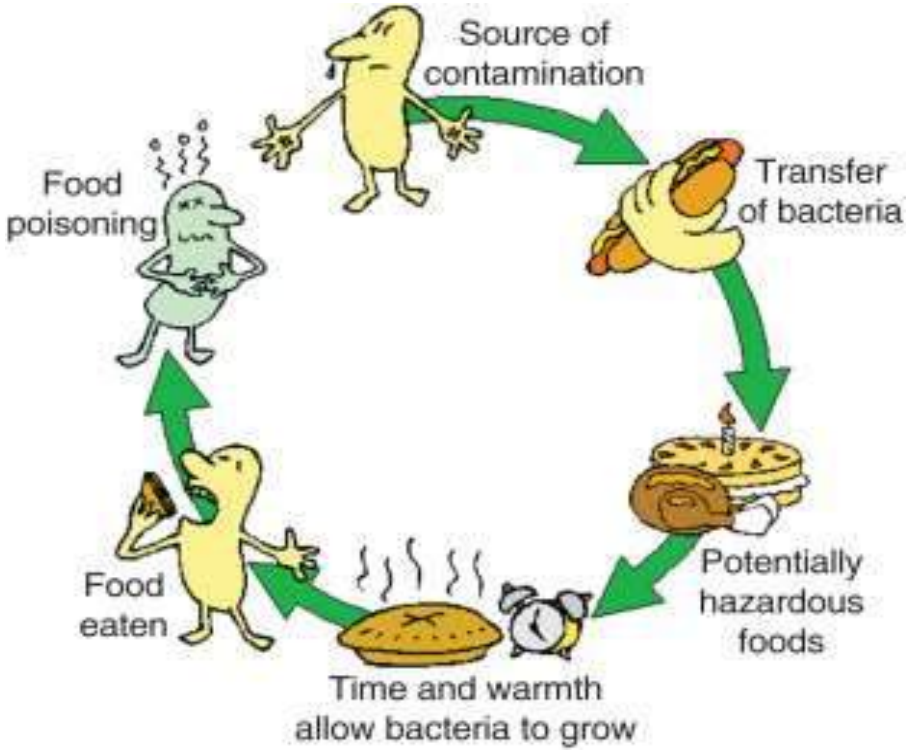
- **Examples of high risk foods include:**

  - Meat and meat-based products (e.g. gravies, stews, soups and stocks)
  - Poultry
  - Shellfish and seafood (e.g. oysters, raw fish, prawns and mussels)
  - Dairy products (e.g. milk, cream and cheese)
  - Eggs and egg-based products (e.g. mayonnaise, cake frosting)

- Ready-to-eat foods (i.e. foods which do not require further preparation before being consumed)

Ready-to-eat foods such as salads and cut fruits are considered high risk foods because they do not undergo further heat treatment such as cooking or microwaving. This means that if the food has been contaminated with bacteria or other causative agents, these bacteria will not be destroyed before the food is being served to the consumer.

- **Controlling biological hazards**



Biological hazards can be controlled by limiting, removing or altering the growth kinetics microorganisms need to survive, grow and reproduce. They can be destroyed, eliminated or controlled by thermal processing (heating or cooking), freezing or drying.

Food growers or processors should have three objectives for their HACCP programs with regard to biological hazards:

- To eliminate or significantly reduce the hazard
- To prevent or minimize microbial growth and toxin production
- To control contamination

The following are examples of control measures for biological hazards. ***For bacteria, control measures include:***

- Temperature/time control (proper control of refrigeration and storage time, for example, minimizes the proliferation of microorganisms)
- Heating and cooking (thermal processing) for an adequate time and at an adequate temperature to eliminate microorganisms or reduce them to acceptable levels
- Cooling and freezing
- Fermentation and/or pH control (for example, lactic acid-producing bacteria in yoghurt inhibit the growth of other microorganisms that do not tolerate the acidic conditions and competition)
- Addition of salt or other preservatives, which at acceptable levels may inhibit growth of microorganisms
- Drying, which may use enough heat to kill microorganisms or may remove enough water from the food to prevent certain microorganisms from growing even when drying is conducted at lower temperatures
- Packaging conditions (vacuum packaging, for example, can be used to inhibit microorganisms that require air to grow)
- Source control, i.e. control of the presence and level of microorganisms by obtaining ingredients from suppliers who can demonstrate adequate controls over the ingredients (e.g. suppliers that follow an HACCP program)
- Cleaning and sanitizing, which can eliminate or reduce the levels of microbiological contamination
- Personal and hygienic practices, which can reduce the levels of microbiological contamination

For viruses, control measures include:

- Thermal processing - heating or cooking methods such as steaming, frying or baking - which may destroy many but not all viruses (the type of virus determines the appropriate controls)
- Personal hygienic practices, including the exclusion of workers affected by certain viral diseases, e.g. hepatitis

For parasites (worms and protozoa), control measures include:

- Dietary control (infection from *Trichinella spiralis* in pork, for example, has decreased as a result of better control of the pigs' diet and environment) - a method not always practical, however, for all species of animals used for food (the diet and environment of wild fish, for example, cannot be controlled)
- Heating, drying or freezing
- Salting or brining
- Visual examination, which can be used in some foods to detect parasites (e.g. a procedure called "candling" can be used for certain fish)
- Good personal hygiene practices by food handlers, proper disposal of human faeces and proper sewage treatment

The above are basic requirements that shall be observed at all times and at all stages of food preparation, storage and serving. Observing these good practices are necessary to prevent the growth, survival and spread of germs.

Physical contamination

The presence of unwanted foreign materials in food. If hygiene and safety practices in kitchens are poor then there is a risk that food may become contaminated by soil, dust, hairs, pieces of glass, insects or anything else that can be carried in by food, people or animals or that could be the result of an accident

Some examples of physical contamination include the presence of the following:

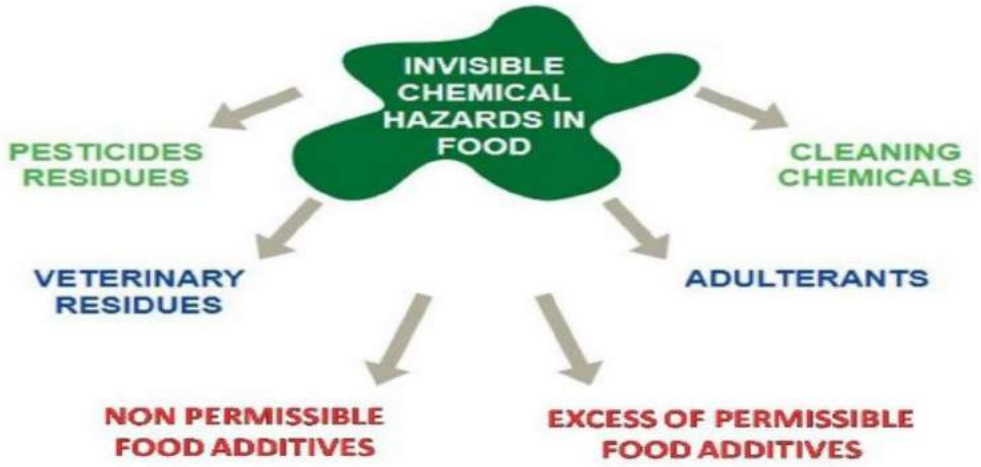
- **Natural physical contaminants**
    - Bone fragments
    - Feathers or hair
    - Pit, stem, and skin of raw fruits
    - Pest droppings
- **Unnatural physical contaminants**
    - Glass
    - Plastic
    - Soil or sand
    - Metal shards
    - Personal effects (e.g., jewelry)
- **The most common symptoms of contamination are:**
    - Some may cause injury, whereas others can create cuts to the throat or mouth.
    - In addition to causing injuries, these contaminants can become precursors to other types of contamination, such as biological contamination.
- **Controlling physical hazards**

The following are examples of control measures for physical hazards:

- Source control, i.e. specifications for raw materials and ingredients and vendor certification that unacceptable physical hazards or levels are not present
- Processing control, e.g. use of magnets, metal detectors, sifter screens, de-stoners, clarifiers, air tumblers
- Environmental control, i.e. ensuring that good manufacturing practices are followed and that no physical contamination occurs to the food through the building, facilities, work surfaces or equipment

Chemical contamination

The presence of unwanted chemicals in foods.



- **Common chemical contaminants include:**
    - Cleaning products (e.g. detergent, sanitizer)
    - Pesticides/herbicides
    - Toxic chemicals in metals and plastic
    - Preservatives
    - Naturally-occurring toxins
- **Effects of chemical contamination**
    - burning,
    - swelling,
    - gastric problems, and
    - Sometimes even long-term effects.
- **Controlling chemical hazards**

The following are examples of control measures for chemical hazards:

- Source control, i.e. specifications for raw materials and ingredients and vendor certification that harmful chemicals or levels are not present

- Processing control, i.e. formulation control and the proper use and control of food additives and their levels
- Proper segregation of non-food chemicals during storage and handling
- Control of incidental contamination from chemicals (e.g. greases, lubricants, water and steam treatment chemicals, paints)
- Labelling control, i.e. ascertaining that the finished product is accurately labelled with ingredients and known allergens

Allergen contamination

Severe allergic reactions (e.g. anaphylactic reaction) occur when the body's immune system strongly reacts to a particular allergenic protein or irritant present in food such as tree nuts, milk, eggs, crustacean, fish, peanuts, soybeans and wheat and other cereals containing gluten and their derivatives

- **Common symptoms of a food allergy include:**
    - Feeling dizzy or lightheaded.
    - Itchy skin or a raised rash (hives).
    - Swelling of the lips, face and eyes (angioedema).
    - Coughing, wheezing, breathlessness, noisy breathing or a hoarse voice.
    - Sneezing or an itchy, runny or blocked nose.
    - Feeling sick or being sick.
    - Tummy pain.
    - Diarrhea.
- **This management system shall be implemented include:**
    - Determination of food allergens for the site employees and keeping these information in the medical record for each one.
    - Including all food ingredients in the food menu and hang it in suitable area to be easily seen by everyone before serving food.
    - Controls put in place to prevent the presence of allergens in foods where they are not labelled.
    - Controls to prevent cross-contact from foods containing allergens to other foods should be implemented, e.g. separation either physically or by time (with effective cleaning between foods with different allergen profiles).
    - Food shall be protected from unintended allergen cross-contact by cleaning and line change-over practice and/or product sequencing.
    - Increase the employee's awareness about food allergens using posters.
    - Controls to inform the medical department and providing the first aid needed in case of emergencies.

Natural Foods

Some foods are poisonous and should not be eaten unless they can be prepared and cooked in a way which makes them safe; examples include:

- Red kidney beans must be soaked for a long time before cooking (if they are tinned they are safe)
- Certain types of mushroom / berries may be fatally poisonous if eaten
- Rhubarb leaves contain oxalic acid, they must be removed along with an inch of stalk

- Certain types of / parts of fish and shellfish e.g. ‘dead man’s fingers’ in crab

- If you do not know how to prepare a food safely, or if you have any doubt as to the identity of a plant or fungus, do not take a chance.

2.2.3 Water supply

- Water that is used as a food ingredient or comes into contact with food for cleaning, heating, steaming, cooling must be of drinking quality.
- Ice that may come into contact with food or drink, must be made with potable water and must be produced, handled and stored hygienically.
- Steam that comes into contact with food must not contain any contaminants that could affect food safety.
- Water that is used for non-food purposes, such as fire control, heating, refrigeration, must be kept in isolated systems so that it cannot contaminate food, drink, surfaces or equipment.

2.2.4 Pest Control

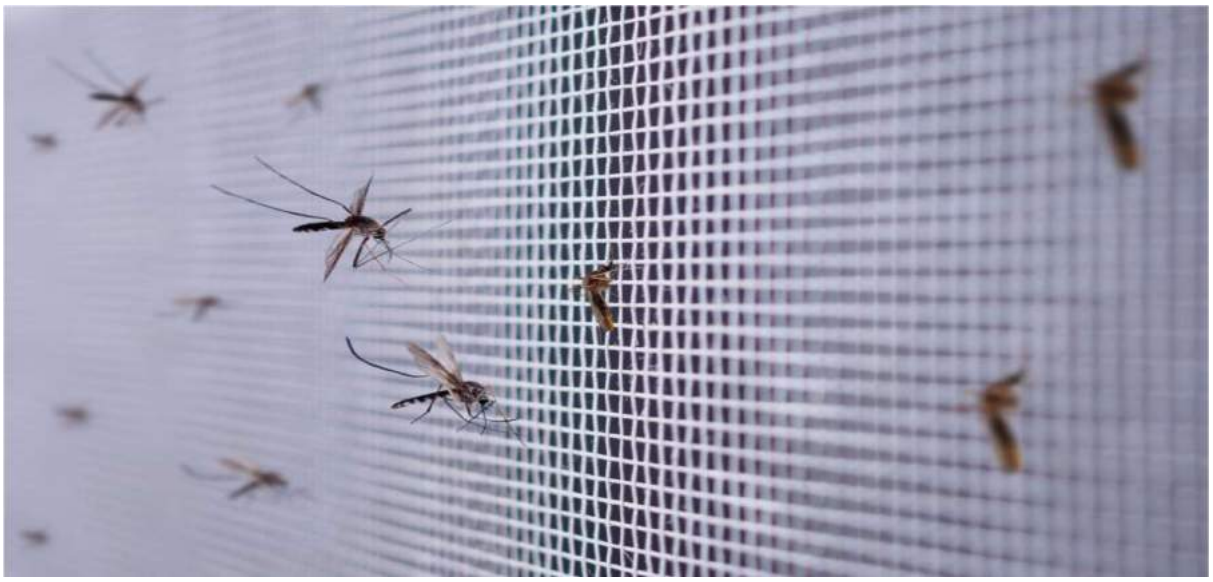
A food pest is a creature living on or in our food, which is capable of directly or indirectly contaminating food. They are destructive, noxious or troublesome.

Pest control is essential to prevent the spread of disease, although there are many other reasons for controlling pest infestations of food premises, ***including:***

- To prevent the contamination of food by rodents or birds which may result in food poisoning or physical contamination. Rodents are scavengers and will feed on refuse, waste and unfit food. Rats often live in sewers and in close association with other animals. They often carry food poisoning bacteria, such as salmonellae, both inside and outside their bodies and on their feet and in their mouths. When entering food premises, they can easily transfer food poisoning bacteria to food and food-contact surfaces from their fur, feet, mouths, urine and droppings;
- To prevent contact with rat urine which may result in Weil's disease;
- To prevent the wastage of food by contamination, and losses due to pest damage of packaging;
- To avoid the costs associated with loss of production, recall of contaminated food or defending criminal or civil action as a result of selling contaminated products;
- To prevent physical contamination from fur, body parts and faeces;
- To prevent damage caused by gnawing. Electrical fires, burst pipes and subsidence, caused by burrowing, may all result from rodent infestation;
- To comply with the law and avoid possible closure of the food business;
- To avoid losing customers who object to pest infested premises or the sale of contaminated food; and
- To avoid losing staff who will not want to work in infested premises.

The common pests found in the food industry include:

- Rodents: rats and mice;
- Insects: flies, wasps, cockroaches, silverfish, ants and stored product insects (moths, weevils and beetles) which infest dry products such as biscuits, cereals and flour;
- Birds: mainly feral pigeons and sparrows and occasionally seagulls; and mites.
- Cats and dogs may also be considered as pests and should not be allowed into food premises. They carry pathogens, including salmonella and campylobacter in their intestines and mouths and on their coats and paws. Contamination may also occur from droppings and urine.



Pest control is an essential component of all food safety programs. Proper measures shall be implemented to prevent pest food contamination in storage and preparation. ***These measures shall include:***

- Building premises with pest control in mind.
- Regularly maintaining/repairing/cleaning premises to prevent pest access.
- Storing ingredients and prepared food such that pest access is prevented.
- Implementing proper handling measures to prevent food spills.
- Safely disposing of waste materials that can attract pests to the food environment.
- Besides pest control, ensure that food is kept free of contamination from any animals, including house cats, dogs, and other pets.

Insects

Insect pests can attack and destroy large amounts of food which becomes contaminated with bodies, webbing and excreta. Furthermore, cockroaches and flies may transmit food poisoning organisms to high-risk food. No food is completely safe from insect attack, but beans, cereals, flour and dried fruits are among the most susceptible to infestation.

Flies

Many types of fly can cause problems in the food industry including the Housefly, the Bluebottle and the Fruit Fly. Many pathogens have been isolated from flies, including salmonella, *E. coli* O157, campylobacter, listeria and rotavirus. ***Flies contaminate our food in four ways:***

- To feed they vomit partly digested food from the previous meal;
- They continually defecate;
- They carry bacteria on the hairs on their body and legs; and pupal cases, eggs, maggots and dead bodies end up in our food.
- Typical breeding sites for Houseflies are refuse and decaying organic matter. The female Housefly lays around 600 eggs and it takes less than two weeks to go from egg to maggot to pupa to adult in warm weather. Blowflies usually breed on decaying matter of animal origin, especially meat.

Design, maintenance and proofing of buildings

Pests gain access to food premises in various ways. They may enter through open windows or doors, through gaps and cavities in the structure of the building or they may be brought in with food, packaging material or even laundry. Buildings must be designed and maintained to avoid undisturbed areas which can provide harborage for pests. False ceilings, boxing, ducting, ovens and elevators must always be accessible for inspection and treatment. Cavities in internal walls or between surface finishes and walls must be eliminated or effectively sealed. Service pipes or conduits passing through walls should be cemented in position.

All structural damage which provides access for pests must be repaired immediately and gaps around pipework must be sealed. Drains should be provided with suitable covers and defective drains should be made good.

All buildings should be adequately proofed; doors should be self-closing and provided with metal kick-plates, ventilation stacks should be provided with wire balloons and all ventilation openings, including opening windows (where there is a risk of infestation) must be adequately proofed to avoid pests gaining access. If a pencil can pass through a gap so can a young mouse. Air curtains are occasionally used to keep out flying insects.

All sources of water, such as dripping taps, defective gutters and leaks should be repaired and puddles removed.

Physical control methods

Physical control methods are usually preferred as the pest is caught, either dead or alive, and consequently is not able to die in some inaccessible place and the dead body will not

contaminate food. Furthermore, physical control methods can be used during food production.

Examples of physical control include:

- Rodent traps (baited or unbaited);
- Catch trays must be emptied frequently
- Electronic flying-insect killers (EFKs) which use ultraviolet (u/v) light to attract insects. Insects are caught on glue boards or electrocuted on charged grids. Catch trays for dead insects should be emptied frequently. EFKs should never be positioned above food or food equipment, next to a window (may attract insects if left open) or near fluorescent tubes, as they emit u/v light;
- Sticky cockroach traps or pheromone traps for moths and wasps. These are useful for monitoring the extent of infestations and the success of chemical treatments;
- Mist nets for birds; and bird scaring devices.

Deliveries should be checked to ensure they are pest free. Stock, especially in dry stores, should be examined regularly and any infested stock segregated and removed from the premises immediately.

Chemical control methods

Unfortunately, although physical control methods may catch the occasional invader, they are usually unsuitable for dealing with major pest infestations, which have to be destroyed as quickly as possible.

Rodenticides, chemicals for killing rodents, are used in bait boxes. Modern formulations can be provided in solid blocks or in a paste formulation to avoid problems from spillage and reduce the risk of food contamination.

The key to effective chemical control is to identify the insect and then determine which the most vulnerable stage is in its life cycle. Knock-down and residual insecticides of low toxicity can be used to control insects. Before use, all food and, where practicable, equipment, should be removed and after treatment, work surfaces must be thoroughly cleaned and pests removed before food production commences. Particular care is necessary to avoid food contamination by dead flies or insecticide if aerosol fly spray is used by food handlers. (Indiscriminate control by food handlers is not good practice.) Insecticide will not be broken down by cooking so even raw food contaminated by pesticide should be discarded.

A range of insecticidal dusts, baits, gels and sprays may be used to control most pests if care is taken to avoid contamination of food. Most treatments rely on the insects walking over the formulation and ingesting or absorbing a lethal dose. The continuous use of residual insecticides is not recommended in food rooms because of the risk of dead insects dropping into food. However, they may be useful in non-food rooms.

Ant and wasp nests should be located and destroyed by the pest control operator.

Fumigation of product is usually the only successful way to control infestations within commodities, although severe infestations may require the destruction of the product because of contamination with dead bodies.

Narcotizing of birds using alpha-chloralose, which is a stupefying substance, may be successful as any protected species can be released and the pest species collected and humanely destroyed.

It is essential that chemical control is undertaken by trained staff from either local authorities or specialist contractors. Safety precautions must be taken to comply with health and safety legislation. As soon as an infestation is discovered, immediate advice must be obtained and a pest control contractor will probably need to be contacted immediately.

The use of a pest control contractor

When selecting a pest control company, apart from the cost of the service, ***the following points should be taken into consideration:***

- The type of pests you wish to control and the company's competency to deal with them;
- The ability to give 24-hour cover and provide an emergency call-out service;
- The use of suitably trained and discreet staff, with experience of the food industry;
- The frequency of the visits;
- The methods and materials to be used;
- If the company is a member of an appropriate professional association;
- The ability to provide a written report, including recommendations; and
- The adequacy of appropriate insurance cover regarding product, public and employees' liability.

The employment of a contractor does not absolve the company from overall responsibility for the conditions of the premises and food. However, it would most likely assist if a due-diligence defense was being relied upon.

The role of the supervisor in pest control

Supervisors and their staff should be able to recognize signs of pests and know the action required in the event of an infestation or a complaint regarding contamination of a food product by pests. Signs of infestation must be reported to the manager/supervisor immediately and any contaminated food must be discarded.

The supervisor should give instruction to staff regarding:

- Signs of different types of infestation;
- The importance of staff reporting:
- Signs of infestation;
- Any condition that could allow pest incursion or encourage the development of a pest infestation;
- Not to touch or move bait boxes; and
- The importance of good housekeeping and adherence to the cleaning schedules and waste disposal procedures.

The supervisor should contact their pest control contractor as soon as they are aware of a problem. The contractor should be accompanied throughout the inspection. The supervisor should record the position of all bait boxes and any recommendations regarding proofing, good housekeeping or control should be carried out as quickly as possible. It is important to supervise external pest control personnel, ensuring that they fulfil the requirements of the pest control contract.

As well as taking remedial action, the supervisor may need to report to senior management issues such as an ineffective pest contractor, structural defects, conditions that permit pest incursion or inadequate waste control procedures like

2.3 Personal hygiene

Bacteria that cause food poisoning can be on everyone – even healthy people. You can spread bacteria from yourself to the food if you touch your nose, mouth, hair or your clothes, and then food.

Many infections are able to be transmitted through food, e.g. Hepatitis A and *Shigella*. It is important that all staff who work as food handlers understand this and how to reduce/eliminate the likelihood of this occurring. Also, food handlers may be at risk from some aspects of their job and it is necessary to identify vulnerable individuals.

2.3.1 Food handler health and fitness for work

- Food handlers may contaminate food, so employers and employees must be careful to ensure that no illness is passed on by those working in the industry.
- Induction of new staff must include awareness of food hygiene, correct food handling and the importance of personal hygiene.
- All food handlers should be assessed pre-employment.
- Periodic review is necessary (annual is recommended).
- All food handlers are immunized against food-borne conditions, e.g. polio, typhoid, Hepatitis A and immunizations should be updated at the time.
- Food handlers shall not go to work if they are sick with an illness that is likely to be transmitted through food. Such illnesses include gastroenteritis including viral gastroenteritis (norovirus or rotavirus), hepatitis A, sore throat with fever, and fever with jaundice.

- Food handlers shall not go work if they are vomiting, diarrhea, stomach pain, nausea, fever, jaundice or someone living with them with diarrhea or vomiting. Infected skin, nose or throat.
- Staff handling food or working in a food handling area must report these symptoms to management immediately and should not return to work until their symptoms have stopped for 48 hours. If they are unsure, they should contact the doctor for advice.
- Food handlers must inform their supervisor if they are feeling unwell, including when suffering from a cold, flu, and eye infections.
- Managers must exclude staff with these symptoms from working with or around open food and ensure that these staff can be adequately assessed, and if necessary, treated.

2.3.2 Personal hygiene practices

- Wash and dry your hands thoroughly before handling food, and wash and dry them again frequently during work in case of :
    - Going to the toilet
    - Handling raw food
    - Blowing your nose
    - Handling garbage
    - Touching your ears, nose, mouth or other parts of the body
    - Smoking
    - Every break
    - Handling animals.

Steps of proper hand washing

a) Palm to palm

b) Between fingers

c) Back of hands

d) Base of thumbs

e) Back of fingers

f) Fingernails

g) Wrists

- Dry your hands with a clean towel, disposable paper towel or under an air dryer
- Never smoke, chew gum, spit, or eat in a food handling or food storage area

- Never cough or sneeze over food, or where food is being prepared or stored
- Wear clean protective clothing, such as an apron
- Keep your spare clothes and other personal items (including mobile phones) away from where food is stored and prepared
- Tie back or cover long hair
- Keep fingernails short so they are easy to clean, and don't wear nail polish because it can chip into the food
- Avoid wearing jewelry, or only wear plain-banded rings and sleeper earrings
- Completely cover all cuts and wounds with a wound strip or bandage (brightly colored waterproof bandages are recommended)
- Wear disposable gloves over the top of the wound strip if you have wounds on your hands
- Change disposable gloves regularly
- Advise your supervisor if you feel unwell, and don't handle food.

2.3.3 The Dress Code for Food Service

- Food service employees are generally required to wear clean sets of uniforms, including shirts, pants, and hair nets, appropriate shoes, and aprons.
- All worn clothes must be free from holes, rips, loose buttons, and visible dirt.
- Food handlers working in direct contact with food must also wear effective hair restraints, such as a chef hat and other head coverage.
- Clothes, uniforms, hair restraints, and aprons must also be changed every shift change. Additionally, aprons must be changed after working with raw foods.

2.4 Cleaning & sanitation

Cleaning and sanitization programs are a key prerequisite to ensure the adoption of good hygienic practice. Cleaning will not be effective unless it is fully supported by management. The role of management is to define the hygiene standards required and to communicate these effectively to staff, usually by means of a comprehensive cleaning schedule and associated task procedures. Management must demonstrate commitment by providing the appropriate means, that is, the equipment the chemicals and the training for staff.

Cleaning schedules coordinate cleaning activities and are a means of information transfer between management and staff. They should be established for external areas, the premises itself and equipment, plant and services. They should also be established for transport vehicles in the distribution supply chain. Individuals who have the appropriate level of competence and knowledge to develop an effective cleaning and disinfection regime should

design cleaning schedules and associated procedures. The site hygiene plan and associated cleaning schedules and cleaning procedures should be based on a risk assessment approach. Documentation such as cleaning schedules and associated task procedures must be clear.

2.4.1 Site Hygiene Plan

- The quality control manager should develop and validate a site hygiene plan and associated procedures for the site. The site hygiene plan should be reviewed at regular intervals to determine its appropriateness and effectiveness in ensuring a hygienic manufacturing site and minimizing the risk of potential product contamination.
- It needs to be determined whether a clean-down process is required between different products during a production run or the cleaning process will be undertaken at the start and end of the production period (i.e. daily, per shift or between production runs).
- It needs to be determined who will undertake the cleaning, i.e. will there be a designated hygiene team or will the production staff undertake the cleaning at the end of production or intervals as determined?
- If a hygiene team is used, will they be internal staff or will cleaning be outsourced to a cleaning contractor? Cleaning contractors should be approved as per the supplier approval procedure.

- The budget for cleaning needs to be determined. The cost of water, equipment, labor, chemicals, energy, production down time and waste treatment should be considered.
- The chemical supplier should be approved as per the supplier approval procedure. The plan should take into account the areas to be cleaned, the structure and layout of the premises and the type and condition of the surfaces for floors, walls, ceilings and doors. It should also differentiate between food and hand contact services that require a disinfection process to take place and non-hand and non-food surfaces where cleaning alone may be sufficient.
- The plan should also take into account the equipment type, design, purpose and the type of cleaning that is required. Some equipment can be fully cleaned without dismantling while other equipment may require full dismantling. Cleaning may involve both partial cleaning and deep cleaning. Other equipment may involve a lot of pipework and a cleaning-in- place (CIP) system may be used.
- The plan should take into account that water hardness will affect the types of chemicals that can be used.
- The plan needs to take into account the type of soiling on a given surface or piece of equipment and whether the cleaning task is the removal of general debris, grease and/or involves the removal of material with a high microbial loading.
- The plan needs to reflect the situational factors in the manufacturing unit, such as the presence of services, including water, steam, electricity and drainage.
- The plan needs to reflect the supervision and training needs of the staff, as well as the mechanism for assessing the effectiveness of training and the influence of the plan on the requirements for refresher training for staff.
- The plan needs to identify the records that need to be completed following cleaning; and

- An inventory and stock rotation system should be set up to ensure that the actual volume of chemical used complies with expected volumes. Any discrepancy between actual and expected usage must be fully investigated by the appropriate personnel.
- Care should be taken to avoid mixing of cleaning agents since their chemical nature may cause them to interact and could result in a health and safety hazard to staff working in the area.
- Detergents are formulated to remove soil and dirt. Disinfection can be achieved by using:
    - Heat and/or steam as moist heat is most effective. Steam cleaners can also be used to disinfect machinery or surfaces. However, the use of heat to disinfect is costly and often impractical. When using heat to disinfect equipment the efficiency is based on a relationship between temperature and time, for example equipment may be disinfected in sterilizing units where equipment is immersed in water at 82°C for 30 second.
    - Chemicals – the chemical disinfectant used will depend on a number of requirements, including:
        - The amount of grease and soiling
        - The effectiveness of the chemical against the type of microorganisms under consideration
        - The temperature and chemical contact time
        - The equipment and type of surfaces
        - Water hardness
        - The potential for taint
        - The method of application
        - The detergent that has been used prior to disinfection

2.4.2 The cleaning schedule & procedures

- The cleaning schedule needs to ensure effective, economic cleaning. Equipment should be installed so as to facilitate effective cleaning. The practices used will vary with the size and type of food premises and number of staff involved.
- Cleaning schedules should be in place to ensure that external areas are kept clean and free from rubbish. Particular attention should be paid to waste storage areas. The cleaning requirements for chill and cold stores, road vehicles and shipping and air freight containers need to be considered.
- Cleaning schedules need to be developed with appropriate protocols to minimize the risk of product contamination and determine the effectiveness of cleaning as follow:
    - What area or equipment is to be cleaned?
    - Who is to undertake the task (i.e. responsibility)?
    - When it is to be cleaned (i.e. how often).
    - How it is to be cleaned (i.e. work instruction or task procedure, including how the equipment should be dismantled and reassembled).
    - The time duration of the cleaning task, especially the required contact time for any chemicals used. Contact time is the time that the cleaning chemical has to be in contact with the surface in order to be effective.

- The materials to be used, that is, the cleaning chemicals and cleaning equipment.
- Dilution rates and whether the chemicals are pre-diluted or need to be diluted by staff to the correct rate at the time of the cleaning operation.
- The requirements for rinsing between chemicals and if required the protocol for the pH testing of rinse water to ensure effective rinsing of equipment has taken place.
- The cleaning standard expected in terms of either visual standard or if microbiological or adenosine triphosphate (ATP) sampling is undertaken the standards to be reached to approve the cleaning task as having been effective.
- The operator personal safety aspects that need to be addressed to ensure that the personal protective equipment (PPE)/clothing that may need to be worn when handling concentrated chemicals and/or when completing cleaning tasks is defined.
- The health and safety of staff and the environmental concerns in the event of a spillage of chemicals and how such spillages should be contained and cleaned up to ensure adequate protection of the staff and the environment but also to minimize product contamination risk.
- Who should be contacted in the event there is a problem during the cleaning task?
- Which cleaning records need to be completed after the task has been completed and by whom.
- Who is responsible for monitoring the task to ensure it has been effective and completes the records to that effect?
- Who is responsible for verifying after the cleaning and sanitation process that the standards of hygiene are as required and that the associated records are completed appropriately?
- Who is responsible for routinely auditing the whole process?

- Cleaning schedules may be designed to address daily, weekly, monthly, quarterly, six-monthly and annual tasks separately or all on one format. Cleaning may be monitored by the quality control function as part of a routine site hygiene audit, or cleaning may be monitored instead as part of production procedures by a hygiene team leader or equivalent. Verification of cleaning.
- The implementation of the cleaning schedule will only be effective if there are sufficient resources available in terms of time، trained personnel, suitable chemicals and cleaning equipment. Consideration should be given to the level of cleaning, for example routine cleaning at one level and then further deep cleaning programs at designated intervals. Deep cleaning may need to be undertaken during periods of shutdown and nonproduction, and engineering and maintenance resources may also need to be programmed where equipment dismantling is required. If equipment is dismantled, appropriate controls should be in place to ensure that machine parts are not placed directly onto the floor. Controls include, but are not limited to tables, designated racking and so forth. A hygiene clearance/sign back into production procedure should be in place for all cleaning tasks, but additional clearance procedures may be adopted following deep cleaning activities to ensure the risk of product contamination is minimized. The cleaning schedule and associated task procedures must be validated before implementation and monitored by staff to ensure they are sufficient to deliver the food safety objectives of the manufacturing organization. Verification activities must take place over and above monitoring to demonstrate that the hygiene management system as a whole is functioning effectively

2.4.3 Efficiency of Cleaning

The efficiency of cleaning and sanitization should be checked and recorded at routine intervals by the quality control manager or designate. The frequency of checks should be based on risk assessment. The hygiene standards required should be defined.

2.4.4 Cleaning Tools

- There must be controls in place to ensure safe and secure storage of cleaning and sanitization chemicals when they are not in use.
- Procedures should be developed to ensure that:

- Chemicals are kept in secure, closed, labeled containers and used according to manufacturers' instructions;
- Chemical stores are secure, locked and bunded, and away from food areas;
- Stock is rotated correctly and chemicals are used within their duration marking;
- Food containers are not used for storage of cleaning chemicals;

- Health and safety data are available and reliable for all chemicals؛
- Cleaning chemicals for food-processing areas and for toilet areas where these are non-food grade are stored separately؛
- Correct protective clothing is used; and spillage procedures are developed and implemented.

- Appropriate cleaning equipment must be used. It should be fit for purpose and not be a source of contamination in itself.
- Cleaning equipment that is used in designated areas should be color coded to prevent its use in another area
- A color-coded site plan may prove effective in communicating where equipment can be used.
- The use of mops, especially string mops, should be risk assessed to determine that they can be effectively cleaning and disinfected after use.
- Cloths should be adequately controlled and be single issue where deemed appropriate within the hygiene risk assessment. Surfaces should be allowed to air-dry, but if the task procedure requires that they must be wiped after cleaning, this must be with a single use cloth, a sanitizing wipe or blue paper towel that is appropriately disposed of to prevent contamination.
- If disposable single-issue gloves are used by personnel during cleaning, they should be adequately controlled.
- The equipment should be cleaned and stored so as to minimize the potential for product contamination. Equipment should be allowed to air dry in designated racks.

2.5 Kitchen safety



2.5.1 Most common hazards

Fire Hazard

Sufficient number of workers shall be trained as first responders for the firefighting as per the civil defense requirements

The workers shall be trained for the emergency response and the evacuation

Emergency fire drills shall be conducted periodically as per the company approved procedures and the local emergency response plans

All the fire hazards shall be eliminated specially for the grease above the cooking areas such as the grill, ovens and the fryers

Electrical hazard

All the maintenance including electrical hazard shall be conducted by approved competent workers

Providing a supervision on the kitchen crew.

Performing a regular preventive maintenance for electrical devices.

Avoid temporary connections.

Avoid using flammable materials too close to an electrical device.

Ensuring good ventilation inside the kitchen.

Using protective systems such as fuses – circuit breakers – earthing – isolations.

The equipment shall be tagged out and locked out

The residual energy shall be released before the work is conducted

The isolation shall be tested regularly by competent persons

Chemical hazards

All the workers deal with the chemicals shall attend an awareness training regarding the chemical hazards related to their scope of work

The cleaning and disinfection chemicals shall have an existing SDS as per the GHS requirements

The cleaning chemicals shall be from reputable suppliers and labeled properly as per recognized standard

The workers shall be equipped with the relevant PPE related to their scope of wok

Physical hazards

The physical hazards shall be managed as per the local regulations such as per decree 211/ 2003 or as per a more stringent recognized international standard

Ergonomics hazards

The equipment used shall be ergonomically suitable for the workers and does not create a manual handling or ergonomics hazard to the users

The psychosocial hazards

The workers shifts and work patterns shall be managed as per a recognized best practice or international standard to minimize the work-related stress and to protect the workers mental health to the worker

2.5.2 Hazards Control

Slips and trips

Slips and trips are the most common cause of major injury in workplaces and commercial kitchens. It is the responsibility of the employer to ensure the safety of staff, visitors and the public by taking adequate precautions.

This can involve staff training, ensuring the use of safe practices and proper cleaning and maintenance. Different floor materials have different levels of risk and require different cleaning and maintenance practices. Practices for preventing slips are also closely related to general food hygiene practices:

- Food spillages: preventing and cleaning up
- Water spills and leaks: preventing sinks from overflowing and water leaks on the floor
- Poor floor conditions: good maintenance and cleaning, and also use of suitable materials
- Trip hazards: things left in working spaces and unexpected places on the floor, such as boxes, bags, cables, are a danger
- Cleaning practices: floors are kept clean to prevent build-up of slippery substances and spills are removed quickly and safely

- Carrying hot oil: replacing oil for deep fat frying needs to be done safely to avoid burns and spills

Cuts in the Kitchen: safety around kitchen knives

Kitchen knives were the cause of past injuries for almost half of the people surveyed by the National Accident Helpline, making them the household object most likely to cause injury. Yet it would be impossible to prepare most meals without the use of a knife. So how can we keep safe?

- **Sharper is safer**. Although counter-intuitive, sharp knives are less likely to cause accidental injury than blunt knives. If we try to cut something with a blunt knife, the knife is more likely to slip. At the same time, we apply more pressure with blunt knives, as they need more force to cut through food. Combined, these two factors can create a dangerous situation.
- **Storage is significant**. Thoughtful knife storage is essential and there are a number of factors to consider: accessibility, organization and blade protection. Knives need to be easily accessible to you; they also need to be carefully organized so that you never have to rummage through a drawer of knives; additionally, some especially knives may need a blade protector to keep them sharp.
- **Holding and using knives**.
  - Choose the correct type of knife for the food that you are cutting.
  - Cut on a stable surface – never cut an object while you are holding it in your hand.

- Keep knives out of washing up bowls – they can get lost and cut you when you put your hands in.
- Carry knives with the blade pointing downward.
- Use protective equipment if necessary, such as a protective glove on the non-knife hand during deboning.
- Use the knife appropriate for the task
- All the moving parts shall be covered
- Not allowed any time to add the hands while the moving parts are moving unless the equipment is locked and isolated and the all the moving parts are stopped
- The meat mincer shall be from approved supplier, not homemade and inherently safe which shall not enable the user to add his hands inside the mincer while it is operating

- **Clean carefully :** The equipment shall be cleaned and used as per the manufacturer instructions
- **Train staff in the safe use of knives**

Flames and Fire: safety around hobs and ovens

- Make sure you don't leave cooking unattended on the hob or grill; turn off the heat if you have to leave the kitchen. Similarly, double-check that you have turned off the heat once you have finished cooking.
- Be aware of fabrics that could catch fire around a flame – think about loose clothing or tea-towels and ensure they stay away from naked flames.

- Always use a spark device, rather than a match or lighter, to light a gas cooker, to avoid a naked flame near gas.
- Make sure your oven, hob, cooker hood, extractor fan and grill are clean, as built-up fat and grease can cause a fire.

Gloves

In the food industry suitable gloves should offer comfort, protection, flexibility and durability for wearers as follow:

- The gloves must also be suitable for food contact. For food handling gloves, the materials of composition must be suitable so that chemicals do not migrate from the gloves into the food.
- The gloves must be durable enough so that they do not break and pose a physical hazard to the food handling area or food product, causing risks to consumer and subsequent customer complaints.
- The gloves shall be free from odors and perfumes that could taint food, as well as being free from loose external matter like excess powder, flocking, dust or dirt.
- The gloves shall not have surface prints or surface dyes that might migrate into food or food contact packaging materials.

Catering first aid

- **Major wounds**

- Check for danger, response, airway, breathing and circulation. Protect yourself by using gloves or another improvised barrier for protection.
- Observe the casualty for the signs of hypovolemic shock and treat if necessary.
- Sit them down.
- Expose the wound by removing or cutting off clothing.
- Inspect the wound for foreign bodies.
- Apply direct pressure over the wound to stop the bleeding.
- Apply an appropriately sized first aid dressing over the wound. If there is an object in the wound do not remove it but pack the dressing around it.
- If blood loss seeps through the first dressing, remove and reapply pressure. Once controlled, secure new dressing.
- Monitor and record.
- Consider applying a tourniquet

- **Minor wounds, cuts and grazes**
    - Check for danger, response, airway, breathing and circulation; protect yourself by using gloves or another improvised barrier for protection.
    - Expose the wound and stop any bleeding by using pressure and a first aid dressing as above. Do not proceed to cleaning or dressing the wound unless you have stopped the bleeding.
    - If there is debris in the wound, dousing it in sterile wound cleaning fluid can flush this out or tap water can be used.
    - Apply a sterile non-adhesive dressing or plaster as appropriate.
    - Check if there is an underlying injury for example a soft tissue injury or fracture.
    - Advise the casualty to seek further medical advice if either the first aider or the casualty is concerned.

- Any minor wound should be covered with a waterproof plaster, which provides a resistance to water whilst remaining adhesive.

- **Burns**

  - All thermal burns (flame, hot liquids, and hot surfaces) should be cooled as soon as possible; cooling the surface of the burn is an extremely effective analgesic. Cool, clean running water for 20 minutes (approximately 65 liters per burn injury) is the recommended international guideline. It is important to identify the heat source before cooling.

  - Once the burn injury is fully cooled, cling film may be layered on to the wet burn site in loose strip lengths (never wrap around head, body or limb, to avoid constriction) to cover the wound from irritation, and possible infection. Cling film should NEVER be applied to a hot burn site, it should only be used when the burn injury has been totally cooled.

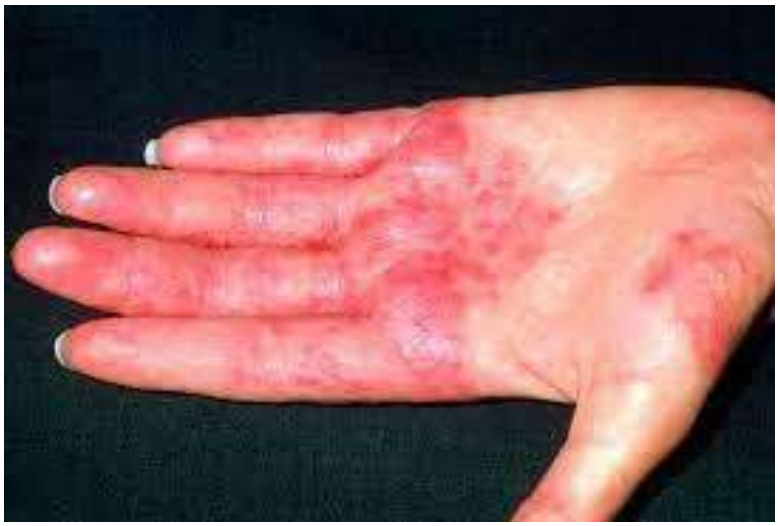
  - If there is an extensive burn, it may be necessary to reduce the period of application of cool water from the optimal 20 minutes in order to prevent hypothermia. Hypothermia should be prevented at all costs

  - A burns patient must be kept warm: Heat the room where the patient is being treated. Use warm blankets. Administer humidified oxygen (if available). Resuscitation fluids should be warmed prior to infusion.

  - Cool only the burn injury, if possible, keeping it small and shallow.

  - The availability of a sterile supportive cooling mechanism (gel-soaked burn dressings) that does not require water or induce hypothermia can be very useful in these circumstances. These heat-absorbing burn dressings are sterile and do not require a secondary covering (i.e. cling film), providing cooling comfort and pain relief to the burn patient in any circumstance or location devoid of water. The dressings also allow the provider two free hands to administer a more effective trauma response to the patient.

Dermatitis



Dermatitis in one of the main causes of illness for chefs, cooks and catering assistants. It affects staff that handle a lot of food where they have to wash hands frequently to meet food safety requirements, do cleaning tasks and wash kitchen equipment and utensils.

Practices that prevent dermatitis are also good food safety practices:

- Protect the skin by avoiding contact with cleaning products, water, and food where possible
- Use utensils to handle food and equipment to process/prepare food where possible
- Use a dishwasher instead of hands to wash up
- Wear gloves suitable for the task: food handling or cleaning
- For food preparation, use food-safe disposable gloves, wash hands before and after wearing and avoid cross contamination from the outside of the gloves
- Use soft disposable paper towels for drying hands
- Protect the skin with food and skin safe moisturizer to replace the natural oils: this should be hypoallergenic, fragrance free and free of food allergens such as nut oil
- Check hands regularly for signs of dermatitis: itchy, dry or red skin
- Train staff in keeping hands healthy and food safe

2.5.3 Kitchen Emergency

- **Purpose:** To manage potential emergency situations and accidents that can impact food safety and which are relevant to the role ofthe organization in the food chain.

- **Scope:** All Food handling process, persons and premises.
- **Person on charge:** Quality and safety manager is responsible to the emergence team
- **Frequency:**

- (Ongoing) All the time company team is ready to deal with the potential emergency situations and accidents that can impact food safety.
- Mock emergency trail is occurred once annually as minimum.

Potential emergency situations which may include, for example,

- **Electrical fire**

- One of the most dangerous elements of a fire is sometimes not the fire itself, but toxic fumes released from burning materials.
- Food in cans or jars may appear to be okay, but the heat from a fire can activate food spoilage bacteria. If the heat is extreme, the cans or jars themselves can split, interpreting the food unsafe.
- Discard any raw food or food in permeable packaging- cardboard, plastic wrap, screw-topped jars, and bottles, etc.
- Discard any raw food or food stored outside the refrigerator.
- Discard food that has been near a fire. Food exposed to fire can be damaged by the heat of the fire, smoke fumes, and chemicals used to fight the fire.
- Food stored in refrigerators or freezers can also become contaminated by fumes.
- The refrigerator seal isn't airtight and fumes can get inside. Chemicals used to fight the fire contain toxic materials and can contaminate food.
- Food that is exposed to chemicals should be thrown away-the chemicals cannot be washed off the food.
- This includes food stored at room temperature, such as fruits and vegetables, as well as food stored in permeable containers like cardboard and screw topped jars and bottles.
- Shelves and surfaces exposed to firefighting chemicals can be decontaminated by washing in soap and hot water.

- **Bioterrorism and sabotage**

- Biological tampering or terrorism involves the deliberate use of a biological agent to spread disease-producing microorganisms or toxins in food, water or the atmosphere.
- These agents can be powders, liquids or in other forms. A biological agent will almost never cause immediate symptoms, as it takes time for the biological agent to grow or cause its toxic effects.
- Because deliberate contamination of the nation's food supply can happen anywhere along the food supply stream, food managers and workers play key roles in minimizing these potential threats.
- Clean-up after biological tampering will depend on the biological agent, its form (powder or liquid) and how it was spread (food, air or water) and is determined on a case-by-case basis.
- Keep foods in their original places and seek further guidance from law enforcement and health authorities.
- Follow special instructions on how to safely dispose of items contaminated by biological agents

- **Energy Failure**

- Close the facility. (It’s not safe to operate without lights, refrigeration, ventilation or hot water.)
- Write down the TIME when the power outage occurred. (Your food safety "time clock" starts ticking when the power goes out.)
- Begin taking regular food TEMPERATURE readings. (Have a food thermometer at-the-ready at all times. Check hot foods every hour.)
- Keep a time/temperature record for every item checked in every unit.

What to do to mitigate

- Keep the refrigerator and freezer doors closed as much as possible to maintain the cold temperature.
- The refrigerator will keep food safely cold for about 4 hours if it is

unopened.

- A full freezer will hold the temperature for approximately 48 hours (24 hours if it is half full) if the door remains closed.
- Obtain dry or block ice to keep your refrigerator as cold as possible if the power is going to be out for a prolonged period of time.
- Plan ahead and know where dry ice and block ice can be purchased.

- **Staff injures**

- Food employees who are ill with vomiting or diarrhea should be excluded from working in the establishment.
- Restrict food employees who are ill with Salmonella, Shigella, E. coli or Hepatitis A from working with food. Clean equipment, utensils, and linens.
- Evaluated the potential for food-borne disease transmission.

Reduce the risks in a number of ways. We consider:

- The storage areas are close to the working area to reduce carrying distances;
- Storing items appropriately depending on their weight, size and frequency of use, e.g. Frequently used, heavier items within easy reach, and between knuckle and elbow height
- Keeping storage areas clear and free from obstructions;
- Providing sufficient space in storage areas to allow the use of mechanical aids.
- Using adjustable-height handling aids during shelf stacking and stocktaking.
- Waste removal will involve lifting heavy rubbish bags, which carries the risk of forceful exertion. As we provide smaller refuse bags;

- **Floods water covered food store**

- Do not use any food that may have come into contact with flood water.
- Discard any food that is not in a waterproof container if there is any chance that it has come into contact with flood water.
- Food containers that are not waterproof include those with screw-caps, snap

lids, pull tops, and crimped caps.

- Also, discard cardboard juice/milk and water bottles if they have come in contact with flood water, because they cannot be effectively cleaned and sanitized.
- Inspect canned foods and discard any food in damaged cans. Can damage be shown by swelling, leakage, punctures, holes, fractures, extensive deep rusting, or crushing/denting severe enough to prevent normal stacking or opening with a manual, wheel-type can opener.

- **Food Poisoning**

- Food poisoning can be caused by chemical agents (a chemical product that was inadvertently mixed with the food), physical agents (a foreign body that was inadvertently dropped in the food), or biological agents (viruses, bacteria, toxins or by-products of bacteria, parasites).
- If an employee is suspected of food poisoning , the following procedures should be followed:

➢ Provide first aid

➢ Notify the person on charge.

- If the diagnosis of food poisoning is likely OR no professional assessment of the situation is available then all of the following apply:

➢ Keep a sample of the suspected food item(s)

➢ Wrap and label item(s)

➢ Store items in the refrigerator to prevent further deterioration.

➢ Place foreign matter in a sealed bag and store in the refrigerator.

- Document the incident as per company procedures and include specifics such as:

➢ Contents of meal served

➢ Description of any foreign matter found in the meal

➢ Any food preparation completed on-board e.g. chilled/non- chilled stowage, time and temperature controls

- Time of food consumption
- Time of symptom onset
- Other employees affected

- If surfaces have been contaminated by body fluids, clean/disinfect those surfaces according to hygiene and safety regulations
- Hand over the suspected food item(s) or foreign matter to specific laboratory where food analysis can be done and prearrangements have been made.

- **Storing and Using Poisonous or Toxic Chemicals**

This procedure applies to foodservice employees who use chemicals in the kitchen. As foodservice manager will visually observe that chemicals are being stored, labeled, and used properly during all hours of operation, and applied the following instructions:

- Foodservice employees were Train on using the procedures in this SOP.
- Designate a location for storing the Material Safety Data Sheets (MSDS).
- Follow manufacturer's directions for specific mixing, storing, and first aid instructions on the chemical containers in the MSDS.
- Label and date all poisonous or toxic chemicals with the common name of the substance.
- Store all chemicals in a designated secured area away from food and food contact surfaces using spacing or partitioning.
- Limit access to chemicals by use of locks, seals, or key cards.
- Maintain an inventory of chemicals.
- Store only chemicals that are necessary to the operation and maintenance of the kitchen.
- Mix, test, and use sanitizing solutions as recommended by the manufacturer and local health department.
- Use the appropriate chemical test kit to measure the concentration of sanitizer each time a new batch of sanitizer is mixed.

- Do not use chemical containers for storing food or water.
- Label and store first aid supplies in a container that is located away from food or food contact surfaces.
- Label and store medicines for employee use in a designated area and away from food contact surfaces.
- Do not store medicines in food storage areas.
- Store refrigerated medicines in a covered, leak proof container where they are not accessible to employees and cannot contaminate food.

- **Undeclared/Accidental Allergen Inclusion**

- If it was discovering that a product accidentally contains an undeclared allergen, or if a product has been incorrectly labeled the following action must be taken:
- Where possible withdraw or correct the meal. If it is not possible to withdraw the meal, provide employees with supporting documentation clearly identifying the allergen present.
- Contact the person on charge to communicate the issue.

Corrective Action:

- Retrain any foodservice staff found not following the procedures in this SOP.
- Discard any food contaminated.
- Label and properly store any unlabeled or misplaced chemicals.

Verification and Record Keeping:

- The production manager will complete the Food Safety Checklist daily to indicate that monitoring is completed. Foodservice employees will record the name of the contaminated food, date, time, and the reason why the food was discarded on Reject and damage Product Log.
- The Executive manager will verify that appropriate corrective actions are being taken by reviewing, initialing, and dating the Reject and damage Product Log each day.

- Daily Checkup report and Reject and damage Product Logs are kept on file for a minimum of 1 year.

- **First Aid Catering Kits**

Contents

N	Item	Medium
1	Alcohol free antiseptic wipes	6
2	Blue detectable tape	1
3	Burns cream	1
4	Finger stalls –blue	6
5	First aid guidance leaflet	1
6	Large sterile wound dressings	2
7	Latex gloves	2 prs
8	Medium sterile dressings	6
9	Medium wound dressings, sterile assorted adhesive plasters	20
10	Paraffin Gauze pad	2
11	Safety pins	6
12	Sterile eye pads	2
13	Triangular bandages	4
14	Tuff Cut scissors	1

2.6 Food Fraud

Any deliberate action of businesses or individuals to deceive others in regards to the integrity of food to gain undue advantage. Types of food fraud include but not limited to: adulteration, substitution, dilution, tampering, simulation, counterfeiting, and misrepresentation."

Food fraud deceives the consumers by providing them with lower quality foodstuff, against their knowledge and will. Economically-motivated adulteration deprives the consumers of the quality products they intend to purchase. It can also have serious implications on food safety and the health of consumers.

Common Form of Food Fraud

- Seafood: Seafood is a high-value product that is often subject to substitution and mislabeling. ...
- Olive oil: Olive oil is a popular and expensive product that is often subject to food fraud with cheaper oils, such as sunflower.
- Meat/poultry
- Dairy products
- Herbs/spices

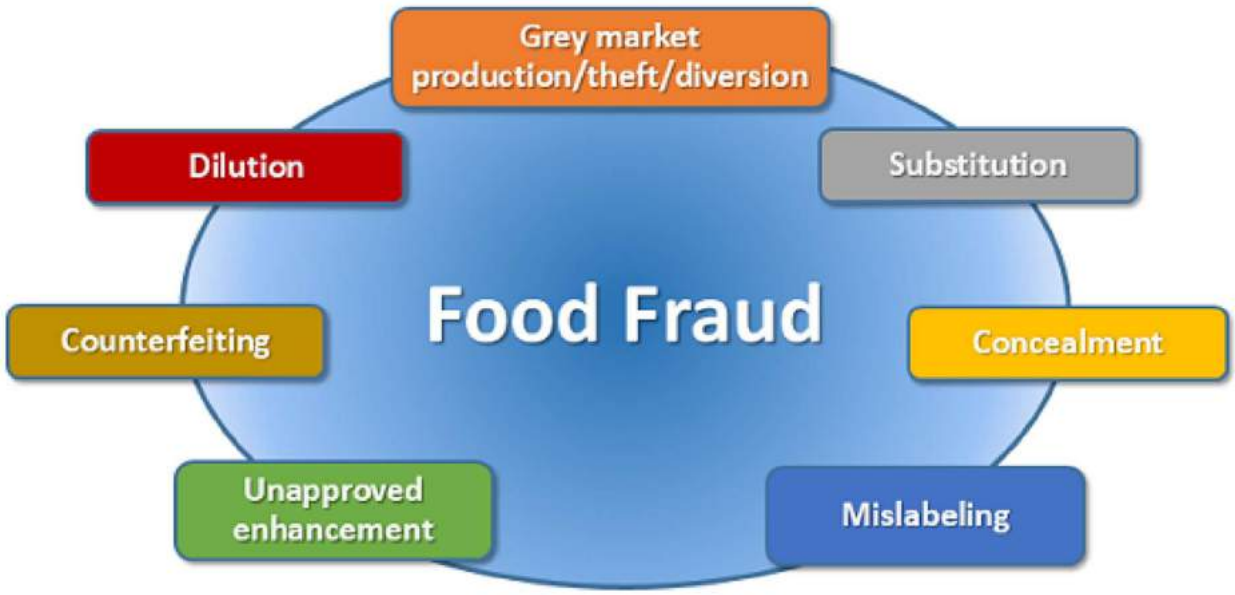


Figure 3: food fraud

Food Adulteration

Food adulteration is the intentional addition or modification of a food product with inferior, cheaper, or non-authentic substances, often to increase volume or weight, or to improve appearance, which can compromise the product's quality, safety, and nutritional value.

Food adulteration often takes the form of the following:

- Substituting one product for another.
- Using unapproved enhancements or additives.
- Misrepresenting something (e.g., country of origin).
- Misbranding or counterfeiting.
- Stolen food shipments.
- Intentional contamination with a variety of chemicals, biological agents, or other.

How to prevent food fraud?

- Proactive food defiance plan using 'The Four A's' (assess, access, alert, audit)
- Supplier due diligence
- Regular testing on ingredients
- Traceability system
- Reliable third-party verification

Food Defense Measures

Is having measures in place to reduce the chances of someone intentionally contaminating the food supply in order to kill or hurt people, disrupt our economy, or ruin your business.

1. **Outside Security Measures**: To prevent unauthorized access by people, or entry of unapproved materials to the facility.

- **Physical Security**

- Premises boundaries are clear and secured to prevent unauthorized entry (for example, fences installed, no trespassing signs posted)
- Entrances are secured (for example, locks and/or alarms installed and operating)
- Plant perimeter is periodically monitored for suspicious activity

- Outside lighting is present to deter unauthorized activities
- Other access points such as windows and vents are secured
- Outside storage on the premises is protected from unauthorized access

- **Receiving Security**

- Incoming supplies are examined for potential tampering
- Incoming and outgoing vehicles are examined for suspicious activity
- Loading and unloading activities are scheduled and/or monitored
- Loading dock access is controlled (for example, monitored or locked)

2. **Inside Security Measures: To protect product from intentional contamination throughout the production process**

- **General Inside Security**

- Suspicious packages are reported to appropriate personnel
- Restricted areas of the establishment are clearly identified
- Previously unattended materials are checked before use
- Unexpected changes in inventory (product or equipment) are reported to appropriate personnel
- Emergency lighting is in place
- An emergency alert system is identifiable, tested, and reviewed with emergency contacts (for
- example, police or fire personnel)

- **Processing Area Security**

- Access to process control equipment such as ovens, mixers is restricted
- Ingredients are examined for possible tampering
- Records ensure traceability for one step backward, one step forward, or bot

- **Storage Security**

- Access to storage areas is restricted
- Stock rotation (first in, first out) is practiced

- Labels and packaging materials are controlled to prevent theft and misuse
- Periodic examinations for tampering of materials in storage are performed

- **Ingredients/Water/Ice Security**

- Restrict access to storage tanks for potable water.
- Access to lines that transfer water or ingredients are examined and restricted
- Access to ice-making equipment is controlled
- Restricted ingredients (for example, nitrites) are controlled
- Supplier food safety/security information is requested

- **Chemical/Hazardous Material Control Security**

- Chemicals/hazardous materials, including pesticides, cleaning and sanitizers, are secured by a lock
- Maintain an up-to-date inventory of hazardous materials and chemicals, and investigate discrepancies.
- Potentially hazardous waste (biological or chemical) is controlled and disposed of properly

- **Information Security**

- Access to sensitive information such as site plans and processing details is controlled
- Access to computer systems is protected through firewalls and/or passwords

2.7 Food Hygiene Rating

The food hygiene rating system is a method used to evaluate and score the cleanliness of a food establishment. The ratings are determined by assessing the establishment's premises, food handling and preparation procedures, and food operation systems as a whole.

Ratings range from 0 to 5, with 5 being the highest rating and 0 being the lowest. The ratings are displayed on the premises and published online to help consumers make informed choices about where to eat or buy food.

The food hygiene rating system can benefit individuals and businesses within the food industry, such as restaurants, cafes, takeaways, caterers, food manufacturers, and food retailers.

Here is a brief explanation of ***how the rating system works, along with the corresponding points for each rating category:***

- **Food Hygiene rating No. 5: Excellent (0 to 15 points):** The premises of a food business demonstrate and implement the most superior hygiene standards.
- **Food Hygiene rating No. 4: Good (20 points):** The food business has very good hygiene standards; however, there are some aspects that can improve.
- **Food Hygiene rating No. 3: Satisfactory (25 to 30 points):** The food business has areas that need improvement; however, these areas don't generally pose an immediate health concern.
- **Food Hygiene rating No. 2: Needs Improvement (35 to 40 points):** The food business has areas that need further improvement and could potentially cause a health risk.
- **Food Hygiene rating No. 1: Poor (45 to 50 points):** The food business has serious hygiene issues that could pose an immediate risk to health and safety.
- **Food Hygiene rating No. 0: Very Poor (50+ points):** The food business has serious issues that pose an immediate risk to health and safety and it is urgently necessary to address them.

Benefits of the Food Hygiene Rating Scheme

The Food Hygiene Rating Scheme has several advantages for both customers and businesses. Here are some of the benefits of a food hygiene rating scheme:

- **Encourages Higher Standards of Hygiene**

The Food Hygiene Rating Scheme helps to encourage food establishments to maintain high standards of cleanliness and hygiene. Knowing that they will be rated on their performance can motivate businesses to improve their hygiene practices, which can lead to a safer and healthier environment for the public.

- **Empowers Consumers to Make Informed Choices**

The scheme empowers consumers to make informed choices about where to eat or buy food. By looking at the rating displayed in the establishment or online, people can quickly assess the hygiene standards of a food business and make choices based on their preferences and level of comfort with the business's hygiene practices.

- **Provides a Uniform Standard**

The scheme provides a uniform standard across the country, meaning all food establishments are assessed using the same criteria. This helps to ensure consistency in food safety and hygiene standards across different regions of the UK.

- **Encourages Businesses to Comply with Regulations**

The Food Hygiene Rating Scheme helps to encourage businesses to comply with food safety and hygiene regulations. Knowing that a food safety officer will assess them can motivate businesses to meet the legal requirements and provide a safe environment for their customers.

- **Publicly Recognizes Compliant Establishments**

Establishments that comply with food safety and hygiene regulations and receive high ratings can be publicly recognized for their efforts. This recognition can be useful for marketing purposes and can help businesses attract more customers looking for a safe and hygienic place to eat or buy food.

Tips To Improve Food Hygiene Ratings

As a business that serves food, it is essential to be aware of the regulations and guidelines for food safety and hygiene. Here are some tips that can help you improve your food hygiene rating:

- **Training**

Ensure all staff receive proper training in food hygiene and safety. This includes training in personal hygiene, cross-contamination, and food storage and handling. Training should be ongoing, and staff should be regularly reminded of good hygiene practices.

- **Food Storage and Preparation**

Proper food storage and preparation are essential for maintaining food hygiene. Store different types of foods separately and at the correct temperatures. Use appropriate cleaning materials and sanitizers to clean work surfaces and equipment. Follow cooking and reheating guidelines to avoid undercooking or overcooking food.

- **Labeling and Disposal**

Ensure food products' labels are correct with relevant allergen information, dates, and storage instructions. Dispose of food waste appropriately and ensure that the bins are empty to avoid contamination.

- **Regular Cleaning**

Implement a regular cleaning schedule to ensure thorough cleaning and disinfecting of equipment, utensils, and work surfaces. This includes regularly cleaning fridges, freezers, and ovens to ensure no build-up of bacteria or mold.

By following these tips, food establishments can improve their hygiene standards, maintain a high hygiene rating, and provide a safe and hygienic environment for their customers.

2.8 Staff Training

Food business operators are to ensure that: food handlers are supervised and instructed and/or trained in food hygiene matters commensurate with their work activity, in other words, trained to carry out their specific job safely and ensure the production of safe food; and those responsible for the development and maintenance of the food safety management system based on the HACCP principles, or for the operation of the relevant guides have received adequate training in the application of the HACCP principles.

It is recommended that:

- All food handlers receive written or verbal instruction in the essentials of food hygiene before they start work and additional hygiene awareness instruction (introduction to food hygiene in Scotland) within four weeks of starting work; food handlers who prepare open high-risk foods or have a supervisory role receive Level 2 (Foundation/Elementary) training within three months of starting work; and
- Supervisors undertake Intermediate training or Level 4 (Advanced) training, depending on their actual duties. Supervisors and managers should also undertake relevant HACCP training

Any staff involved in food preparation, handling, serving, and clean up must receive full training in food hygiene and understand the responsibility of their work. Food employees should be taught that they share the responsibility with management when it comes to preventing foodborne illness.

The objectives of hygiene training

The main objective of hygiene training is to change the behavior and attitude of food handlers at work and so minimize the risk of food poisoning and food complaints. To achieve this objective, staff will need to be provided with the knowledge and skills to operate hygienically

and then motivated and supervised to ensure that they implement what they have learned. Training should not be undertaken haphazardly but must be carefully planned. The most effective way of undertaking hygiene training is to develop and implement a training program, the principles of which are applicable to all businesses, although the program will be less formal for smaller businesses.

For instance, they should know:

- How employee health is related to foodborne illnesses
- The importance of immediately reporting symptoms of food-borne disease (vomiting, diarrhea, jaundice, sore throat) and exposed infected wounds or cuts to their manager.
- Proper hand hygiene and rules of no bare-hand contact with food.

Training programs elements to take into account in determining the extent of training required include:

- The nature of hazards associated with the food, e.g. its ability to sustain growth of pathogenic or spoilage microorganisms, the existence of potential physical contaminants or known allergens.
- The manner in which the food is produced, processed, handled and packed, including the likelihood of contamination.
- The extent and nature of processing or further preparation before consumption of the food.
- The conditions under which the food will be stored.
- The expected length of time before consumption of the food.
- The use and maintenance of instruments and equipment associated with food.

Topics to be considered for training programs could include the following as appropriate to a person's duties:

- The principles of food hygiene applicable to the food business.
- The measures relevant to the food business that are used to prevent contaminants in food.
- The importance of good personal hygiene, including proper hand washing and wearing, when needed, appropriate clothing, for food safety.

- The general hygiene practices (GHPs) applicable to the food business; and appropriate actions to take when food hygiene problems are observed.

Refresher training should be continuous to ensure food handlers always implement the good hygiene practices they have been taught. It reinforces hygiene rules and demonstrates management commitment to food hygiene. The supervisor has a key role in refresher training and they should never let a member of staff break a hygiene rule without correcting it. Bad habits must not be allowed to develop. When a failure has been identified in any part of the HACCP-based system, the staff concerned must be retrained and/or given new instructions to carry out their job role safely.

Refresher training is also important to keep staff up to date with the latest food safety information as well as the operation of new equipment

Training methods

There are many ways of ensuring that food handlers are effectively trained depending on the type of business, their level of hygiene knowledge and their literary skills. Continuous on-the-job instruction and control by a knowledgeable supervisor is essential to ensure food safety procedures are being carried out correctly. A large number of visual aids are available to enhance training sessions or reinforce important messages. Videos, overhead transparencies, books, leaflets, posters and computer-based training packages are all useful, especially if the audience finds them enjoyable. Humorous illustrations are more memorable than text. Interactive training packages and training sessions, for example group exercises, quiz books, software, games and role playing, produce better results.

Training program and records

It is good practice for food businesses to have a training program which identifies the training needs of each food handler. Records of training, to include induction (hygiene essentials), hygiene awareness, Level 2 (Foundation/Elementary), Level 3 (Intermediate) or Level 4 (Advanced), any specific courses attended, such as HACCP, and refresher training, should be completed for each food handler to assist compliance with the legal requirements and to assist in establishing a due-diligence defense. (It must always be remembered that the law requires competency for food handlers to produce safe food, not an ageing certificate on the wall).

Records are also useful to provide evidence that staff have received appropriate training, to identify further training needs, plan a training program and determine refresher training.

Verification of effective training

Training can be considered successful when food handlers put into practice what they have been taught. Food handlers must demonstrate that they are competent by implementing the highest standards of food hygiene at all times, even when there is no supervisor present.

An assessment of competency focuses on what is expected of a food handler in the food business, rather than just on the learning process. The competent food handler is one who has the ability to apply what has been learned.

3. Hazard Analysis & Critical Control Points (HACCP)

3.1 Introduction

3.1.1 History of HACCP

HACCP has become synonymous with food safety. It is a worldwide-recognized systematic and preventive approach that addresses biological, chemical and physical hazards through anticipation and prevention, rather than through end-product inspection and testing.

The HACCP system for managing food safety concerns grew from two major developments. The first breakthrough was associated with W.E. Deming, whose theories of quality management are widely regarded as a major factor in turning around the quality of Japanese products in the 1950s. Dr Deming and others developed total quality management (TQM) systems which emphasized a total systems approach to manufacturing that could improve quality while lowering costs.

The second major breakthrough was the development of the HACCP concept itself. The HACCP concept was pioneered in the 1960s by the Pillsbury Company, the United States Army and the United States National Aeronautics and Space Administration (NASA) as a collaborative development for the production of safe foods for the United States space program. NASA wanted a "zero defects" program to guarantee the safety of the foods that astronauts would consume in space. Pillsbury therefore introduced and adopted HACCP as the system that could provide the greatest safety while reducing dependence on end product inspection and testing. HACCP emphasized control of the process as far upstream in the processing system as possible by utilizing operator control and/or continuous monitoring techniques at critical control points. Pillsbury presented the HACCP concept publicly at a conference for food protection in 1971. The use of HACCP principles in the promulgation of regulations for low-acid canned food was completed in 1974 by the United States Food and Drug Administration (FDA). In the early 1980s, the HACCP approach was adopted by other major food companies.

The United States National Academy of Science recommended in 1985 that the HACCP approach be adopted in food processing establishments to ensure food safety. More recently, numerous groups, including for example the International Commission on Microbiological Specifications for Foods (ICMSF) and the International Association of Milk, Food and

Environmental Sanitarians (IAMFES), have recommended the broad application of HACCP to food safety.

3.1.2 Advantages of HACCP

The HACCP system, as it applies to food safety management, uses the approach of controlling critical points in food handling to prevent food safety problems. The system, which is science based and systematic, identifies specific hazards and measures for their control to ensure the safety of food. HACCP is based on prevention and reduces the reliance on end product inspection and testing.

The HACCP system can be applied throughout the food chain from the primary producer to the consumer. Besides enhancing food safety, other benefits of applying HACCP include more effective use of resources, savings and more timely response to food safety problems.

HACCP enhances the responsibility and degree of control in food preparation. A properly implemented HACCP system leads to greater involvement of food handlers in understanding and ensuring food safety, thus providing them with renewed motivation in their work. Implementing HACCP does not mean undoing quality assurance procedures or good practices already established by a company; it does, however, require a revision of these procedures as part of the systematic approach and for their appropriate integration into the HACCP plan. The application of the HACCP system can also aid inspection by food control regulatory authorities.

Any HACCP system should be capable of accommodating change, such as advances in equipment design, changes in processing procedures or technological developments.

3.1.3 Application of HACCP

While the application of HACCP to all segments and sectors of the food chain is possible, it is assumed that all sectors should be operating according to the Codex General Principles of Food Hygiene. The ability of premises to support or implement the HACCP system depends on the degree of its adherence to these practices.

The successful application of HACCP requires the full commitment and involvement of management and the workforce. It requires a multidisciplinary approach which should include, as appropriate, expertise in agronomy, veterinary health, microbiology, public health, food technology, environmental health, chemistry, engineering, etc. according to the particular situation. The application of the HACCP system is compatible with the

implementation of total quality management systems (TQM). However, HACCP is the system of choice in the management of food safety within such systems.

Food control regulatory agencies worldwide have shown interest in implementing the HACCP system. A common understanding about terminology and approaches for application will greatly enhance its adoption and will lead to a harmonized approach to food safety among countries all over the world. Food regulation authority in Egypt has recommended integration and application of the HACCP system in any food preparation process.

3.1.4 Objectives of the FAO approach to HACCP

The objectives of the FAO approach to HACCP include:

- Promotion of the implementation of the HACCP system based on the harmonized Codex
- General Principles of Food Hygiene and GMPs
- Development of a program to train trainers who are in a position to train others who can apply the knowledge gained
- Identification and provision of appropriate reference and training materials on the application of HACCP to support the training
- Provision of training to individuals involved to varying degrees with the preparation, monitoring, administration and verification of HACCP plans
- Enhancement of the role of science and risk assessment in the development of HACCP systems
- Creation of a framework for determining the equivalence of food safety control programs through a harmonized approach to the application of HACCP

3.1.5 Guidelines for the application of the HACCP system

Prior to application of HACCP to any sector of the food chain, that sector should be operating according to the Codex General Principles of Food Hygiene, the appropriate Codex Codes of Practice, and appropriate food safety legislation. Management commitment is necessary for implementation of an effective HACCP system. During hazard identification, evaluation, and subsequent operations in designing and applying HACCP systems, consideration must be given to the impact of raw materials, ingredients, food operation practices, and role of

operation processes to control hazards, categories of consumers of concern, and epidemiological evidence relative to food safety.

The intent of the HACCP system is to focus control at CCPs. Redesign of the operation should be considered if a hazard which must be controlled is identified but no CCPs are found.

HACCP should be applied to each specific operation separately. CCPs identified in any given example in any Codex Code of Hygienic Practice might not be the only ones identified for a specific application or might be of a different nature.

The HACCP application should be reviewed and necessary changes made when any modification is made in the product, process, or any step.

It is important when applying HACCP to be flexible where appropriate, given the context of the application, taking into account the nature and the size of the operation.

3.1.6 Principles of the HACCP system

The HACCP system consists of the following seven principles:

Principle 1: Conduct a hazard analysis.

Identify the potential hazard(s) associated with food production at all stages, from primary production, processing, manufacture and distribution until the point of consumption. Assess the likelihood of occurrence of the hazard(s) and identify the measures for their control.

Principle 2: Determine the Critical Control Points (CCPs).

Determine the points, procedures or operational steps that can be controlled to eliminate the hazard(s) or minimize its (their) likelihood of occurrence.

A "step" means any stage in food production and/or manufacture including the receipt and/or production of raw materials, harvesting, transport, formulation, processing, storage, etc.

Principle 3: Establish critical limit(s).

Establish critical limit(s) which must be met to ensure the CCP is under control.

Principle 4: Establish a system to monitor control of the CCP.

Establish a system to monitor control of the CCP by scheduled testing or observations.

Principle 5: Establish the corrective action to be taken when monitoring indicates that a particular CCP is not under control.

Principle 6: Establish procedures for verification to confirm that the HACCP system is working effectively.

Principle 7: Establish documentation concerning all procedures and records appropriate to these principles and their application.

3.2 Application of the HACCP principles

The application of HACCP principles consists of the following tasks as identified in the Logic Sequence for Application of HACCP.

Logic sequence for application of HACCP

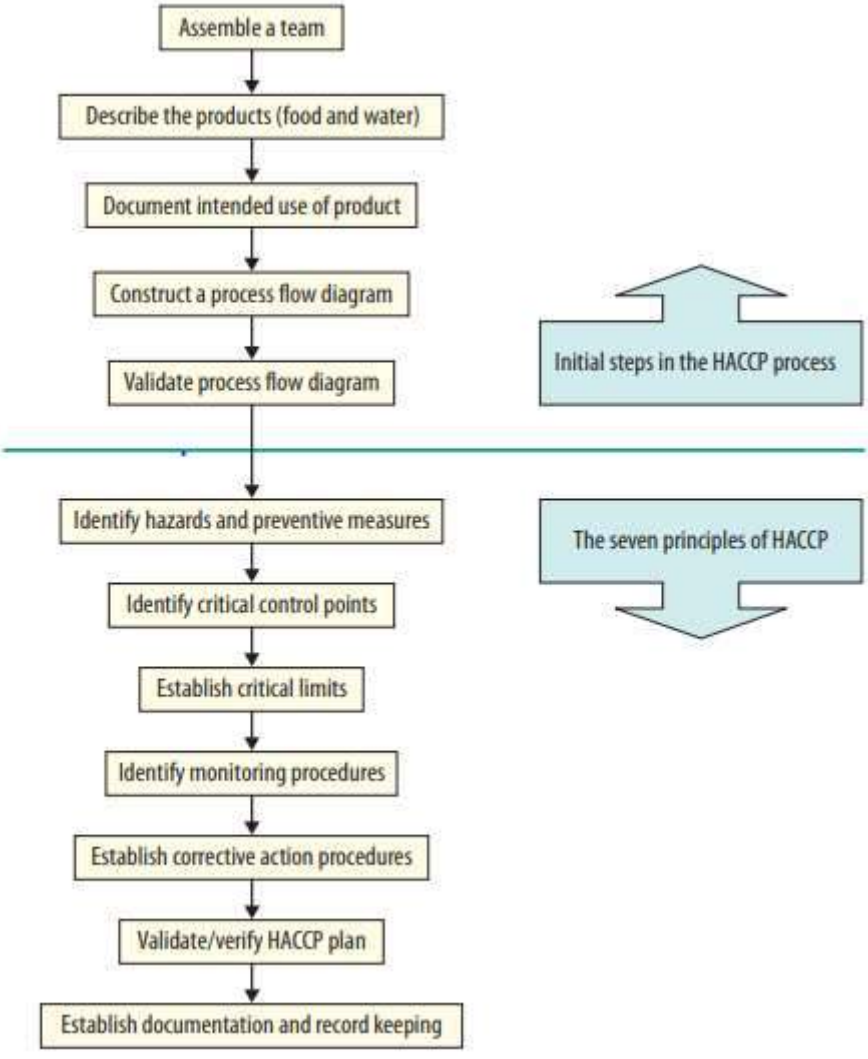


Figure 4: The five steps for the HACCP implementation and seven principles

Training

Training of personnel in industry, government and academia in HACCP principles and applications, and increasing awareness of consumers are essential elements for the effective implementation of

HACCP. As an aid in developing specific training to support an HACCP plan, working instructions and procedures should be developed which define the tasks of the operating personnel to be stationed at each Critical Control Point.

Cooperation between primary producer, industry, trade groups, consumer organizations and responsible authorities is of vital importance. Opportunities should be provided for the joint training of industry and control authorities to encourage and maintain a continuous dialogue and create a climate of understanding in the practical application of HACCP.

The International Commission on Microbiological Specifications for Foods (ICMSF) monograph *HACCP in microbiological safety and quality,* which describes the type of training required for various target groups, is an example of a general approach to training.

3.2.1 Assemble the HACCP team

Task 1

The food operation should assure that the appropriate product specific knowledge and expertise is available for the development of an effective HACCP plan. Optimally, this may be accomplished by assembling a multidisciplinary team. Where such expertise is not available on site, expert advice should be obtained from other Sources. The scope of the HACCP plan should be identified. The scope should describe which segment of the food chain is involved and the general classes of hazards to be addressed (e.g. does it cover all classes of hazards or only selected classes).

Prior to proceeding to HACCP team selection, it is extremely important to have full commitment to the HACCP initiative from management at all levels. Without a firm commitment, it may be difficult or impossible to implement the HACCP plan. Before the study is begun, management should inform all staff of the intention to implement HACCP. Both the company and the personnel involved in the development of the HACCP plan must be totally committed to its implementation.

The first task in the application of HACCP is to assemble a team having the knowledge and expertise to develop an HACCP plan. The team should be multidisciplinary and could include

premises personnel from production/sanitation, quality assurance, laboratory, engineering and inspection. It is essential to assemble the right blend of expertise and experience, as the team will collect, collate and evaluate technical data and identify hazards and critical control points.

In smaller establishments, one person may fulfil several roles or even constitute the whole team. In the latter case the use of external consultants or advice may be necessary.

The team should also include personnel who are directly involved in daily processing activities, as they are more familiar with the specific variability and limitations of the operations. Their representation will foster a sense of ownership among those who will have to implement the plan. The HACCP team may require independent outside experts to advice on identified issues or problem areas; for example, an expert in public health risks associated with the product or process may be hired. However, complete reliance on outside sources is not recommended in developing the HACCP plan, as such an approach may lack the support of the plant personnel.

Team composition

When selecting the team, ***the coordinator should focus on:***

- Those who will be involved in hazard identification
- Those who will be involved in determination of critical control points
- Those who will monitor critical control points
- Those who will verify operations at critical control points
- Those who will examine samples and perform verification procedures

Knowledge required

Selected personnel should have a basic understanding of:

- Practical aspects of the food operations
- The flow and technology of the process
- Applied aspects of food microbiology
- HACCP principles and techniques

Scope

One of the first tasks of the HACCP team should be to identify the scope of the HACCP plan.

The team should:

- Limit the study to a specific product and process
- Define the type(s) of hazards to be included (e.g. biological, chemical, physical)
- Define the part of the food chain to be studied

Coordinator

The team must include a coordinator (chairperson) whose role is to:

- Ensure that the composition of the team meets the needs of the study
- Suggest changes to the team if necessary
- Coordinate the team's work
- Ensure that the agreed established plan is followed
- Share the work and responsibilities
- Ensure that a systematic approach is used
- Ensure that the scope of the study is met
- Chair meetings so that team members can freely express their ideas
- Represent the team before management
- Provide management with an estimate of the time, money and labor required for the study

Training requirements

It is essential that the team members be trained on the Codex General Principles of Food Hygiene and the guidelines for the application of the HACCP system to ensure that the team will work together with a common focus and use the same approach and terminology.

Resources

The number of meetings will depend on the scope of the study and the complexity of the operation. For efficiency, each meeting should have a specific objective, a planned agenda and a limited duration. Meetings should be of sufficient frequency to maintain momentum,

but spaced out enough so there will be time between meetings for the gathering of any necessary information. It is advantageous to keep the study proceeding at a reasonable pace to maintain the enthusiasm of the team. A time-line should be developed and goals set for the accomplishment of team and individual assignments.

To ensure success and demonstrate commitment, it is important for senior management to allocate the necessary resources for the HACCP study. **These may include:**

- Time for team meetings and administration
- Costs of initial training
- Necessary documents
- Access to analytical laboratories
- Access to information sources to answer questions raised by the team (e.g. universities, public and private research authorities, government and public authorities, scientific and technical literature, databases)

3.2.2 Describe product and identify intended use

Product description (Tasks 2)

The HACCP team must make a complete description of each food product - including all ingredients/processing methods/packaging materials/etc. used in the formulation of the product - to assist in the identification of all possible hazards associated with the product. In brief, the product description should include the name of the product, ingredients and composition, potential to support microbial growth (water activity [Aw], pH, etc.), brief details of the process and technology used in production, appropriate packaging and intended use, including target employees.

To complete this description as accurately as possible it is important that the team be familiar with the properties, destination and use of the product. It is important, for example, to take into consideration whether sensitive segments of the employees may consume the product for example (elders and immune suppressed persons).

The HACCP team needs to have as complete an understanding of the product as possible. All details of the product's composition and processing should be known and understood. This information will be essential particularly for microbiological hazards because the product's composition needs to be assessed in relation to the ability of different pathogens to grow.

Before arriving at the specific details of the product description, the HACCP team should address the questions outlined below.

Formulation of product

- What raw materials or ingredients are used?
- Are microorganisms of concern likely to be present in or on these materials, and if so what are they?
- If food additives or preservatives are used, are they used at acceptable levels, and at those levels do they accomplish their technical objective?
- Will the pH of the product prevent microbial growth or inactivate particular pathogens?
- Will the Aw of the product prevent microbial growth?
- What is the oxidation/reduction potential (Eh) of the product?

Processing and preparation checklist

- Can a contaminant reach the product during preparation, processing or storage?
- Will microorganisms or toxic substances of concern be inactivated during cooking, reheating or other processing?
- Could any microorganisms or toxins of concern contaminate food after it has been heated?
- Would more severe processing be acceptable or desirable?
- Is the processing based on scientific data?
- How does the package or container affect survival and/or growth of microorganisms?
- How much time is taken for each step of processing, preparation, storage and display?
- What are the conditions of distribution?

Identification of intended use (Tasks 3)

The intended use should be based on the expected uses of the product by the end user. In specific cases, vulnerable groups of the employees may have to be considered.

3.2.3 Construct flow diagram and on-site confirmation of flow diagram

Flow diagram (Task 4)

The flow diagram should be constructed by the HACCP team. The flow diagram should cover all steps in the operation. When applying HACCP to a given operation, consideration should be given to steps preceding and following the specified operation.

It is easier to identify routes of potential contamination, to suggest methods of control and to discuss these among the HACCP team if there is a flow diagram. The review of the flow of raw materials from the point at which they enter the premises, through processing to waste disposal is the feature that makes HACCP a specific and important tool for the identification and control of potential hazards.

A process flow diagram must be constructed, following interviews, observation of operations and other sources of information such as blueprints. The process flow diagram will identify the important process steps (from receiving of ingredients to waste disposal) used in the production of the specific product being assessed. There should be enough detail to be useful in hazard identification, but not so much as to overburden the plan with less important points.

Each process step should be considered in detail and the information expanded to include all relevant process data. **Data may include but is not restricted to:**

- All ingredients and packaging used (biological, chemical, physical data)
- Sequence of all process operations (including raw material addition)
- Time/temperature history of all raw materials and intermediate and final products, including the potential for delay
- Flow conditions for liquids and solids
- Equipment design features

Premises schematic

A premise schematic must be developed to show product flow and food staff traffic patterns within the premise. The diagram should include the flow of all ingredients and packaging materials from the moment they are received at the premise, through storage, preparation, processing, packaging, finished product holding and display.

The personnel flow should indicate staff movement through the premise, including changing rooms, washrooms and lunchrooms. The location of hand-washing facilities and footpaths (if applicable) should also be noted.

This plan should aid in the identification of any areas of potential cross-contamination within the premise. The premise schematic/floor and equipment layout should be considered in detail and assessed.

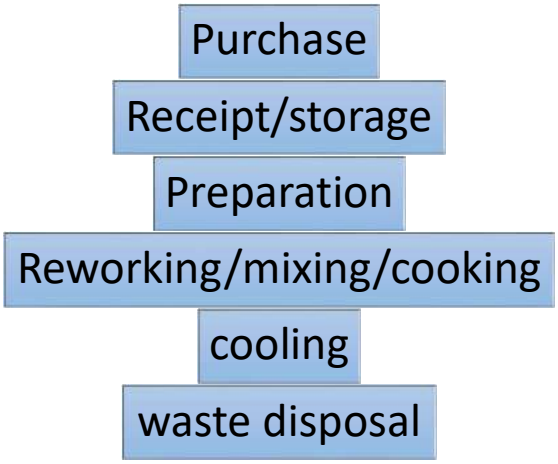


Figure 5 Typical stages of a HACCP diagram Ingredients enter the flow

Data may include but is not restricted to:

- Staff routes
- Routes of potential cross-contamination
- Area segregation
- Flow of ingredients
- Location of changing rooms, washrooms, and hand-washing stations

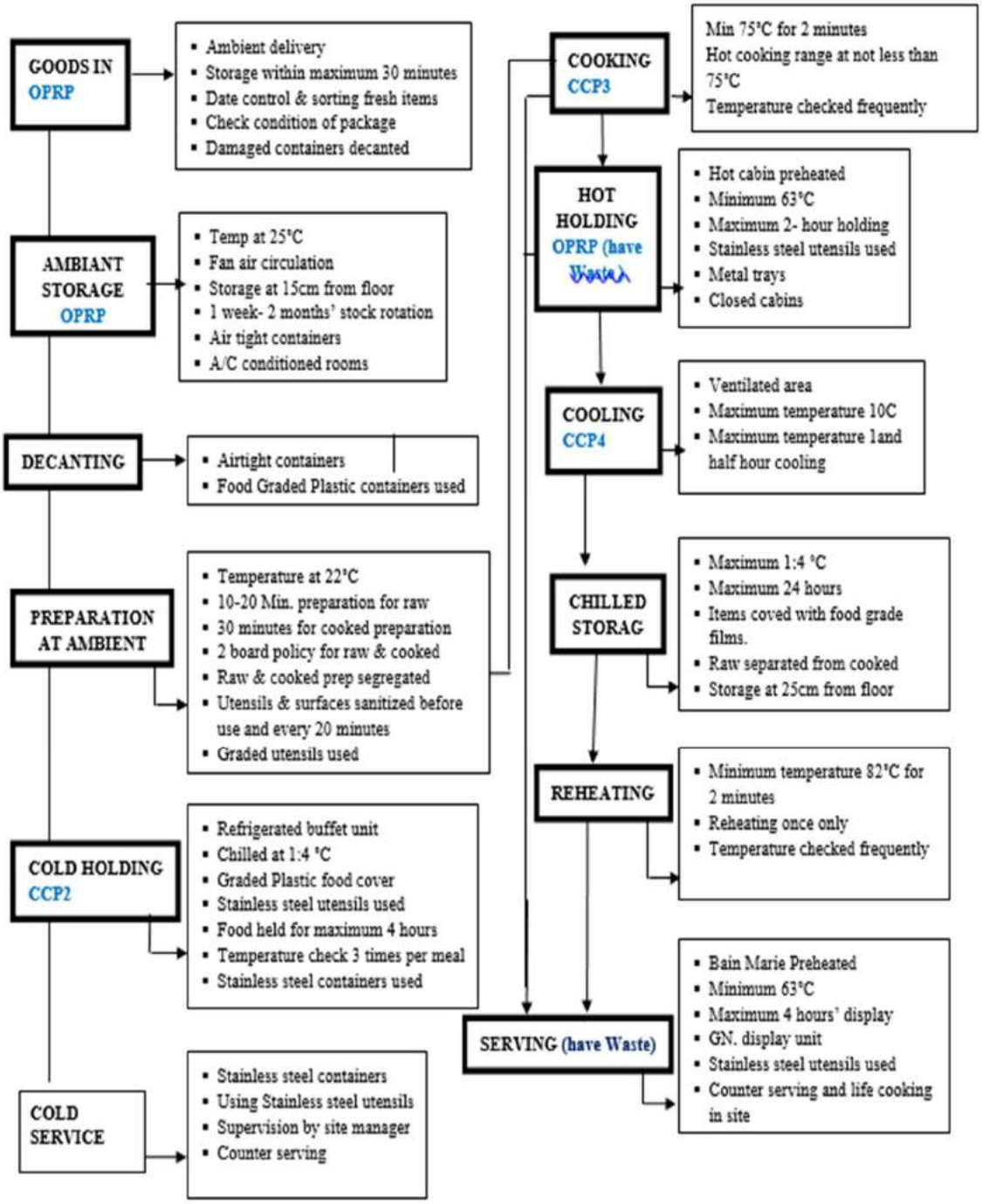
On-site confirmation of flow diagram and premise schematic (Task 5)

Once the process flow diagram and plant schematic have been drafted, they must be confirmed by an on-site inspection for accuracy and completeness. This will ensure that all the major process operations have been identified. It will also confirm the assumptions made with respect to the movement of product and employees on the premises.

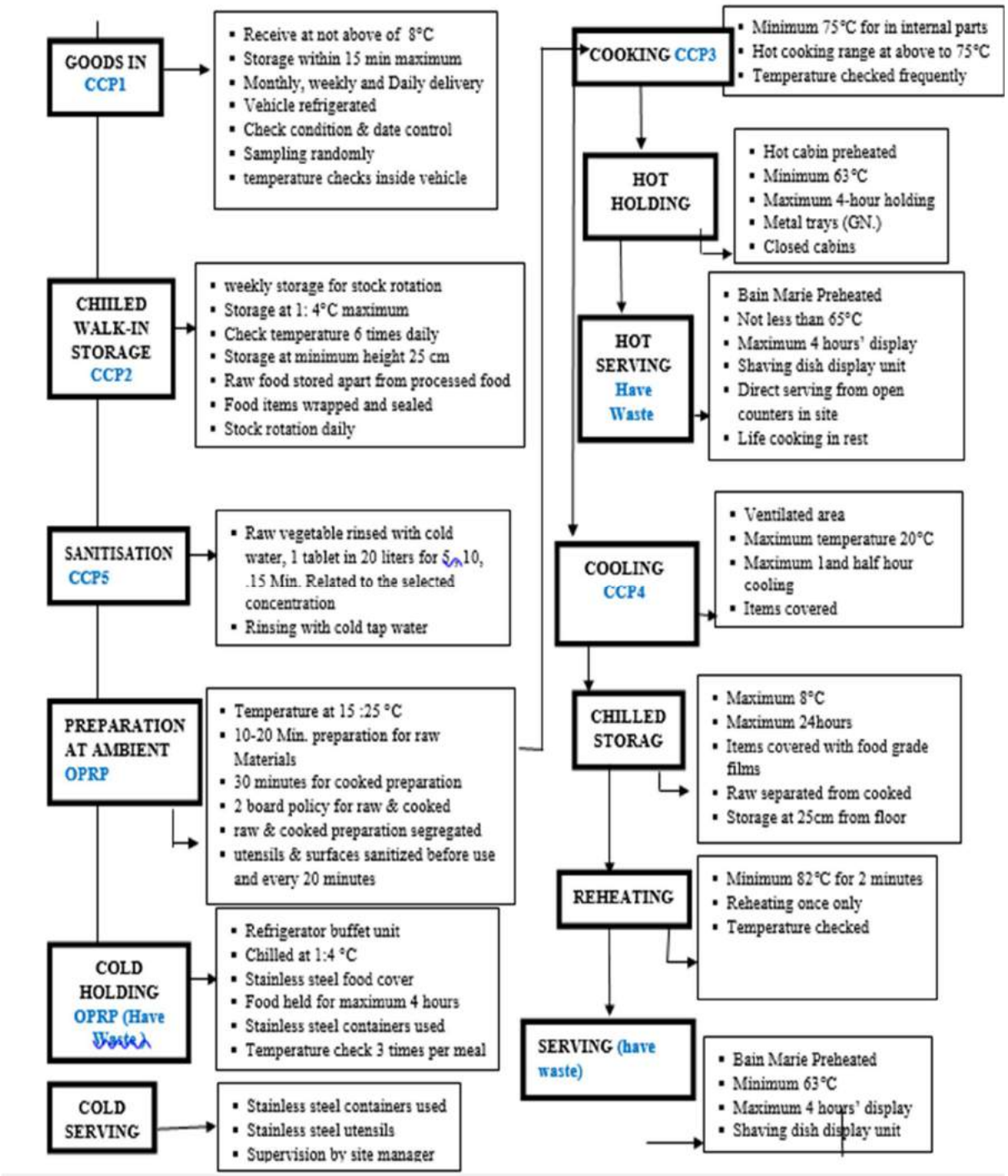
The draft flow diagram should be compared with the operation it represents on site. The process should be reviewed at various times throughout the hours of operation to verify that the flow diagram is valid throughout all operational periods. All members of the HACCP

team should be involved in the flow diagram confirmation. Adjustments should be made to the flow diagram, as necessary based on the actual operations observed.

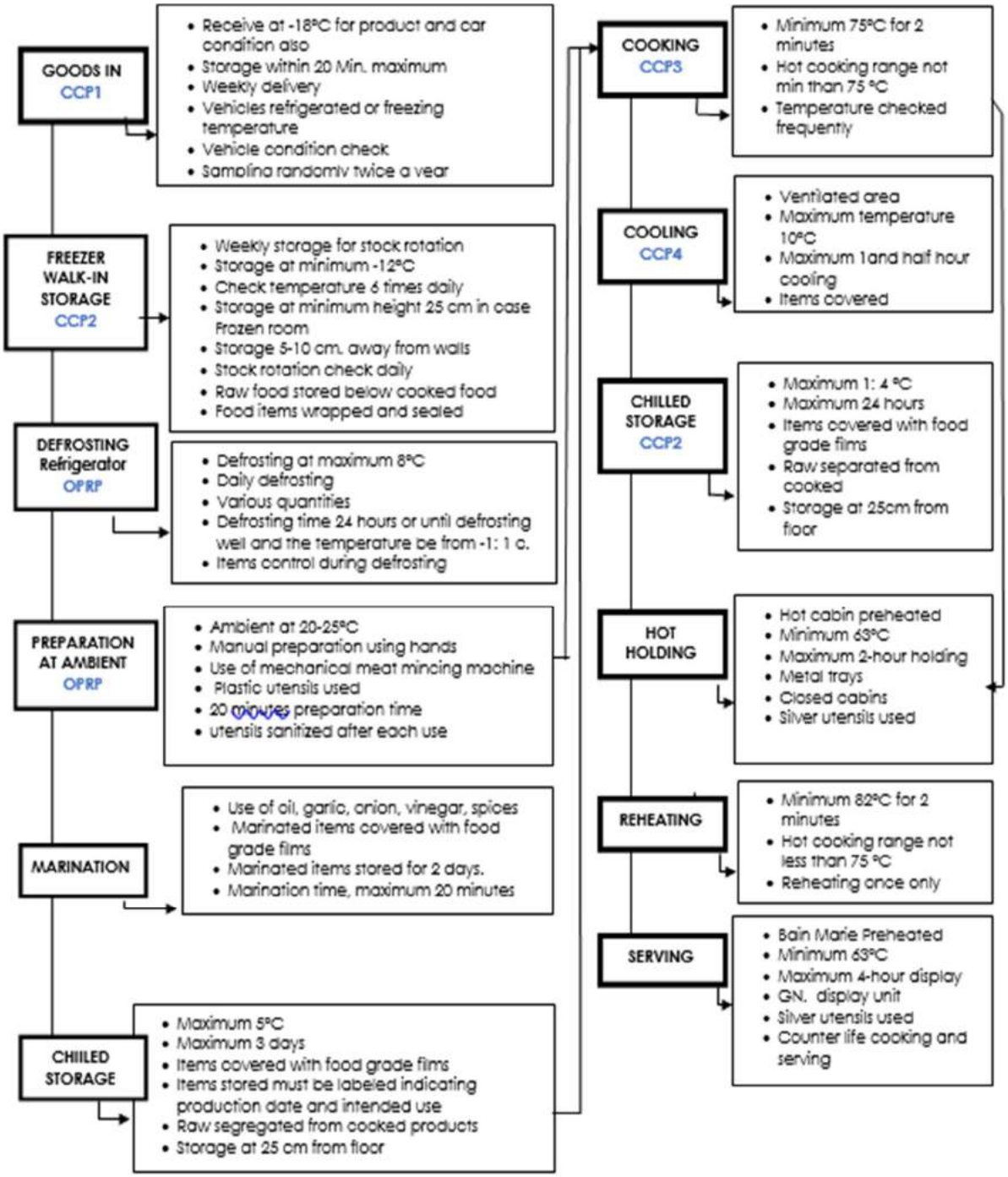
Examples of flow diagram/ HACCP - Dry received materials



Refrigerated products received



Frozen Product received



3.2.4 List all potential hazards associated with each step, conduct a hazard analysis and consider any measures to control identified hazards

Hazard analysis (Task 6/Principle 1)

Hazard analysis is the first HACCP principle. As the name HACCP implies, hazard analysis is one of the most important tasks. An inaccurate hazard analysis would inevitably lead to the development of an inadequate HACCP plan. Hazard analysis requires technical expertise and scientific background in various domains for proper identification of all potential hazards.

Knowledge of food science and HACCP is necessary for the performance of a satisfactory hazard analysis.

The Codex *Hazard Analysis and Critical Control Point* (*HACCP*) *system and guidelines for its application* [Annex to CAC/RCP 1-1969, Rev. 3 (1997)] defines a hazard as "A biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect". The hazard analysis is necessary to identify for the HACCP plan which hazards are of such a nature that their elimination or reduction to acceptable levels is essential to the production of a safe food.

The HACCP team should list all hazards that may be reasonably expected to occur at each step from primary production, processing, until the point of waste disposal.

The HACCP team should next conduct a hazard analysis to identify for the HACCP plan which hazards are of such a nature that their elimination or reduction to acceptable levels is essential to the production of a safe food.

In conducting the hazard analysis, wherever possible the following should be included:

- The likely occurrence of hazards and severity of their adverse health effects
- The qualitative and/or quantitative evaluation of the presence of hazards
- Survival or multiplication of microorganisms of concern
- Production or persistence in foods of toxins, chemicals or physical agents
- Conditions leading to the above.

Hazards will vary among firms making the same products because of differences in:

- Sources of ingredients

- Formulations
- Processing equipment
- Processing and preparation methods
- Duration of processes
- Storage conditions
- The experience, knowledge and attitudes of personnel

Therefore hazard analysis must be done on all existing and new products. Changes in raw materials, product formulations, processing or preparation procedures, packaging, and/or use of the product will require review of the original hazard analysis.

The first step in the development of an HACCP plan for a food operation is the identification of all potential hazards associated with the product at all stages from raw materials to consumption. All biological, chemical and physical hazards should be considered.

Sources of information for hazard analysis

The information required concerning potential hazards associated with a specific food can be obtained from a variety of sources including the following reference texts depending on the experience and knowledge of the team, review of texts on HACCP, food microbiology, food processing and plant sanitation may be useful. **Such texts include:**

- *Procedures to implement the HACCP system.* International Association of Milk, Food and Environmental Sanitarians (IAMFES), 1991. Ames, Iowa, USA
- *HACCP in microbiological safety and quality.* International Commission on Microbiological Specifications for Foods (ICMSF), 1989. Boston, Massachusetts, USA, Blackwell Scientific Publications
- *An evaluation of the role of microbiological criteria for foods and food ingredients.* National Research Council (NRC) Committee on Food Protection, 1985. Washington, DC, USA, National Academy Press
- *Microorganisms in foods 1 - Their significance and methods of enumeration.* ICMSF/1978. Toronto, Ontario, Canada, University of Toronto Press

- *Microorganisms in foods 2 - Sampling for microbiological analysis: principles and specific applications.* ICMSF, 1986. Toronto, Ontario, Canada, University of Toronto Press (second edition)
- *Microbial ecology of foods.* Volume 1, *Factors affecting life and death of microorganisms;* Volume 2, *Food commodities.* ICMSF, 1980. Orlando, Florida, USA/Academic Press

How to conduct a hazard analysis

After listing all the hazards (biological, chemical or physical) that may be reasonably expected at each step of processing until the point of waste disposal, the HACCP team should assess the potential significance or risk of each hazard by considering its likelihood of occurrence and severity. The estimate of the risk of a hazard occurring is based upon a combination of experience, epidemiological data and information in the technical literature. Severity is the degree of seriousness of the consequences of a hazard if the hazard is not controlled. There may be differences of opinion even among experts as to the risk of a hazard.

Hazards addressed under the HACCP system must be of such a nature that their prevention, elimination or reduction to acceptable levels is essential to the production of safe foods.

Hazards of a low probability of occurrence and a low severity should not be addressed under the HACCP system but may be addressed through the good operation practices contained in the Codex General Principles of Food Hygiene.

A hazard analysis must be conducted for each existing product or process type. In addition, the hazard analysis done for a product or process type must be reviewed if any changes are made in raw material, product formulation, preparation, and processing, packaging and intended use of the product.

For simplicity, the hazard analysis procedure has been broken down into the five following activities. Applying them in a logical sequential manner will help to avoid any omissions.

1. Review incoming material

Review the information on the product description form and determine how it could influence your interpretation during the analysis of the process. For example, a ready-to-eat product must not contain pathogens in amounts that may harm the consumer.

For each incoming material (ingredient or packaging material), identify all biological, chemical or physical hazards, using the sources of information described above.

To facilitate the identification of potential hazards, answer the following questions for each incoming material:

- Could pathogenic microorganisms, toxins, chemicals or physical objects possibly be present on/in this material?
- Are any returned or reworked products used as ingredients? If yes, is there a hazard linked to that practice?
- Does the amount and type of acid ingredients and the resulting pH of the final product affect growth or survival of microorganisms?
- Do the moisture content and the water activity (Aw) of the final product affect microbial growth? Do they affect the survival of pathogens (parasites, bacteria, fungi)?
- Should adequate refrigeration be maintained for products during transit or in holding?

2. Evaluate processing operations for hazards

The objective of this activity is to identify all realistic potential hazards related to each processing operation, the product flow and the staff traffic pattern. This can be accomplished by reviewing the process flow diagram and the premise schematic and modifying them as follows:

- Assign a number to each processing step on the process flow diagram horizontally from receiving to waste disposal
- Examine each step on the process flow diagram and determine if a hazard (biological, chemical or physical) exists for that operation
- Review the premise schematic and staff traffic pattern in the same manner.

To help in determining if a hazard exists, the following questions should be answered for each processing step:

- Could contaminants reach the product during this processing operation? (Consider personnel hygiene, contaminated equipment or material, cross-contamination from raw materials, etc.)

- Could any microorganisms of concern multiply during this processing operation to the point where they constitute a hazard? (Consider temperature, time)

3. Observe actual operating practices

The HACCP team must be very familiar with every detail of the operation under investigation.

Any identified hazard must be recorded on the appropriate forms. The HACCP team shall:

- Observe the operation long enough to be confident that it comprises the usual process or practices
- Observe the staff (e.g. could raw or contaminated product cross-contaminate staff hands, gloves or equipment used for finished or post-process product?)
- Observe hygienic practices and note the hazards
- Analyze if there is a kill step (process which destroys all microorganisms) during the process (if so, attention should be focused on potential cross-contamination after this processing operation)

4. Take measurements

It may be necessary to take measurements of important processing parameters to confirm actual operating conditions. Before measuring, make sure all devices are accurate and correctly calibrated.

The following are examples of some of the measurements that may be done, depending on the product or process type:

- Measure product temperatures, considering heat processing and cooling or chilling operations: take measurements at the coldest point of the product when heat processing is evaluated and at the warmest point of the product when cooling or chilling is evaluated (frequently at the center of the largest piece)
- Measure time/temperature for cooking, storing, thawing, etc.
- Measure the dimension of the containers used to hold foods being cooled and the depth of the food mass
- Measure the pH of the product during processing and also of the finished product, measuring pH at room temperature whenever possible

- Measure Aw of the product, running duplicate samples whenever possible (because of variations) and remembering to make corrections for ambient temperatures, as necessary
- Sample collections, inoculated-pack studies and microbial challenge studies could be necessary when information on hazards is not otherwise available.

5. Analyze the measurements

A qualified individual (with proper scientific background) must analyze the measurements to interpret correctly the data collected. During the review and interpretation of the data.

For example:

- Plot time/temperature measurements using a computer or on graph paper
- Interpret controlled data versus optimal growth temperatures of microorganisms and temperature ranges at which they can multiply
- Estimate and evaluate probable cooling rates; interpret cooling rates and compare the measured temperatures with temperature ranges within which bacteria of concern multiply rapidly versus temperature at which growth begins, slows and ceases.
- Compare Aw and pH values to ranges at which pathogens multiply or are eliminated

Control measures

After the hazard analysis is completed, the team must then consider what control measures, if any, exist which can be applied for the control of each hazard. Control measures are any actions and activities that can be used to prevent or eliminate a food safety hazard or reduce it to an acceptable level. More than one measure may be required to control a specific hazard and more than one hazard may be controlled by a specified measure.

Risk analysis methods can help to determine the level of control that should be implemented to control a hazard

Hazard assessment

The information gathered from the hazard analysis can be used to determine:

- The severity of the hazard(s)
- Risks associated with hazards identified at various stages of the operation

- The points, steps or procedures at which control can be applied and a food safety hazard can be prevented, eliminated or reduced to an acceptable level, i.e. critical control points (CCPs)

Severity

Severity is the magnitude of a hazard or the degree of consequences that can result when a hazard exists. Disease-causing hazards can be categorized according to their severity. One system uses the categories of:

- High (life-threatening) - examples include illnesses caused by *Clostridium botulinum, Salmonella typhi, Listeria monocytogenes, and Escherichia coli* 0157:H7, *Vibrio cholerae, Vibrio vulnificus,* paralytic shellfish poisoning, amnesic shellfish poisoning
- Moderate (severe or chronic) - examples include illnesses caused by *Brucella* spp., *Campylobacter* spp. *Salmonella* spp., *Shigella* spp. *Streptococcus* type A, *Yersinia entercolitica,* hepatitis A virus, mycotoxins, ciquatera toxin
- Low (moderate or mild) - examples include illnesses caused by *Bacillus* spp., *Clostridium perfringens, Staphylococcus aureus,* Norwalk virus, most parasites, histamine-like substances and most heavy metals that cause mild acute illnesses

Risk of hazard

Risk is a function of the probability of an adverse effect and the magnitude of that effect, consequential to a hazard(s) in food. Degrees of risk can be categorized as high (H), moderate (M), low (L) and negligible (N).

Identification of points, steps and procedures

The above data can then be used to ascertain the appropriate locations to establish critical control points, the degree of monitoring required and any changes in the process or ingredients that would reduce the magnitude of the hazards that exist.

3.2.5 Determine critical control points

Since the publication of the decision tree by Codex, its use has been implemented many times for training purposes. In many instances, while this tree has been useful to explain the logic and depth of understanding needed to determine CCPs, it is not specific to all food operations, and therefore it should be used in conjunction with professional judgement, and modified in some cases.

There may be more than one CCP at which control is applied to address the same hazard. The determination of a CCP in the HACCP system can be facilitated by the application of a decision tree. Application of a decision tree should be flexible, given whether the operation is for production, slaughter, processing, storage, distribution or other. It should be used for guidance when determining CCPs. This example of a decision tree may not be applicable to all situations, other approaches may be used. Training in the application of the decision tree is recommended.

If a hazard has been identified at a step where control is necessary for safety, and no control measure exists at that step, or any other, then the product or process should be modified at that step, or at any earlier or later stage, to include a control measure.

Critical control points (Task 7/Principle 2)

The determination of critical control points (Task 7) is the second principle of HACCP. The Codex guidelines define a critical control point (CCP) as "a step at which control can be applied and is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level".

If a hazard has been identified at a step where control is necessary for safety/and if no control measure exists at that step or at any other, then the product or process should be modified at that step, or at an earlier or later stage, to include a control measure.

The determination of a CCP in the HACCP system can be facilitated by the application of a decision tree such as that included in the Codex *Hazard Analysis and Critical Control Point* (*HACCP*) *system and guidelines for its application* (see Figure 6) which indicates a logical reasoning approach. The application of the decision tree should be flexible according to the type of operation. The decision tree proposed by Codex may not be applicable to all situations. Other approaches based on risk analysis may be used.

Review of identified hazards

Prior to determining CCPs, verify if any of the identified hazards are fully controlled by the application of the Codex General Principles of Food Hygiene, and good hygienic practices (GHPs).

Furthermore, an on-site verification must be carried out by the HACCP team to verify if those hazards are in fact controlled by the application of GHP measures. Hazards that are not fully controlled by GMPs should be analyzed to determine whether they are CCPs or not.

The decision tree consists of a systematic series of four questions designed to assess objectively whether a CCP is required to control the identified hazard at a specific operation of the process.

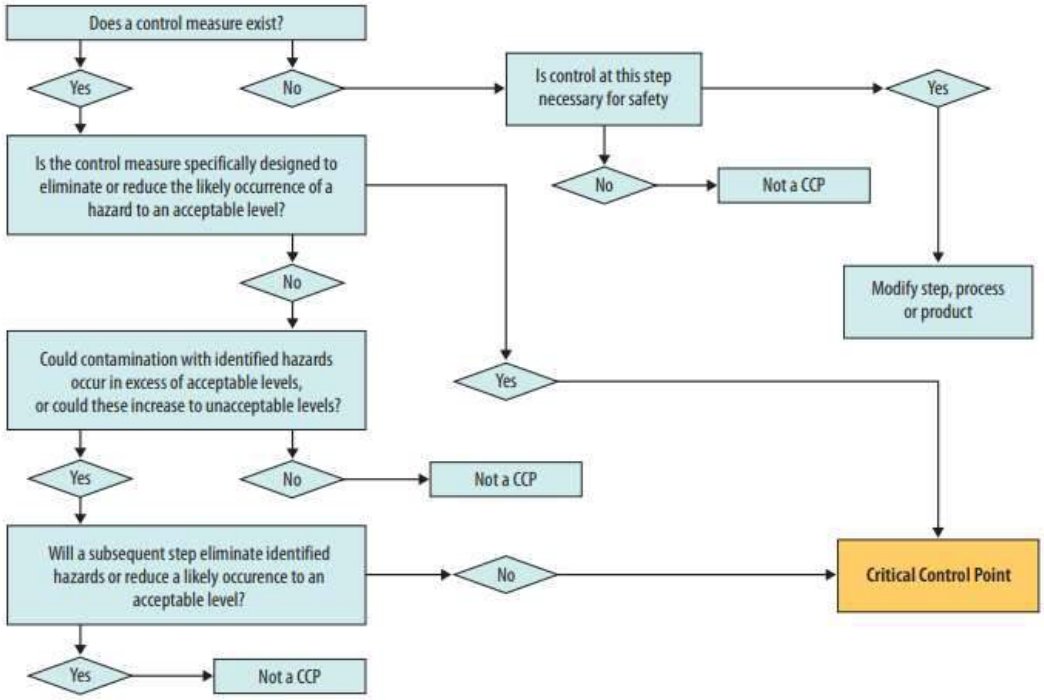


Figure 6: HACCP Decision Tree

Example of decision tree to identify critical control points

Instructions:

- **Category and identified hazard:** Determine if hazard is fully controlled by adherence to Codex General Principles of Food Hygiene. If **yes**, indicate "GMPs", describe and proceed to next identified hazard. If **No**, proceed to Question 1.
- **Question 1: Do control preventive measure(s) exist?** If **No**, this is not a CCP. Identify how the hazard can be controlled before or after the process and proceed to the next identified hazard. If **yes,** describe and proceed to the next question.
- **Question 2: Is the operation specifically designed to eliminate or reduce the likely occurrence of a hazard to an acceptable level?** If **No**, proceed to Question 3. If **yes,** this is a CCP; identify it as such in the last column.

- **Question 3: Could contamination with identified hazard(s) occur in** excess **of acceptable level(s) or could these increase to unacceptable levels?** If **No**, this is not a CCP; proceed to the next identified hazard. If **yes**, proceed to Question 4.
- **Question 4: Will a subsequent operation eliminate identified hazard(s) or reduce likely occurrence to an acceptable level?** If **No**, this is a CCP; identify it as such in the last column. If **yes**, this is not a CCP; identify the subsequent step and proceed the next identified hazard.

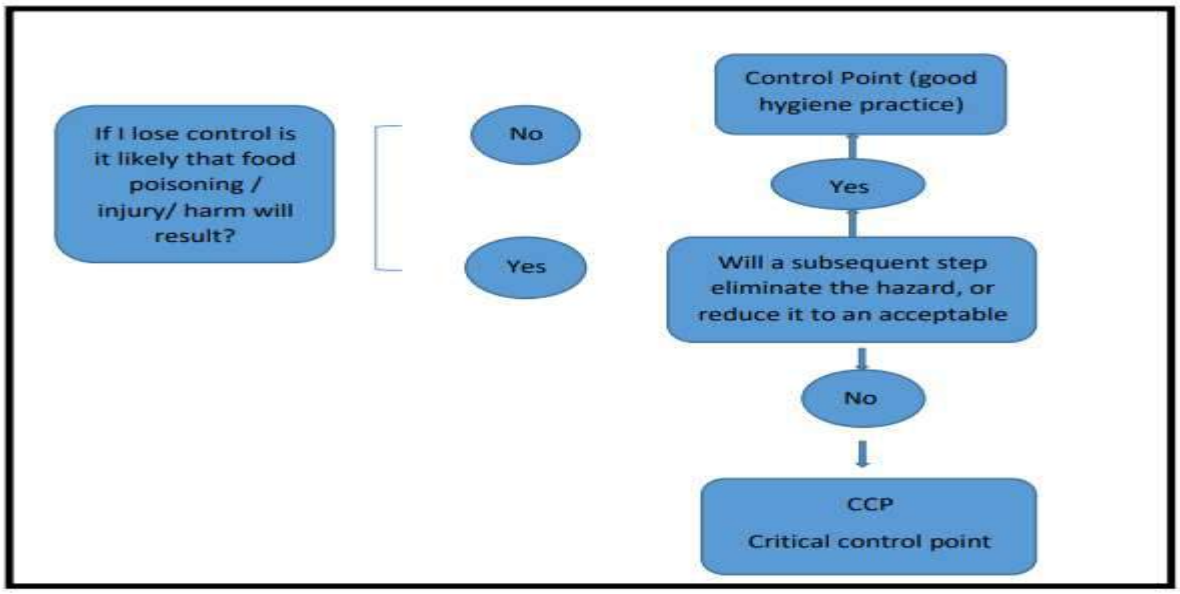


Figure 7: Simpilified HACCP Decision Tree

Identification of CCPs

CCPs sequentially, independent of process operation numbering, and to indicate readily to the user of the HACCP plan which type(s) of hazard need(s) to be controlled at a particular process operation. Each hazard not controlled by the operator should be re-examined to determine whether or not a control measure could be established by the operator.

- If yes, then the appropriate control measure should be identified.
- If no, then report these hazards and indicate how these hazards could be addressed outside the operator's processing operation.

Parameters attached to CCPs

Once the CCPs have been established, the next step is to report the CCPs and to document the parameters that will be monitored and controlled. The critical limits, monitoring procedures,

deviation procedures, verification procedures and record keeping will be described in the HACCP plan. This HACCP plan will provide the written guidelines that will be followed in the establishment.

3.2.6 Establish critical limits for each critical control point

Critical limits (Task 8/Principle 3)

At each critical control point (CCP)/critical limits are established and specified. Critical limits are defined as criteria that separate acceptability from unacceptability. A critical limit represents the boundaries that are used to judge whether an operation is producing safe products. Critical limits may be set for factors such as temperature, time (minimum time exposure), water activity, moisture level, etc. These parameters, if maintained within boundaries, will confirm the safety of the product. The critical limits should meet requirements of government regulations and/or company standards and/or be supported by other scientific data.

It is essential that the person(s) responsible for establishing critical limits have a knowledge of the process and of the legal and commercial standards required for the product.

Sources of information on critical limits include:

- Scientific publications/research data
- Regulatory requirements and guidelines
- Experts (e.g. thermal process authorities, consultants, food scientists, microbiologists, equipment manufacturers, sanitarians, academics)
- Experimental studies (e.g. in-house experiments, contract laboratory studies)

If the information needed to establish critical limits is not available, a conservative value should be selected or regulatory limits used. Rationale and reference materials used should be recorded. The materials become part of the support documentation of the HACCP plan.

Once the critical limits are established, they are recorded together with the description of the process step, CCP number and hazard description.

Operating limits

If monitoring shows a trend towards lack of control at a CCP, operators can take action to prevent loss of control of the CCP before the critical limit is exceeded. The point at which operators take such action is called the "operating limit". Operating limits should not be

confused with critical limits. Often, the operating limits are more restrictive and are established at a level that would be reached before the critical limit is violated; i.e. they should prevent a deviation from critical limits.

An operator may observe a trend towards loss of control, such as the failure of a cooker to maintain the desired temperature consistently. Observing a trend towards loss of control early and acting on it can save product rework or, worse yet, product destruction. When the critical limit is exceeded, corrective action is required (see Task 10/Principle 5). For this reason a processor may choose to operate a CCP at a limit more conservative than the critical limit.

Such operating limits may be selected for various reasons:

- For quality reasons, e.g. higher cooking temperatures for flavor development or product texture
- To avoid exceeding a critical limit, e.g. using a cooking temperature higher than the critical limit as an alarm point, to warn the operator that the temperature is approaching the critical limit and needs adjusting
- To account for normal variability, e.g. setting a cooker with 2°C variability at least 2°C above the critical limit to avoid violating it

The process may need to be adjusted when the operating limit is exceeded. Such actions are called "process adjustments". A processor should use these adjustments to prevent loss of control and the need for product disposition.

3.2.7 Establish a monitoring system for each critical control point

Task 9/Principle 4

The Codex *Hazard Analysis and Critical Control Point* (*HACCP*) *system and guidelines for its application* defines monitoring as "the act of conducting a planned sequence of observations or measurements of control parameters to assess whether a CCP is under control".

Monitoring is the scheduled measurement or observation of a CCP relative to its critical limits.

The monitoring procedures must be able to detect loss of control at the CCP. Therefore, it is important to specify fully how, when and by whom monitoring is to be performed. ***The purposes of monitoring include the following:***

- To measure the performance level of the system's operation at the CCP (trend analysis)
- To determine when the performance level of the system results in a loss of control at the CCP, e.g. when there is deviation from a critical limit (see Task 10)
- To establish records that reflect the performance level of the system's operation at the CCP to comply with the HACCP plan

Monitoring is the process that the producer relies upon to show that the HACCP plan is being followed. It provides the producer with accurate records enabling the producer to show that the conditions of production are in compliance with the HACCP plan.

Ideally, monitoring should provide information in time to allow any adjustments to the process, thus preventing loss of control of the process and critical limits being exceeded. In practice, operating limits are often used to provide a safety margin which allows extra time to adjust the process before the critical limit is exceeded.

There are many ways to monitor the critical limits of a CCP. Monitoring can be done on a continuous (100 percent) or batch basis. Where feasible, continuous monitoring is preferred, as it is more reliable. Continuous monitoring is designed to detect shifts around target levels, thus allowing correction of these shifts and preventing deviation beyond the critical limits.

Where monitoring is not continuous, the amount and frequency of monitoring should be sufficient to provide an acceptable level of assurance that the CCP is under control. The higher the frequency of monitoring (i.e. the less time between each instance of monitoring), the less product will be affected when there is a loss of control at the CCP.

A further consideration when establishing a monitoring system is the time taken to achieve a result from the monitoring procedure. Most monitoring procedures will need to be rapid, as they relate to on-line processes which in general do not leave time for lengthy analytical testing. For this reason physical and chemical measurements or visual observations, which may be done rapidly, are often preferred to microbiological testing. Examples of some physical and chemical measurements taken to monitor critical limits are temperature, time, pH, moisture level and water activity (A). It is essential that all monitoring equipment be properly calibrated for accuracy.

Monitoring procedures performed during the operation should result in written documentation which will serve as an accurate record of the operating conditions. Monitoring

records provide information on conditions during the operation and allow for action to be taken in the event of a loss of control or for a process adjustment to be made if there is a trend towards a loss of control.

Accurate monitoring procedures and associated records provide information to the operator and allow for decisions to be made on the acceptability of the lot at a particular stage in the process. To complete the monitoring process, data derived from monitoring should be reviewed and evaluated by a designated person or persons with knowledge and authority to carry out corrective actions when indicated (see Task 10).

The worst scenario is that in which monitoring procedures indicate that any one of the critical limits is exceeded, which indicates loss of control of a CCP. This lack of control is considered to be a deviation resulting in the production of a hazardous or unsafe product. The situation requires immediate identification and control of the affected product and corrective action.

Responsibility for monitoring should be clearly defined, and individuals must be adequately trained in the monitoring procedures for the CCP for which they are responsible. They must also fully understand the purpose and importance of monitoring. The individual should have ready access to the monitoring activity, must be unbiased in monitoring and must accurately report the monitoring activity

Design of a monitoring system

The control measures discussed at Task 6 are intended to control a hazard or hazards at each CCP. The monitoring procedures will determine if the control measures are being implemented and ensure that critical limits are not exceeded. They should give information on:

- What will be monitored
- How critical limits and preventive measures will be monitored
- Frequency of monitoring
- Who will monitor

What will be monitored?

Monitoring may mean measuring a characteristic of the product or of the process to determine compliance with a critical limit. Examples include:

- Measurement of the time and temperature of a thermal process
- Measurement of cold-storage temperatures
- Measurement of pH
- Measurement of Aw

Monitoring may also mean observing whether a control measure at a CCP is being implemented. Examples include:

- Visual examination
- Verification of vendor's certificates of analysis

It is also important to remember at this stage that monitoring procedures may determine if operating limits are being adhered to rather than the critical limits, so that the operator has time to make any necessary process adjustment.

How will critical limits and preventive measures be monitored?

Deviation from a critical limit should be detected in as short a time as possible to allow corrective action to limit the amount of adversely affected product. To ensure accurate knowledge of conditions during the process, the monitoring procedures should provide rapid (real-time) results and should not involve lengthy analytical procedures. Microbiological testing is rarely effective for monitoring CCPs for this reason, and also because large sample sizes would be needed to find microorganisms at levels that may cause illness. Instead, physical and chemical measurements (e.g. pH, Aw, time, temperature) are preferred, as they can be done rapidly and can often be related to the microbiological control of the process.

Effective monitoring depends upon the proper selection and calibration of the measuring equipment. The equipment used for monitoring CCPs will vary depending on the attribute being monitored.

Examples of monitoring equipment include:

- Thermometers
- Clocks
- Scales
- PH-meters

- Water activity meters
- Chemical analytical equipment

Equipment should undergo periodic calibration or standardization as necessary to ensure accuracy. However, the variability of the equipment should be considered in setting the critical limits.

Operators should be trained in proper use of the monitoring equipment and should be provided with a clear description of how the monitoring should be carried out. The details should be relevant to the type of monitoring performed; for example, it would be important to specify that temperature measurements for a heating process should be made at the coldest point of the process, while temperature measurements for a cooling process should be made at the warmest part.

Monitoring frequency

Monitoring can be continuous or non-continuous. Where possible, continuous monitoring is preferred; it is possible for many types of physical or chemical methods.

For continuous monitoring to be effective, it is necessary to review the monitoring results periodically and take action when appropriate. The length of time between checks is important as it is directly related to the amount of product involved when there is a deviation from a critical limit.

Where non-continuous monitoring is the chosen system, the frequency of monitoring should be determined from historical knowledge of the product and process. When problems are detected the frequency of monitoring may need to be increased until the cause of the problem is corrected. ***The following questions will help to determine the correct frequency:***

- How much does the process normally vary?
- How close is the operating limit to the critical limit?
- How much product is the processor prepared to risk if there is deviation from the critical limit?

Who will monitor?

In developing the HACCP plan consideration should be given to assigning responsibility for monitoring. ***Individuals assigned to monitor CCPs may include:***

- Equipment operators

- Supervisors
- Maintenance personnel
- Quality assurance personnel

Once assigned, ***the individual responsible for monitoring a CCP must:***

- Be adequately trained in the CCP monitoring techniques
- Fully understand the importance of CCP monitoring
- Have ready access (be close) to the monitoring activity
- Accurately report each monitoring activity
- Have the authority to take appropriate action as defined in the HACCP plan
- Immediately report critical limit deviation

It is important that the responsible individual report all unusual occurrences and deviations from critical limits immediately to make sure that process adjustments and corrective actions are made in a timely manner. This person should record and sign all monitoring results and occurrences associated with monitoring CCPs. Records and documents associated with monitoring CCPs should also be signed by one or more responsible reviewing officials of the company.

3.2.8 Establish corrective actions

Establishing corrective actions (Task 10/Principle 5)

The Codex *Hazard Analysis and Critical Control Point* (*HACCP*) *system and guidelines for its application* defines corrective action as "any action to be taken when the results of monitoring at the CCP indicate a loss of control".

Loss of control is considered as a deviation from a critical limit for a CCP. Deviation procedures are a predetermined and documented set of actions to be implemented when a deviation occurs. All deviations must be controlled by taking action(s) to control the noncompliant product and to correct the cause of non-compliance. Product control includes proper identification, control and disposition of the affected product. The control and disposition of the affected product and the corrective action(s) taken must be recorded and filed.

The diversity of possible deviations at each CCP means that more than one corrective action may be necessary at each CCP. When a deviation occurs, it will most likely be noticed during the routine monitoring of the CCP. Deviation and corrective action procedures are prescribed so that employees responsible for CCP monitoring understand and are able to perform the appropriate corrective action(s) in the event of a deviation.

Process adjustments should also be made when monitoring results indicate a trend towards loss of control at a CCP. Action should be taken to bring the process within the operating limits before a deviation occurs.

Deviation

The Codex guidelines for the application of the HACCP system define deviation as "failure to meet a critical limit". Procedures should be in place to identify, isolate and evaluate products when critical limits are exceeded. Inadequate deviation procedures could result in unsafe products and the eventual recurrence of the deviation. ***The producer should control deviations as follows:***

- **Identification of deviation**

The producer should have a system in place to identify deviations when they occur.

- **Isolation of affected product**

The producer should have effective procedures in place to isolate, mark clearly and control all product produced during the deviation period.

- All affected product i.e. that processed since the last point at which the CCP was known to be under control, should be isolated.
- Isolated product should be clearly marked, e.g. with firmly attached tags, with information including: hold number, product, amount, date held, the reason for the hold, the name of the person holding the product.
- The producer should maintain control of the product from the hold date to the date of final disposition.

- **Evaluation of affected product**

Product evaluation should be conducted by a qualified person. For example, thermal process deviations would be evaluated by a competent process authority or reference center.

The evaluation of affected product should be adequate to detect potential hazards, i.e. it should be ensured that sampling is adequate to identify the extent of the problem, that the tests are appropriate, that the judgement is based on sound science and that the product is not released until the evaluation has determined that no potential hazard exists.

Corrective action procedures

Since the main reason for implementing HACCP is to prevent problems from occurring, corrective action should be taken to prevent deviation at a CCP. Corrective action should be taken following any deviation to ensure the safety of the product and to prevent recurrence of the deviation.

Corrective action procedures are necessary to determine the cause of the problem, take action to prevent recurrence and follow up with monitoring and reassessment to ensure that the action taken is effective. If the corrective action does not address the root cause of the deviation, the deviation could recur.

Reassessment of the hazard analysis or modification of the HACCP plan may be necessary to eliminate further occurrence.

The producer's corrective action program should include the following:

- Investigation to determine the cause of the deviation
- Effective measures to prevent recurrence of the deviation
- Verification of the effectiveness of the corrective action taken

Deviation and corrective action records

Records should be available to demonstrate the control of products affected by the deviation and the corrective action taken. Adequate records permit verification that the producer has deviations under control and has taken effective corrective action.

The following information should be recorded in the deviation and corrective action records.

- **Deviation**

- Product/code
- Date produced/held/released
- Reason for the hold

- Amount of product held
- Results of evaluation: amount analyzed, analysis report, number and nature of defects
- Signature of personnel responsible for hold and evaluation
- Disposition of held product (if appropriate)
- Signed authorization for disposition

- **Corrective action**

- Cause of deviation identified
- Corrective action taken to correct deficiency
- Follow-up/assessment of effectiveness of corrective action
- Date
- Signature of person responsible

3.2.9 Establish verification procedures

Task 11/Principle 6

The Codex guidelines define verification as "the application of methods, procedures, tests and other evaluations, in addition to monitoring to determine compliance with the HACCP plan".

Verification and auditing methods, procedures and tests, including random sampling and analysis, can be used to determine if the HACCP system is working correctly.

Careful preparation of the HACCP plan with clear definition of all the necessary items does not guarantee the plan's effectiveness. Verification procedures are necessary to assess the effectiveness of the plan and to confirm that the HACCP system adheres to the plan.

Verification allows the producer to challenge the control measures and to ensure that there, is sufficient control for all possibilities; for example, verification may ensure that adequate contingency procedure plans are in place when critical limits are exceeded at a CCP.

Verification should be undertaken by an appropriately qualified individual or individuals who are capable of detecting deficiencies in the plan or its implementation. Verification should be undertaken at the completion of the HACCP study; whenever there is a change in product,

ingredients, process, etc.; when a deviation occurs; in the event of newly identified hazards; and at regular predetermined intervals.

Routine monitoring activities for critical limits should not be confused with verification methods, procedures or activities.

Description of verification activities

Each HACCP plan should include verification procedures for individual CCPs and for the overall plan. HACCP plans are expected to evolve and to improve with experience and new information. Periodic verification helps improve the plan by exposing and strengthening weaknesses in the system and eliminating unnecessary or ineffective control measures.

Verification activities include:

- HACCP plan validation
- HACCP system audits
- Equipment calibration
- Targeted sample collection and testing

HACCP plan validation

Validation is the act of assessing whether the HACCP plan for the particular product and process adequately identifies and controls all significant food safety hazards or reduces them to an acceptable level. ***HACCP plan validation should include:***

- Review of the hazard analysis
- CCP determination
- Justification for critical limits, based for example on current good science and regulatory requirements
- Determination of whether monitoring activities, corrective actions, record keeping procedures and verification activities are appropriate and adequate

Validation involves ensuring that the HACCP plan is based on current good science and current information and is appropriate for the actual product and process. A scientific and technical review is performed to ensure that there is a sound scientific and technical basis for decisions regarding which hazards are being controlled, which hazards are not being controlled and how identified hazards are being controlled. This review could incorporate the

use of new scientific information and data gathered for the purpose of the verification. ***The process of validating an existing HACCP plan should also include:***

- Review of HACCP audit reports
- Review of changes to the HACCP plan and the reasons for those changes
- Review of past validation reports
- Review of deviation reports
- Assessment of corrective action effectiveness
- Review of information on consumer complaints
- Review of linkages between the HACCP plan and GMP programs

HACCP plan validation is an ongoing, periodic procedure. Validations may be scheduled at a pre-set frequency. However, other factors may trigger a review of the plan to determine if changes are necessary. These factors could include changes to the raw materials, product or process; adverse audit findings; recurring deviations; new scientific information about potential hazards or control measures; and complaints and/or product rejections.

HACCP system audits

As part of verification, audits are performed to compare the actual practices and procedures of the HACCP system with those written in the HACCP plan.

Audits are systematic and independent examinations involving on-site observations, interviews and review of records to determine whether the procedures and activities stated in the HACCP plan are implemented in the HACCP system. These examinations are usually performed by one or more independent persons who are not involved in implementation of the HACCP system. Audits may be performed for individual CCPs and/or for the overall plan.

On-site observation may include, for example, visual inspection to ensure that:

- The product description and flow chart are accurate
- Monitoring required by the HACCP plan at the CCPs is performed
- Processes are operating within established critical limits
- Records are filled out accurately and at the time observations are made

Records to be reviewed during auditing of the HACCP plan include, for example, those demonstrating that:

- Monitoring activities have been performed at the locations specified in the HACCP plan
- Monitoring activities have been performed at the frequencies specified in the HACCP plan
- Affected product has been controlled and corrective actions have been taken whenever monitoring has indicated the occurrence of a deviation from critical limits
- Equipment has been calibrated at the frequencies specified in the HACCP plan Audits should occur frequently enough to ensure that the HACCP plan is being followed continuously. This frequency depends on a number of conditions, such as the variability of the process and product.

Calibration

Calibration involves checking instruments or equipment against a standard to ensure accuracy. Calibration should be documented and the records should be available for review during verification.

Calibration of appropriate equipment and instruments used in the development and, implementation of the HACCP plan should be carried out, during monitoring and/or verification,

- At a frequency sufficient to assure continuous accuracy
- According to procedures established in the HACCP plan (which can be based on instrument or equipment manufacturer specifications)
- By checking accuracy against a recognized standard
- Under conditions similar or identical to those under which the instrument or equipment will be used

Calibration of CCP monitoring equipment is important; if the equipment is out of calibration, then monitoring results will not be accurate and may be completely unreliable. When the equipment monitoring a CCP is out of calibration, the CCP is considered to have been out of control since the last documented calibration.

Targeted sample collection and testing

Verification may also include targeted sampling and testing and other periodic activities. Targeted sampling and testing involves taking product samples periodically and testing them to ensure that critical limits are appropriate for product safety.

Targeted sampling may be carried out to check vendor compliance when receipt of material is a CCP and purchase specifications are relied on as critical limits. For example, in the case of cooked shrimp, the processor may purchase shrimp under a supplier's guarantee for suphite levels less than 100 ppm. A sample may be collected for laboratory analysis on a quarterly basis to ensure that sulphite levels are compliant with the supplier's guarantee.

When critical limits are set for equipment operation, product samples may be taken to ensure that the equipment settings are appropriate to provide product safety.

When sampling and testing is used as a verification tool, the usefulness of the test often depends on how the material is sampled. The risk and level of confidence needed will determine the sample size and the method of sample collection.

Role of microbiological testing in HACCP verification

Sampling and microbiological testing are usually not adequate by themselves to ensure food safety. Microbiological testing is seldom effective for monitoring CCPs and cannot be used as a means of process control because of the lengthiness of analytical procedures and the inability to provide results in real time. In addition, detection of pathogenic microorganisms can be difficult if contamination of the product at the CCP is at a low level or is unevenly distributed in the food sample, necessitating large and numerous samples.

Microbiological testing does have a role in HACCP verification, however: when critical limits are established for the elimination of pathogens or their reduction to an acceptable level, microbiological testing can be used to verify the HACCP plan's effectiveness and to ensure that the identified microbiological limits have not been exceeded. In this instance, the length of time involved in the analytical procedures does not create operational difficulties.

Verification frequency

Verification activities should be performed according to a pre-established schedule described in the HACCP plan or whenever there are indications that the food safety status may have changed. ***These indications may include:***

- On-line observations that CCPs may not be operating within critical limits

- Record reviews indicating inconsistent monitoring
- Record reviews indicating that CCPs are repetitively operated outside critical limits
- Complaints or product rejections
- New scientific data

Verification procedures should be scheduled at a frequency that ensures that the HACCP plan is being followed continuously and that measurements remain accurate within established limits. Thus, the length of time between scheduled verification activities should match the level of confidence in the continuous and accurate performance of the HACCP plan.

The frequency of verification activities may change over time. A history of verification activities indicating that the process is consistently in control may support safe reduction of the frequency of verification activities.

Records of verification

Verification activities should be documented in the HACCP plan. Records should be made of the results of all verification activities. Records of verification should include methods, date, individuals and/or organizations responsible, results or findings and action(s) taken.

Verification procedures for the overall HACCP plan should be documented in a file for the

HACCP plan.

3.2.10 Establish documentation and record keeping

Task 12/Principle 7

Records are essential for reviewing the adequacy of the HACCP plan and the adherence of the HACCP system to the HACCP plan.

A record shows the process history, the monitoring, the deviations and the corrective actions (including disposition of product) that occurred at the identified CCP. It may be in any form, e.g. processing chart, written record, computerized record. The importance of records to the

HACCP system cannot be overemphasized. It is imperative that the producer maintain complete, current, properly filed and accurate records.

Four types of records should be kept as part of the HACCP program:

- Support documentation for developing the HACCP plan

- Records generated by the HACCP system
- Documentation of methods and procedures used
- Records of food staff training programs

Support documents

The HACCP plan support documents include information and support data used to establish the HACCP plan such as the hazard analysis and records documenting the scientific basis for establishing the CCPs and critical limits. ***Examples include:***

- Data used to establish the control measures to prevent microbiological growth
- Data used to establish the adequacy of critical limits in ensuring the safety of the product

The HACCP plan support documents should also include a list of the HACCP team members and their responsibilities, as well as all the forms produced during the preparation of the HACCP plan, ***showing:***

- Product description and intended use
- Flow diagram
- Hazard analysis
- Identification of CCPs
- Identification of the critical limits for each CCP, including data from experimental studies or information collected to support the critical limits
- Documented deviation and corrective action plans
- Planned verification activities and procedures
- Identification of the preventive measures for each hazard

Support documents may also include correspondence with consultants, as well as documents detailing how the HACCP plan was developed.

Records generated by the HACCP system

HACCP system records are kept to demonstrate adherence of the HACCP system with the

HACCP plan. These records are used to demonstrate control at CCPs in the food process. By tracking records generated by the HACCP system, an operator or manager can become aware

that a process is approaching its critical limit. Review of records can be instrumental in identifying trends and in making operational adjustments. Timely corrective action can be taken if a critical limit is violated.

Failure to document the control of a CCP would be a critical departure from the HACCP plan.

The records generated by the HACCP system include all activities and documentation required by the plan, as follows:

- **Monitoring records for all CCPs**

All HACCP monitoring records should be kept on forms that contain the following information:

- Form title
- Time and date
- Product identification (including product type, package size, processing line and product code)
- Critical limits
- Monitoring observation or measurement
- Operator's signature or initials
- Corrective action taken, where applicable
- Reviewer's signature or initials
- Date of review

- **Deviation and corrective action records**

- Identification of the deviant lot/product
- Amount of affected product in the deviant lot
- Nature of the deviation
- Information on the disposition of the lot
- Description of the corrective action

- **Verification/validation records**

- In-house on-site inspection
- Equipment testing and evaluation
- Accuracy and calibration of monitoring equipment
- Results of verification activities, including methods, date, individuals and/or organizations responsible, results or findings and action taken

Documentation of methods and procedures used

The producer should maintain records of the methods and procedures used in the HACCP system. ***Examples include:***

- Description of the monitoring system for the critical limit of each CCP, including: the methods and equipment used for monitoring, the frequency of monitoring and the person performing the monitoring
- Plans for corrective actions for critical limit violations or situations resulting in potential hazards
- Description of record keeping procedures, including copies of all record forms
- Description of verification and validation procedures

Records of food staff training programs

Records should be kept of all employee training. This is of particular importance for employees involved in monitoring critical limits for CCPs and those involved with deviation review, corrective actions and verification. These employees must be trained to understand fully the appropriate procedures/methods and actions to be taken regarding control of CCPs.

4. ISO 22000

0.1 Introduction

0.1.1 General

The adoption of a food safety management system (FSMS) is a strategic decision for an organization that can help to improve its overall performance in food safety. The potential benefits to an organization of implementing a FSMS based on this document are:

- The ability to consistently provide safe foods and products and services that meet customer and applicable statutory and regulatory requirements;
- Addressing risks associated with its objectives;
- The ability to demonstrate conformity to specified FSMS requirements.

This document employs the process approach, which incorporates the Plan-Do-Check-Act (PDCA) cycle and risk-based thinking.

This process approach enables an organization to plan its processes and their interactions.

The PDCA cycle enables an organization to ensure that its processes are adequately resourced and managed, and that opportunities for improvement are determined and acted on.

Risk-based thinking enables an organization to determine the factors that could cause its processes and its FSMS to deviate from the planned results, and to put in place controls to prevent or minimize adverse effects.

In this document, the following verbal forms are used:

- “Shall” indicates a requirement;
- “Should” indicates a recommendation;
- “May” indicates a permission;
- “Can” indicates a possibility or a capability.
- “NOTES” provide guidance in understanding or clarifying the requirements in this document.

0.1.2 FSMS principles

Food safety is related to the presence of food safety hazards at the time of consumption (intake by the consumer). Food safety hazards can occur at any stage of the food chain.

Therefore, adequate control throughout the food chain is essential. Food safety is ensured through the combined efforts of all the parties in the food chain. This document specifies the requirements for a FSMS that combines the following generally recognized key elements:

- Interactive communication;
- System management;
- Prerequisite programs;
- Hazard analysis and critical control point (HACCP) principles.

In addition, this document is based on the principles that are common to ISO management system standards. The management principles are:

- Customer focus;
- Leadership;
- Engagement of people;
- Process approach;
- Improvement;
- Evidence-based decision making;
- Relationship management.

0.1.3 The process approach

General

This document adopts a process approach when developing and implementing a FSMS and improving its effectiveness to enhance production of safe products and services while meeting applicable requirements. Understanding and managing interrelated processes as a system contributes to the organization's effectiveness and efficiency in achieving its intended results. The process approach involves the systematic definition and management of processes, and their interactions, so as to achieve the intended results in accordance with the food safety policy and strategic direction of the organization. Management of the processes and the system as a whole can be achieved using the PDCA cycle, with an overall focus on risk-based thinking aimed at taking advantage of opportunities and preventing undesirable results.

The recognition of the organization's role and position within the food chain is essential to ensure effective interactive communication throughout the food chain.

The process approach is a tool for managing the identified processes (e.g. food safety management processes, realization processes, and supporting processes) of the organization and their interactions in order to achieve the intended results and to avoid unwanted results.

An advantage of the process approach is the ongoing control it provides between the individual processes within the system.

ISO 22000 follows the process approach. When used within an FSMS, the process approach emphasizes the importance of:

- Understanding and fulfilling ISO 22000 requirements
- Considering food safety planning as a process
- Considering traceability as a process
- Monitoring of process performance and effectiveness
- Continual improvement of processes based on objective measurement(s)

Any and all parties, as defined by internal and external communication, can play a role in defining process requirements. Evaluating the satisfaction of these entities requires the collection and analysis of information to determine whether or not the organization has been able to meet these demands.

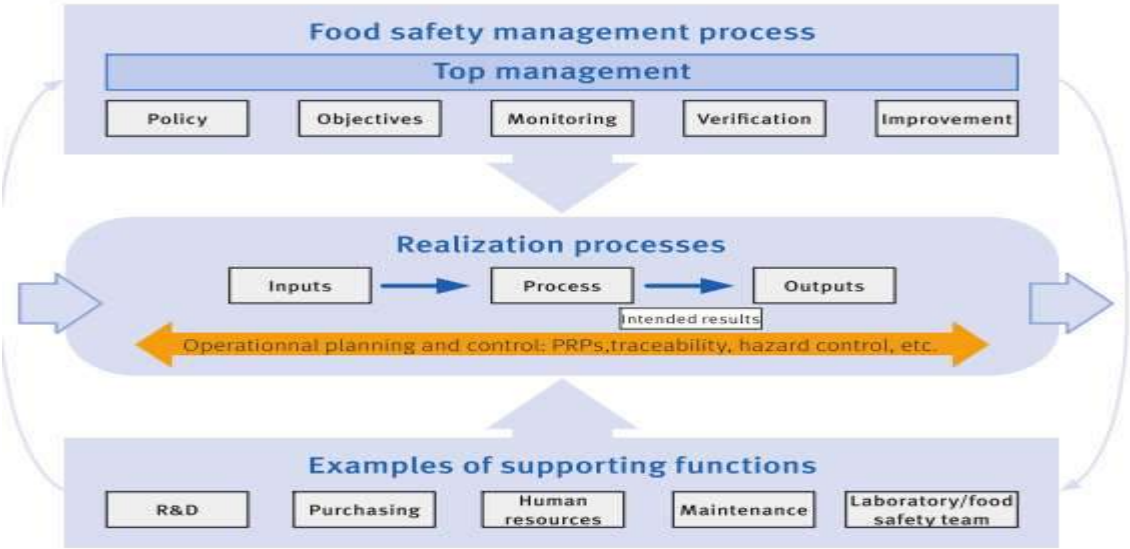


Figure 8: The process approach - ISO 22000

PDCA Cycle

ISO 22000 requires the application of a dynamic and systematic process approach to the development, documentation, implementation and maintenance of an FSMS. This is achieved through effective planning, coordination, implementation, verification and updating of activities, and through appropriate actions in the event of a process nonconformity.

The PDCA cycle (see Figure 9) can be described briefly as:

- Plan: establish the objectives of the system and its processes, provide the resources needed to deliver the results, and identify and address risks and opportunities
- Do: implement what was planned
- Check: monitor and (where relevant) measure processes and the resulting products and services, analysis and evaluate information and data from monitoring, measuring and verification activities, and report the results
- Act: take actions to improve performance, as necessary

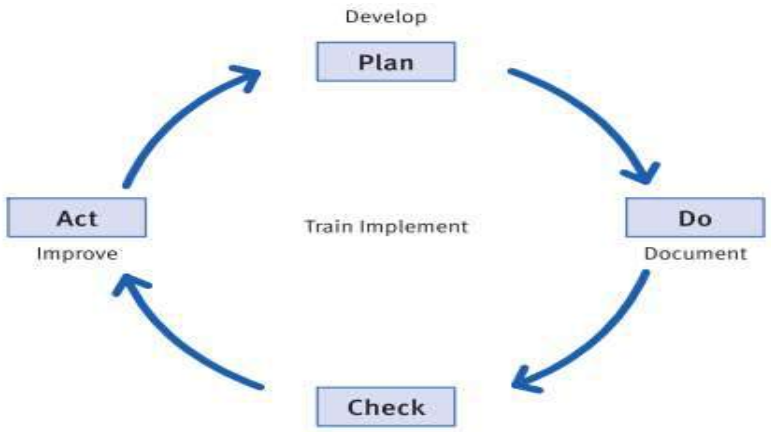


Figure 9: PDCA Cycle

The FSMS is developed and implemented through a PDCA approach at two levels,

- Organizational level
- Operational level (illustrated in Figure 10 by the 'Operational planning and control' part)

The first level covers the overall framework of the FSMS, including processes directly or indirectly impacting food safety (e.g. resources for engineering and maintenance, product development, top management involvement). The second level covers the operational

processes within the food safety system (e.g. hazard analysis, control measures, correction and corrective action). Communication between the two levels is essential.

Figure 10: Illustration of the Plan-Do-Check-Act cycle at the two levels

Risk Based Thinking

Food safety is ensured through the combined efforts of all the parties participating in the food chain. It is a requirement of ISO 22000 that the organization under- stands the issues associated with the context in which it operates. This includes the food safety related needs and expectations of interested parties. The organization should determine the risks and opportunities arising from these issues, and use them as a basis for planning the actions to address them. This action should ensure the FSMS delivers safe products and services from their organization.

The concept of 'risk-based thinking' has been introduced explicitly with the HLS and therefore has to be applied by food operators wishing to conform to ISO 22000.

'Risk-based thinking' is essential for achieving an effective FSMS. In ISO 22000, 'risk-based thinking' is addressed at two levels: organizational (in Clause 6) and operational levels (in Clause 8).

Organizational risk management

Risk is the effect of uncertainty, and any such uncertainty can have positive or negative effects. In the context of organizational risk management, a positive deviation arising from a risk can provide an opportunity, but not all positive effects of risk result in opportunities.

As a concept, risk is used in various ways and it is very important for organizations that work with food to distinguish between the well-known hazard assessment at the operational level, and the concept of business risk, where opportunities also form part of the concept.

Business risks that have an impact on the performance of the FSMS must always be considered when applying ISO 22000.

Consideration should be taken for any decisions that affect the FSMS which may result in potential changes to hazards.

Resources should be available to assess the effects of business decisions that can result in food safety issues. There should be effective communication between top management and the food safety team leader. Personnel involved in assessing management decisions are trained to understand that their decisions may have an impact on hazards, and not only on the FSMS.

To conform to the requirements of this document, an organization plans and implements actions to address organizational risks (Clause 6). Addressing risks establishes a basis for increasing the effectiveness of the FSMS, achieving improved results and preventing negative effects.

Hazard analysis — Operational processes

The concept of risk-based thinking based on the HACCP principles at the operational level is implicit in this document.

The subsequent steps in HACCP can be considered as the necessary measures to prevent hazards or reduce hazards to acceptable levels to ensure food is safe at the time of consumption (Clause 8).

Decisions taken in the application of HACCP should be based on science, free from bias and documented.

The documentation should include any key assumptions in the decision-making process.

0.1.4 Relationship with other management system standards

This document has been developed within the ISO high level structure (HLS). The objective of the HLS is to improve alignment between ISO management system standards. This document enables an organization to use the process approach, coupled with the PDCA cycle

and risk-based thinking, to align or integrate its FSMS approach with the requirements of other management systems and supporting standards.

The HLS concept is designed to improve alignment across MSS, therefore enabling an organization to apply the process approach, coupled with the PDCA cycle and risk-based thinking, as well as, where required, to align it with other MSS.

The concept also includes information on the business context and interested parties, risks, opportunities and continual improvement, and leadership and commitment.

The HLS comprises a structure of ten clauses, common terms and definitions, and standard text, making it easier for anyone applying multiple MSS. The illustration below reflects the common clauses shared by all the MSS.

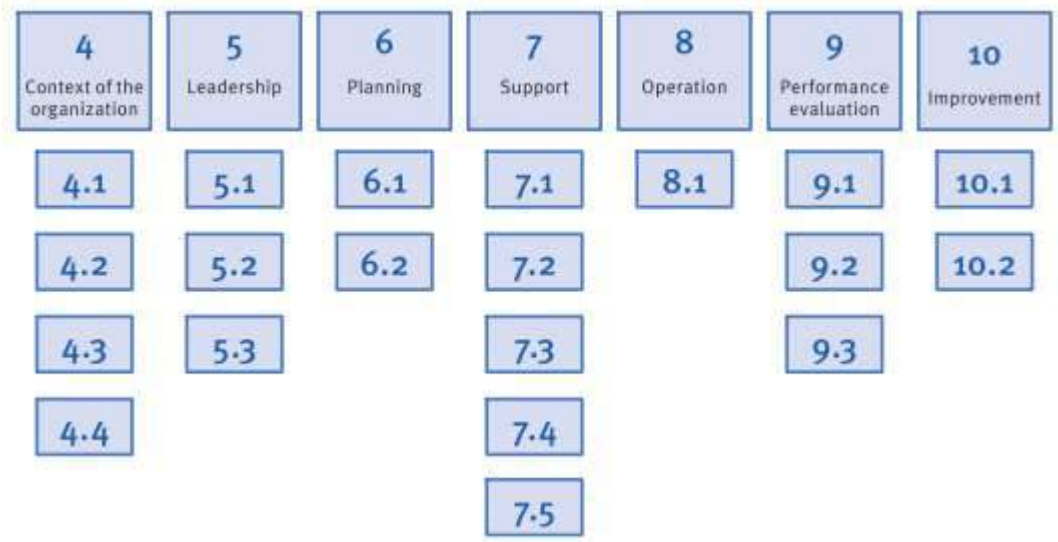


Figure 11 High Level Structure

This document is the core principle and framework for FSMSs and sets out the specific FSMS requirements for organizations throughout the food chain. Other guidance related to food safety, specifications and/or requirements specific to food sectors can be used together with this framework.

In addition, ISO has developed a family of associated documents. These include documents for:

- Prerequisite programs (ISO/TS 22002 series) for specific sectors of the food chain;
- Requirements for auditing and certification bodies;

- Traceability.

ISO also provides guidance documents for organizations on how to implement this document and related standards. Information is available on the ISO website.

Food safety management systems — Requirements for any organization in the food chain

1. **Scope**

This document specifies requirements for a food safety management system (FSMS) to enable an organization that is directly or indirectly involved in the food chain:

- To plan, implement, operate, maintain and update a FSMS providing products and services that are safe, in accordance with their intended use
- To demonstrate compliance with applicable statutory and regulatory food safety requirements
- To evaluate and assess mutually agreed customer food safety requirements and to demonstrate conformity with them
- To effectively communicate food safety issues to interested parties within the food chain
- To ensure that the organization conforms to its stated food safety policy
- To demonstrate conformity to relevant interested parties

All requirements of this document are generic and are intended to be applicable to all organizations in the food chain, regardless of size and complexity. Organizations that are directly or indirectly involved include, but are not limited to, feed producers, animal food producers, harvesters of wild plants and animals, farmers, producers of ingredients, food manufacturers, retailers, and organizations providing food services, catering services, cleaning and sanitation services, transportation, storage and distribution services, suppliers of equipment, cleaning and disinfectants, packaging materials and other food contact materials.

This document allows any organization, including small and/or less developed organizations (e.g. a small farm, a small packer-distributor, a small retail or food service outlet) to implement externally developed elements in their FSMS.

Internal and/or external resources can be used to meet the requirements of this document.

2. Normative references

There are no normative references in this document.

3. Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at https: //www .iso .org/obp
- IEC Electropedia: available at http: //www .electropedia .org/

4. Context of the organization

4.1 Understanding the organization and its context

The organization shall determine external and internal issues that are relevant to its purpose and that affect its ability to achieve the intended result(s) of its FSMS.

The organization shall identify, review and update information related to these external and internal issues.

NOTE 1 Issues can include positive and negative factors or conditions for consideration.

NOTE 2 Understanding the context can be facilitated by considering external and internal issues, including, but not limited to, legal, technological, competitive, market, cultural, social and economic environments, cybersecurity and food fraud, food defense and intentional contamination, knowledge and performance of the organization, whether international, national, regional or local.

Practical advice:

Identify, review and update the relevant information related to external and internal issues which may impact (positive or negative) on the achievement of the intended results of the organization's FSMS (e.g. continual improvement, compliance to statutory and regulatory requirements, customer requirements, producing safe food).

In order to identify the relevant information, you need to ask yourself: what is relevant to your organization, process (es) and products?

Relevant information regarding external and internal issues can be found from various sources, for example:

- External sources: press (e.g. international, national, local), Websites from relevant governmental agencies, relevant regulations/legal issues (international, national, local), relevant interested parties, professional associations and meetings
- Internal sources: FSMS-documented information such as product specifications, notice boards, management meetings, verification, internal results

Examples of information to look for: food adulteration, availability of raw materials, food waste reduction, food poisoning outbreaks, availability of potable water, new technologies, educational levels of employees, local unemployment rates, etc. When sources or information have been identified, the action is to evaluate their pertinence to the organization and determine the potential positive or negative impact on the organization's FSMS.

The results of the information evaluation should be considered as an input to the management review (see Subclause 9.3.2 of ISO 22000).

To determine the organization's context and the relevant issues for achieving its intended results, you can use methods such as asking "what if" questions, brainstorming and using a SWOT (strengths, weaknesses, opportunities and threats) analysis or a PESTLE (political, economic, social, technological, legal, environmental) analysis.

Types of documented information supporting the implementation of the FSMS: example(s)

- Statement of the purpose of the organization
- Statement of the intended result of the FSMS
- List of external and internal issues derived from the collected information, noting their negative and positive contributions
- Collected information used to list the external and internal issues

What questions do you need to ask yourself? (To which an affirmative reply is required) before continuing?

- Have you identified any food safety issues that may affect your organization?
- Have you reviewed and updated information related to external and internal issues that may affect your organization?

4.2 Understanding the needs and expectations of interested parties

To ensure that the organization has the ability to consistently provide products and services that meet applicable statutory, regulatory and customer requirements with regard to food safety, the organization shall determine:

a) The interested parties that are relevant to the FSMS;

b) The relevant requirements of the interested parties of the FSMS.

The organization shall identify, review and update information related to the interested parties and their requirements.

Practical advice:

The organization needs to consider interested parties other than just the direct customer. The focus needs to be on those parties that could have an impact on the ability of the organization to provide safe food. Using, for example, the list of external and internal issues may assist the organization to identify their interested parties. A focus needs to be placed on the relevance of their requirements to food safety.

The organization should consider the relevant requirements of relevant interested parties (e.g. statutory, regulatory authorities, suppliers, services providers' media, customers including charity organizations, financial partners, and consumers). The intention is to focus on only those relevant interested parties that can have an impact on the organization's ability to provide products and services that meet requirements.

You should gather, analyze, and determine the external and internal information relevant to the organization regarding food safety, in order to satisfy the requirements, needs and expectations of the interested parties.

Communicate with these interested parties to ensure a continual understanding of their food-safety requirements, needs and expectations.

Types of documented information supporting the implementation of the FSMS: example(s)

- An updated list identifying all interested parties and their requirements with an assessment of the relevance of the requirements

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Have you identified and prioritized the relevant interested parties?

- Have you identified the food safety requirements, needs and expectations of the relevant interested parties?

4.3 Determining the scope of the food safety management system

The organization shall determine the boundaries and applicability of the FSMS to establish its scope.

The scope shall specify the products and services, processes and production site(s) that are included in the FSMS. The scope shall include the activities, processes, products or services that can have an influence on the food safety of its end products.

When determining this scope, the organization shall consider:

a) The external and internal issues referred to in 4.1;

b) The requirements referred to in 4.2.

The scope shall be available and maintained as documented information.

Practical advice:

Maintain the scope as documented information.

The scope should include details of the products and services provided, including processes and production site(s) and, when relevant, categories of products. The decision to exclude activities, processes, products or services should be carefully assessed; this is only possible if the exclusion does not influence the food safety of the end products included in the scope.

This documented information can be maintained in any form that the organization chooses, from a handwritten document to a computer file.

Types of documented information supporting the implementation of the FSMS: example(s)

- Scope of the organization's FSMS.

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Do you have a clear and fully documented scope?

4.4 Food safety management system

The organization shall establish, implement, maintain, update and continually improve a FSMS, including the processes needed and their interactions, in accordance with the requirements of this document.

Practical advice:

The organization should identify the processes needed for the FSMS, their sequence and their interactions. This includes not only the processes for production and service provision, but also the processes that are needed for the effective implementation of the system, such as internal audit, management review and others (including processes that are performed by external providers).

These processes include management, resources, operations, measurement, analysis and improvement in order to establish, implement, maintain, update and continually improve a robust FSMS.

Define and describe the network of processes and their interaction (see Figure 12), considering the following:

- The inputs and outputs of each process (which may be internal or external)
- Process interactions and interfaces on which processes depend.

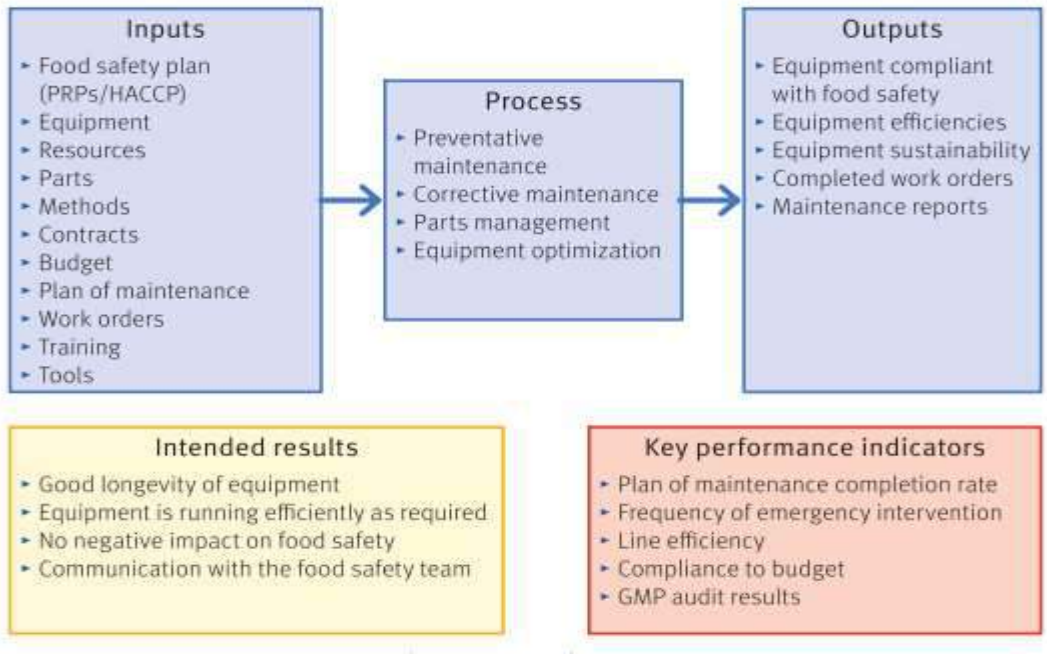


Figure 12: FSMS (processes and interactions)

Types of documented information supporting the implementation of the FSMS: example(s)

- List of processes (e.g. business, FSMS, service providers) also indicating their inputs and outputs
- Process diagram/process map indicating the interaction of the processes

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Have you determined the processes needed for achieving the intended outputs?
- Have you determined how the processes flow in sequence and interaction

5. Leadership

5.1 Leadership and commitment

Top management shall demonstrate leadership and commitment with respect to the FSMS by:

a) Ensuring that the food safety policy and the objectives of the FSMS are established and are compatible with the strategic direction of the organization;
b) Ensuring the integration of the FSMS requirements into the organization's business processes;

c) Ensuring that the resources needed for the FSMS are available;
d) Communicating the importance of effective food safety management and conforming to the FSMS requirements, applicable statutory and regulatory requirements, and mutually agreed customer requirements related to food safety;
e) ensuring that the FSMS is evaluated and maintained to achieve its intended result(s) (see 4.1);
f) Directing and supporting persons to contribute to the effectiveness of the FSMS;
g) Promoting continual improvement;
h) Supporting other relevant management roles to demonstrate their leadership as it applies to their areas of responsibility.

NOTE Reference to "business" in this document can be interpreted broadly to mean those activities that are core to the purposes of the organization's existence.

5.2 Policy

5.2.1 Establishing the food safety policy

Top management shall establish, implement and maintain a food safety policy that:

a) is appropriate to the purpose and context of the organization;
b) provides a framework for setting and reviewing the objectives of the FSMS;

c) Includes a commitment to satisfy applicable food safety requirements, including statutory and regulatory requirements and mutually agreed customer requirements related to food safety;
d) Addresses internal and external communication;
e) Includes a commitment to continual improvement of the FSMS;
f) Addresses the need to ensure competencies related to food safety.

5.2.2 Communicating the food safety policy

The food safety policy shall:

a) Be available and maintained as documented information;

b) Be communicated, understood and applied at all levels within the organization;

c) Be available to relevant interested parties, as appropriate.

Practical advice:

Top management must demonstrate its leadership and commitment to food safety. This is achieved, for example, by establishing the food safety policy and objectives. Management actions need to be based on the food safety policy and objectives of FSMS. This provides evidence of its commitment and leadership, e.g. by supplying the required resources, formulating the policies and objectives of the FSMS, management reviews, communicating the importance of satisfying the food safety requirements.

The policies and objectives of the FSMS must take into account food safety requirements, including statutory/regulatory and customer requirements. The objectives should be specific to the FSMS, measurable (if practicable) and achievable.

ISO 22000 requires that the objectives of the FSMS be linked to the business objectives.

The organization shall determine its risks and opportunities related to FSMS performance and plan/take appropriate actions to address them

When identifying the risks and opportunities for the FSMS, consider relevant external and internal issues, as well as relevant interested parties' requirements. Consider both the current situation and the possibilities for change.

Regarding the risks, the organization shall:

- Identify what the risks are (depending on the organization's context)

- Understand them (determine what is acceptable and unacceptable)

Regarding the opportunities, the organization shall:

- Take into consideration the identified risks relevant to the FSMS
- examine the opportunities, such as ensuring product safety, improving the efficiency of organization, developing new technologies, enhancing customer satisfaction, in compliance with statutory and regulatory requirements

There are various situations where risks and opportunities should be considered, e.g. strategy meetings, management reviews, internal audits, food safety related meetings, the planning stages for the design and development of new products and services, production processes.

For example, the objectives of the FSMS may be derived from the actions noted in 6.1 of ISO 22000, where risks and opportunities are identified and the organization shall establish how to plan and achieve the actions taken.

Examples of objectives of the FSMS: a maximum of 2 % of deliveries to customers delayed due to food safety issues; an 8 % reduction of customer returns; a 10 % reduction of any waste of raw materials; a food tracing operation completed within 4 hours.

Planning to implement the FSMS can be achieved, for example, by using a simple spread-sheet, including action plans with deadlines, scheduling, resources required to achieve goals and assigned responsibilities.

The food safety policy and objectives of the FSMS shall be communicated, and top management shall decide:

- When to communicate
- With whom to communicate
- How to communicate
- Who should communicate?

The organization shall ensure that the food safety policy and objectives of FSMS are understood and applied at all levels within the organization. The food safety policy should be available to interested parties.

The requirement for the food safety policy to be “understood” implies the need for top management to actively facilitate and verify its understanding.

The actions taken by the organization to address risks and opportunities shall be proportionate to the impact on compliance and on food safety. In some cases, the option to address the identified risk could be to accept the risk itself (by informed decision).

Types of documented information supporting the implementation of the FSMS: example(s)

- Strategic direction of the organization (business plans)
- Food safety policy
- Objectives of the FSMS
- Noting of business processes and indicating their integration with the FSMS requirements
- Provision of resources related to food safety (including personnel and financial)
- Policy relevant to the role that the organization plays in the food chain
- Implementation planning of objectives
- Review of whether the objectives of FSMS have been achieved, to be used as an input for the management review
- Evidence of communicating the policy and objectives of the FSMS (e.g. posters, e-mails, letters, notice boards, minutes of meetings, training.)
- Evidence of understanding the policy and objectives of the FSMS (e.g. interviews, internal audits, quizzes, tests.)

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Have you documented your organization's food safety policy?
- Do you have objectives that are measurable, using indicators and are in line with the food safety policy?
- Have you planned the implementation of the organization's FSMS?
- Do you plan to use the food safety policy and the objectives of the FSMS to meet customer requirements? If yes, provide the details
- Do you plan to use the food safety policy and the objectives of the FSMS as a tool to make business decisions? If yes, provide the details

Figure 13: Draft a food safety policy, a set of objectives of the FSMS and plan to achieve them

5.3 Organizational roles, responsibilities and authorities

5.3.1 Top management shall ensure that the responsibilities and authorities for relevant roles are assigned, communicated and understood within the organization.

Top management shall assign the responsibility and authority for:

a) Ensuring that the FSMS conforms to the requirements of this document;

b) Reporting on the performance of the FSMS to top management;

c) Appointing the food safety team and the food safety team leader;

d) Designating persons with defined responsibility and authority to initiate and document action(s).

Practical advice:

Establishing the team is a crucial starting point, since the quality of the work produced will be highly dependent on how it is set up.

The key step is to identify the competences needed in order to involve the appropriate-people. The team should consist of people who have knowledge of the product, associated hazards, technology and associated equipment (the traditional HACCP team). In addition, the team should know and understand the principles of food safety management and the HACCP approach.

The team should be provided with documented information, including the legislation/regulations of the country of manufacture and, in export countries, guides to GHPs and technical literature. For example, a typical team for a small or medium-sized organization would consist of a production manager, a person skilled in FSMSs including HACCP, and

any other personnel possessing sector/ product-specific competencies. If external assistance is required, refer to Sub- clause 7.1.2 in ISO 22000.

Top management shall assign the responsibility and authority for appointing the food safety team and the food safety team leader. It may be appropriate to issue a formal statement and communicate this statement throughout the organization. Generally, the team will be more effective if it can stay independent of hierarchical pressures. This means that it is rarely appropriate for the organization's chief executive to be a member of the team, except in very small organizations.

The food safety team leader and the food safety team members should attend every meeting. The team organizes how it operates. It may invite people with the competencies needed to contribute and create working groups to help it to complete certain tasks. Depending the organization, it may be necessary to appoint an external consultant/expert with the appropriate competencies (see Sub clause 7.2 in ISO 22000). In this case, the organization must clearly define the responsibilities of the consultant.

Types of documented information supporting the implementation of the FSMS: examples

- Statement establishing the food safety team and the appointment of the food safety team leader
- List of members of the food safety team (including internal and external experts)
- Description of the food safety competencies of the team
- Training records for all food safety team members
- Notes/minutes of food safety team meetings
- Contracts with external consultants/experts

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Is the list of food safety team members up to date?
- Does the food safety team have the appropriate knowledge and experience?
- If an external consultant/expert is used, does he/she have the appropriate knowledge and experience in the food sector? And how can you prove this?

5.3.2 The food safety team leader shall be responsible for:

a) Ensuring the FSMS is established, implemented, maintained and updated;

b) Managing and organizing the work of the food safety team;

c) Ensuring relevant training and competencies for the food safety team (see 7.2);

d) Reporting to top management on the effectiveness and suitability of the FSMS.

5.3.3 All persons shall have the responsibility to report problem(s) with regards to the FSMS to identified person(s).

Practical advice:

Top management should lead and play an active role in managing the FSMS, including:

- Expressing its awareness of the food safety issues at stake in the business and clearly expressing its commitment through a policy on these issues
- Employing and maintaining human resources with an adequate level of knowledge, leadership and expertise to ensure the organization's "food safety commitment" and granting the required financial resources to maintain food safety hazards within the determined acceptable levels
- Setting up an appropriate management organization and highly efficient communication channels (internal and external) to achieve the set objectives
- Personally chairing management reviews in order to ensure the continuous implementation of the FSMS within the organization and to establish new

targets/objectives as necessary. Ensuring that the food safety team and food safety team leader are appointed, and providing resources to establish, train and maintain the food safety team

The key issue is to make sure responsibility levels are clearly determined, communicated and understood by all levels within the organization, including the food safety team and the food safety team leader.

Make sure that individuals are assigned to manage each of the food safety related roles. Assign deputies as a contingency plan. Ensure all processes/departments that have an impact on food safety are included (e.g. research and development, purchasing, sales, maintenance).

Ensure that the food-safety team is competent on food safety and the application of HACCP principles. In a small business, the manager or the owner may, also be the food safety team leader, provided that he/she has a basic knowledge of hygiene management and the application of HACCP principles.

Job descriptions and responsibilities should be kept up to date.

Types of documented information supporting the implementation of the FSMS: example(s)

- Organizational chart
- Job definition and/or job description
- Procedures such as documents reflecting roles, responsibilities and authorities of the processes of the FSMS
- Matrix of skills (document indicating people's abilities to perform the tasks related to food safety in different areas)

Figure 14: Define and communicate the roles, responsibilities and authorities for personnel who have an impact on food safety

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Do all of the personnel know and understand their responsibilities with regard to food safety?
- Do the individuals responsible for managing each of the food-safety-related functions have the responsibility and authority to take actions, and record them under the FSMS requirements (e.g. communication with authorities, products release, reworking or disposal of failing product, recall/withdraw)?
- Have you defined the responsibilities and the authorities for the team charged with food safety?
- Over time, have the responsibilities with regard to food safety changed, and have the job descriptions been revised accordingly?
- Has a member of the organization (e.g. the person responsible for food safety) been given the responsibility for establishing communication with external organizations for questions about food safety?
- Do you have a mechanism by which everyone can report food safety issues to the management?

6. Planning

6.1 Actions to address risks and opportunities

6.1.1 When planning for the FSMS, the organization shall consider the issues referred to in 4.1 and the requirements referred to in 4.2 and 4.3 and determine the risks and opportunities that need to be addressed to:

a) Give assurance that the FSMS can achieve its intended result(s);

b) Enhance desirable effects;

c) Prevent, or reduce, undesired effects;

d) Achieve continual improvement.

NOTE In the context of this document, the concept of risks and opportunities is limited to events and their consequences relating to the performance and effectiveness of the FSMS. Public authorities are responsible for addressing public health risks. Organizations are required to manage food safety hazards (see 3.22) and the requirements related to this process that are laid down in Clause 8.

6.1.2 The organization shall plan:

a) Actions to address these risks and opportunities;

b) How to:

1) Integrate and implement the actions into its FSMS processes;

2) Evaluate the effectiveness of these actions.

6.1.3 The actions taken by the organization to address risks and opportunities shall be proportionate to:

a) The impact on food safety requirements;

b) The conformity of food products and services to customers;

c) Requirements of interested parties in the food chain.

NOTE 1 Actions to address risks and opportunities can include: avoiding risk, taking risk in order to pursue an opportunity, eliminating the risk source, changing the likelihood or consequences, sharing the risk, or accepting the presence of risk by informed decision.

NOTE 2 Opportunities can lead to the adoption of new practices (modification of products or processes), using new technology and other desirable and viable possibilities to address the food safety needs of the organization or its customers.

6.2 Objectives of the food safety management system and planning to achieve them

6.2.1 The organization shall establish objectives for the FSMS at relevant functions and levels.

The objectives of the FSMS shall:

a) Be consistent with the food safety policy;

b) Be measurable (if practicable);

c) Take into account applicable food safety requirements, including statutory, regulatory and customer requirements;

d) Be monitored and verified;

e) Be communicated;

f) Be maintained and updated as appropriate.

The organization shall retain documented information on the objectives for the FSMS.

6.2.2 When planning how to achieve its objectives for the FSMS, the organization shall determine:

a) What will be done?

b) What resources will be required?

c) Who will be responsible?

d) When it will be completed;

e) How the results will be evaluated.

6.3 Planning of changes

When the organization determines the need for changes to the FSMS, including personnel changes, the changes shall be carried out and communicated in a planned manner.

The organization shall consider:

a) The purpose of the changes and their potential consequences;

b) The continued integrity of the FSMS;

c) The availability of resources to effectively implement the changes;

d) The allocation or re-allocation of responsibilities and authorities.

7. Support

7.1 Resources

7.1.1 General

The organization shall determine and provide the resources needed for the establishment, implementation, maintenance, update and continual improvement of the FSMS.

The organization shall consider:

a) The capability of, and any constraints on, existing internal resources;

b) The need for external resources.

7.1.2 People

The organization shall ensure that persons necessary to operate and maintain an effective FSMS are competent (see 7.2).

Where the assistance of external experts is used for the development, implementation, operation or assessment of the FSMS, evidence of agreement or contracts defining the competency, responsibility and authority of external experts shall be retained as documented information.

7.1.3 Infrastructure

The organization shall provide the resources for the determination, establishment and maintenance of the infrastructure necessary to achieve conformity with the requirements of the FSMS.

NOTE Infrastructure can include:

- Land, vessels, buildings and associated utilities;
- Equipment, including hardware and software;
- Transportation;
- Information and communication technology.

7.1.4 Work environment

The organization shall determine, provide and maintain the resources for the establishment, management and maintenance of the work environment necessary to achieve conformity with the requirements of the FSMS.

NOTE A suitable environment can be a combination of human and physical factors such as:

a) Social (e.g. non-discriminatory, calm, non-confrontational);

b) Psychological (e.g. stress-reducing, burnout prevention, emotionally protective);

c) Physical (e.g. temperature, heat, humidity, light, air flow, hygiene, noise).

These factors can differ substantially depending on the products and services provided.

Practical advice:

Financial budgets are closely connected to food safety management issues, so it should be made clear that appropriate financial resources are granted when needed.

Financial resources should be allocated in time to build and maintain the system. For instance, understanding the latest food safety trends can be achieved by attending food safety meetings, food safety training and reading technical literature.

The infrastructure (facilities, equipment and services needed for the operation of the organization) will vary according to the specific activities and products of the organization, e.g. concerning open spaces, buildings, manufacturing equipment, vessels (ships), trucks, surrounding areas, pasteurizer, kneading machine, tank, software, water network, maintenance, pest control.

The work environment (conditions under which work is performed) can include physical, social, psychological and environmental factors (such as temperature, lighting, recognition schemes, occupational stress, ergonomics and atmospheric composition). For example, a badly maintained ventilation system can result in a temperature that is too high and too much humidity.

The organization should have a plan in place when facilities need upgrading to meet food safety requirements.

Types of documented information supporting the implementation of the FSMS: example(s)

- Financial plan for the organization's expenditures related to the FSMS (budget)
- Operational plans for improving the FSMS

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

Are the required resources available for the FSMS?

Is the necessary infrastructure in place to establish or maintain the FSMS?

Have you supplied the necessary resources for the implementation, management, and maintenance of the work environment as required by the FSMS?

7.1.5 Externally developed elements of the food safety management system

When an organization establishes, maintains, updates and continually improves its FSMS by using externally developed elements of a FSMS, including PRPs, the hazard analysis and the hazard control plan (see 8.5.4), the organization shall ensure that the provided elements are:

a) Developed in conformance with requirements of this document;
b) Applicable to the sites, processes and products of the organization;
c) Specifically adapted to the processes and products of the organization by the food safety team;
d) Implemented, maintained and updated as required by this document;
e) Retained as documented information.

Practical advice:

The option of using "externally developed combinations of control measures" (PRPs, OPRPs, CCPs) was included in ISO 22000:2005 specifically for small and/or less developed food businesses. ISO 22000:2018 has broadened this concept from "control measures" to any "element" of a FSMS to any food business.

Any element of a FSMS can be sourced externally (e.g. training program, competence evaluation approach, recall procedure, traceability system, hazard analysis, PRP, hazard control measure). If this is carried out, then the element must be adapted to the organization's specific requirements. Sources for externally developed elements can include industry associations, universities, governments and other relevant sources of knowledge. All externally developed elements must demonstrate that they were developed in compliance with the requirements of ISO 22000. This is particularly important with respect to externally developed elements associated with the requirements in Clause 8 of ISO 22000.

Types of documented information supporting the implementation of the FSMS: example(s)

- List of external reference documents consulted
- Communications (e.g. e-mails, letters, notes of telephone calls) with external parties/contributors
- Documents of external origin to support the conformity of the externally developed element(s) of the FSMS
- Documents of internal origin to support the adaptation, maintenance and updating of the externally developed element(s) of the FSMS
- Notes/minutes of internal/food safety team meetings

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Have you identified the element(s) within the FSMS that are based on externally developed information?
- Has the external party/contributor provided your organization with enough information to demonstrate that it conforms to the requirements of ISO 22000? For example, has the external party/contributor provided information on the competence of its equivalent function to the food safety team, a detailed hazard analysis, the basis for its determination that the hazard control measures are valid, etc.?
- If you are using externally developed element(s) as a basis for your hazard analysis and/or for establishing PRPs or hazard control measures, have you ensured that your food safety team can access updates to this(these) element(s) if it(they) is(are) provided by the external party/contributor?
- Have you adapted the elements to your specific requirements (e.g. processes, products)?

7.1.6 Control of externally provided processes, products or services

The organization shall:

a) Establish and apply criteria for the evaluation, selection, monitoring of performance and reevaluation of external providers of processes, products and/or services;
b) Ensure adequate communication of requirements to the external provider(s);

c) Ensure that externally provided processes, products or services do not adversely affect the organization's ability to consistently meet the requirements of the FSMS;
d) Retain documented information of these activities and any necessary actions as a result of the evaluations and re-evaluations.

7.2 Competence

The organization shall:

a) Determine the necessary competence of person(s), including external providers, doing work under its control that affects its food safety performance and effectiveness of the FSMS;
b) Ensure that these persons, including the food safety team and those responsible for the operation of the hazard control plan, are competent on the basis of appropriate education, training and/or experience;
c) Ensure that the food safety team has a combination of multi-disciplinary knowledge and experience in developing and implementing the FSMS (including, but not limited to, the organization’s products, processes, equipment and food safety hazards within the scope of the FSMS);
d) Where applicable, take actions to acquire the necessary competence, and evaluate the effectiveness of the actions taken;
e) Retain appropriate documented information as evidence of competence.

NOTE Applicable actions can include, for example, the provision of training to, the mentoring of, or the reassignment of currently employed persons; or the hiring or contracting of competent persons.

7.3 Awareness

The organization shall ensure that all relevant persons doing work under the organization's control shall be aware of:

a) The food safety policy;
b) The objectives of the FSMS;
c) Their individual contribution to the effectiveness of the FSMS, including the benefits of improved food safety performance;
d) The implications of not conforming to the FSMS requirements.

Practical advice:

Skills and competencies comprise combination of knowledge, ability and personal responsibility. Personal responsibility is key in respect of the rules of food safety. Job descriptions should include the skills, competencies and training requirements for each position.

Ensure that any training action is recorded, even if it is an internal session (e.g. tutoring, on the job training, mentoring, shadowing).

Develop a method to assess the competence of employees and external providers, in relation to food safety performance.

Assess the competence of new or temporary employees. In addition, the organization should periodically assess the competencies of existing employees with regards to food safety.

Types of documented information supporting the implementation of the FSMS: example(s)

- Supporting information for food safety and HACCP training.
- List of resource capabilities and the identification of the need for external providers

- Competency planning, indicating what training on information is required, and to whom training should be given
- Competency scheduling, indicating when to conduct the training, the competency evaluation, and, where required, the re-evaluation
- Training plans and training request forms
- Matrix of skills/competencies
- Training attendance sheets/proof of training
- Curriculum vitae
- Evaluation reports for training effectiveness
- Skills evaluation interview

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Have you checked the external experts you are employing are competent and that records detailing the responsibility and the authority of these experts have been kept?
- Have you checked that the employees with activities related to food safety are well aware of their responsibilities and are competent to fulfill them?
- Do those employees with multiple responsibilities clearly understand them, and are they competent to fulfill all responsibilities in an effective and efficient manner?
- Have the employees requiring specialized training (e.g. those responsible for monitoring and corrective actions in the FSMS) received the training? Have you evaluated the effectiveness of the actions taken?
- Have you kept all records related to these skills?
- What actions did you take to acquire the necessary competencies? Have you evaluated the effectiveness of the actions taken?

7.4 Communication

7.4.1 General

The organization shall determine the internal and external communications relevant to the FSMS, including:

a) On what it will communicate;
b) When to communicate;
c) With whom to communicate;
d) How to communicate;
e) Who communicates?

The organization shall ensure that the requirement for effective communication is understood by all persons whose activities have an impact on food safety.

7.4.2 External communication

The organization shall ensure that sufficient information is communicated externally and is available for interested parties of the food chain.

The organization shall establish, implement and maintain effective communications with:

a) External providers and contractors;

b) Customers and/or consumers, in relation to:

1) Product information related to food safety, to enable the handling, display, storage, preparation, distribution and use of the product within the food chain or by the consumer;

2) Identified foods safety hazards that need to be controlled by other organizations in the food chain and/or by consumers;

3) Contractual arrangements, enquiries and orders, including their amendments;

4) Customer and/or consumer feedback, including complaints;

c) Statutory and regulatory authorities;

d) Other organizations that have an impact on, or will be affected by, the effectiveness or updating of the FSMS.

Designated persons shall have defined responsibility and authority for the external communication of any information concerning food safety. Where relevant, information obtained through external communication shall be included as input for management review (see 9.3) and for updating the FSMS (see 4.4 and 10.3).

Evidence of external communication shall be retained as documented information.

7.4.3 Internal communication

The organization shall establish, implement and maintain an effective system for communicating issues having an impact on food safety.

To maintain the effectiveness of the FSMS, the organization shall ensure that the food safety team is informed in a timely manner of changes in the following:

a) Products or new products;

b) Raw materials, ingredients and services;

c) Production systems and equipment;

d) Production premises, location of equipment and surrounding environment;

e) Cleaning and sanitation programs;

f) Packaging, storage and distribution systems;

g) Competencies and/or allocation of responsibilities and authorizations;

h) Applicable statutory and regulatory requirements;

i) Knowledge regarding food safety hazards and control measures;

j) Customer, sector and other requirements that the organization observes;

k) Relevant enquiries and communications from external interested parties;

l) Complaints and alerts indicating food safety hazards associated with the end product;

m) Other conditions that have an impact on food safety.

The food safety team shall ensure that this information is included when updating the FSMS (see 4.4 and 10.3).

Top management shall ensure that relevant information is included as input to the management review (see 9.3).

Practical advice:

The purpose of any communication is to distribute information.

Communication should ensure that there is a proper transfer of information between interested parties and within the organization.

Communication should include a feedback mechanism, a review cycle and provisions to proactively address changes in the organization's environment.

The organization's communications process should operate both vertically and horizontally, and should be tailored to the differing needs of its recipients. The communication process should address the issues of:

- Ensuring effective two-way communication
- Enhancing trust and credibility
- Involving, where appropriate, relevant interested parties in the process
- Adjusting or modifying the communication program as needed based on system reviews

The organization shall make sure that channels of external communication and internal communication are identified and managed. Appointed persons shall have defined

responsibilities and authorities for the communication of any information regarding food safety.

A communication plan can be used to cover both external and internal communications and should include, at least:

- By whom (the sender)
- Who (the addressees)
- What (the message to be delivered)
- How (how the message is sent)
- When (the timing)
- Why (the purpose)

Communication methods can include e-mails.

External communication

External communication is an exchange of information related to food safety between the organization and external organizations (e.g. with clients, suppliers, statutory or regulatory authorities). This could be achieved either by contract or by other means. It should concern the level of food safety (information on hazard control along the food chain) and the ability to deliver the product to the agreed requirements.

Internal communication

Internal communication should not be taken for granted. Communication is based on the transmission of information and, as such, it is essential to ensure that the message has been received and fully understood.

The internal communication system of the organization should ensure that sufficient, relevant information and data are available to all personnel involved with the various operations and procedures.

During the development and launch of new products, communication to involved personnel within the organization should be carried out in a clear and timely manner. This also applies to intended changes in raw materials, ingredients, production systems, processes, technologies, suppliers and customer requirements. In particular, attention should be given to

the communication of changes in statutory and regulatory requirements, new or emerging food safety hazard(s), and the method of control of these new hazards.

Types of documented information supporting the implementation of the FSMS: example(s)

- Internal communication methods that allow the food-safety team to be informed of changes (e.g. raw materials, ingredients, services, products, procedures, equipment, cleaning and disinfection products, regulations)
- Documents that describe how communication should be conducted for external and internal communication, including the interfaces between these two groups
- Procedure for handling customer and consumer complaints, and subsequent communications with consumers
- E-mails (which may require storage in specified flies for audit purposes)
- Notes/minutes of internal/food safety team meetings
- Records of external communications
- Records of internal communications needed for management review
- Communication plan(s)
- Minutes of the management-review meeting
- An updated record (list) with contact information for internal communication
- An updated record (list) with contact information for external communication

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Have you put into place effective arrangements to communicate with external parties about food safety matters?
- Have you put into place effective arrangements to ensure that information on food safety matters (notably concerning changes) is supplied in a timely manner to the team?
- Have you kept records of communications (external and internal) on food safety matters?
- Have you verified the effectiveness of your communications (external and internal)?

7.5 Documented information

7.5.1 General

The organization's FSMS shall include:

a) Documented information required by this document;

b) Documented information determined by the organization as being necessary for the effectiveness of the FSMS;

c) Documented information and food safety requirements required by statutory, regulatory authorities and customers.

NOTE The extent of documented information for a FSMS can differ from one organization to another due to:

- The size of organization and its type of activities, processes, products and services;
- The complexity of processes and their interactions;
- The competence of persons.

7.5.2 Creating and updating

When creating and updating documented information, the organization shall ensure appropriate:

a) Identification and description (e.g. a title, date, author, or reference number);

b) Format (e.g. language, software version, graphics) and media (e.g. paper, electronic);

c) Review and approval for suitability and adequacy.

7.5.3 Control of documented information

7.5.3.1 Documented information required by the FSMS and by this document shall be controlled to ensure:

a) It is available and suitable for use, where and when it is needed;

b) It is adequately protected (e.g. from loss of confidentiality, improper use, or loss of integrity).

7.5.3.2 For the control of documented information, the organization shall address the following activities, as applicable:

a) Distribution, access, retrieval and use;

b) Storage and preservation, including preservation of legibility;

c) Control of changes (e.g. version control);

d) Retention and disposition.

Documented information of external origin determined by the organization to be necessary for the planning and operation of the FSMS shall be identified, as appropriate, and controlled.

Documented information retained as evidence of conformity shall be protected from unintended alterations.

NOTE Access can imply a decision regarding the permission to view the documented information only, or the permission and authority to view and change the documented information.

Practical advice:

"Documented information" means information required to be controlled and maintained by an organization and the medium on which it is contained (e.g. procedures, instructions, specifications, forms for recording information, records, documents arising from regulations, products specifications, and the food safety policy). The list should be approved by the food safety team.

The management of documented information must be applied to both internal and external documents.

Documented procedures should clearly define how documented information should be changed, how long and how they should be stored, and how they are to be destroyed. Records of destruction should be documented. A documented procedure for the creation, update and control of documented information, which can include a standardized format for procedures and work instructions, could help the organization in the management of the documentation.

The retention time for documents and records must be defined by the organization and, at least, meet applicable laws and regulations.

A key issue for any management system is to make sure that the type and extent of documented information fits with the organization's size and the complexity of its activities.

All documented information should respect the rule of the 3 U's: useful, useable and utilized.

Sources of external documented information should be identified, e.g. legislation, keeping a list of useful websites or publishing bodies. Organize an identification system for your external documented information, e.g. date of receipt, a simple document code.

When controlled documented information is kept electronically, any printed documents should have a disclaimer that they are not controlled, and the only con- trolled documents are those kept on the computer server. In any case, the electronic data should be secured (e.g. password protected against alteration, backed-up). The distribution of documented information needs to be controlled. You need to decide who should receive documents and to define where the master copy is kept.

Keep documented information (documents and records) accessible to the food safety team and other impacted people involved in the organization's FSMS.

Regularly review your external documented information to ensure that you have the current versions.

A failure in documented information control and record may lead to a failure in the FSMS.

Types of documented information supporting the implementation of the FSMS: example(s)

- Documents of external origin sustaining PRP programs
- Protocol for saving electronic data: organizations must comply with appropriate laws and regulations regarding the saving and storage of electronic data
- Documented information required by ISO 22000
- List of applicable external and internal documents
- Review of internal audits on documented information control and follow up actions regarding any changes to documentation requirements

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Have you documented the FSMS?

- Do you have all the documented information required to demonstrate the development, implementation and efficient updating of the FSMS?
- Is the documented information in compliance with appropriate laws and regulations?
- Do you have full control over your documented information (documents and records)?
- Do your designated employees have access to the most recent versions of the documents and record forms?
- Are you sure that people understand and use the current version of documented information and, for records, how they should be completed?

8. Operation

8.1 Operational planning and control

The organization shall plan, implement, control, maintain and update the processes needed to meet requirements for the realization of safe products, and to implement the actions determined in 6.1, by:

a) Establishing criteria for the processes;

b) Implementing control of the processes in accordance with the criteria;

c) Keeping documented information to the extent necessary to have the confidence to demonstrate that the processes have been carried out as planned.

The organization shall control planned changes and review the consequences of unintended changes, taking action to mitigate any adverse effects, as necessary.

The organization shall ensure that outsourced processes are controlled (see 7.1.6).

8.2 Prerequisite programs (PRPs)

8.2.1 The organization shall establish, implement, maintain and update PRP(s) to facilitate the prevention and/or reduction of contaminants (including food safety hazards) in the products, product processing and work environment.

8.2.2 The PRP(s) shall be:

a) Appropriate to the organization and its context with regard to food safety;

b) Appropriate to the size and type of the operation and the nature of the products being manufactured and/or handled;

c) Implemented across the entire production system, either as programs applicable in general or as programs applicable to a particular product or process;

d) Approved by the food safety team.

Practical advice:

The list of PRPs required by the organization should be drawn up in a methodical manner, and by consulting identified reference documents relevant to the type of product and/or step in the food chain, such as:

- Codes of Hygiene Practice of the Codex Alimentarius Commission, e.g. General Principles of Food Hygiene (CXC 1-1969)
- Applicable regulations, regulatory requirements and rules of the organization's home country and/or export destination(s)

- PRP documents published in the ISO/TS 22002 series, which provide the PRPs required in various parts of the food chain published professional guidance documents
- Customer requirements, if applicable (e.g. as listed in contracts, specifications and product safety standards, or in the results of customer audits)

Note: The organization shall establish, implement, maintain and update PRPs to facilitate the prevention and/or reduction of contaminants (including food safety hazards) in the products, product processing and work environment. Consideration should also be given to other issues potentially related, but not directly involved in, food safety (e.g. food spoilage).

Note: If an organization is seeking private-sector certification based on ISO 22000, it may have to meet PRP requirements based on the ISO/TS 22002 series, and other requirements of the schemes.

Types of documented information supporting the implementation of the FSMS: example(s)

- List of external reference documents consulted
- Documents of external origin to support PRPs
- List of identified PRPs

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Have you listed the external reference documents that enable the identification of PRPs (e.g. regulations, client/customer requirements, ISO documents, Codex Alimentarius documents, professional guidance documents)?
- Have you made a list of the PRPs that apply to your organization?
- Have you formally documented the PRPs currently applied?

8.2.3 When selecting and/or establishing PRP(s), the organization shall ensure that applicable statutory, regulatory and mutually agreed customer requirements are identified. The organization should consider:

a) The applicable part of the ISO/TS 22002 series;

b) Applicable standards, codes of practice and guidelines.

Practical advice:

Check all relevant documented information regarding the implemented PRPs exists and is applied.

Examples of documented information include:

- Cleaning and sanitizing procedures
- Staff hygiene instructions
- Pest control program
- Conditions for storage
- Site and equipment maintenance plans
- Where applicable, assess the efficiency of the PRPs

Types of documented information supporting the implementation of the FSMS: example(s)

- Documented information (procedures and instructions) specifying the PRPs, including monitoring procedures, where applicable, and verification plans
- List of implemented PRPs
- Records related to the implementation of PRPs

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Has the implementation plan been drawn up for all established PRPs?
- Have the applicable PRPs been communicated by the food safety team, and implemented within the organization?
- Has documented information been established for all PRPs?

8.2.4 When establishing PRP(s) the organization shall consider:

a) Construction, lay-out of buildings and associated utilities;
b) Lay-out of premises, including zoning, workspace and employee facilities;
c) Supplies of air, water, energy and other utilities;
d) Pest control, waste and sewage disposal and supporting services;
e) The suitability of equipment and its accessibility for cleaning and maintenance;
f) Supplier approval and assurance processes (e.g. raw materials, ingredients, chemicals and packaging);
g) Reception of incoming materials, storage, dispatch, transportation and handling of products;
h) Measures for the prevention of cross contamination;
i) Cleaning and disinfecting;
j) Personal hygiene;
k) Product information/consumer awareness;
l) Others, as appropriate.

Documented information shall specify the selection, establishment, applicable monitoring and verification of the PRP(s).

Practical advice:

Identify the PRPs that should be monitored. An incorrect implementation of some PRPs may lead to potentially unacceptable products, e.g. cross-contact with allergenic food, insufficient cleaning and sanitation of surfaces in contact with ready-to-eat foods.

Establish appropriate monitoring i.e.:

- Monitoring should be based on the parameters established for managing the PRP, if any the monitoring parameters should be measurable and/or observable
- When such parameters are exceeded, the process/operation should be adjusted
- The method and frequency of monitoring should be sufficient to enable the detection of an ineffective implementation of the PRPs
- The monitoring results should be kept as documented information

As an example, a PRP monitoring plan could address:

The PRP

- Parameters or characteristics to be controlled criteria (when relevant):

- Upper specification
- Lower specification
- Control factors (when relevant):
- Upper limit
- Target
- Lower limit

- Measurement (when relevant):

- Person responsible
- Sample size
- Sample frequency
- Handling requirements

Types of documented information supporting the implementation of the FSMS: example(s)

- List of PRPs where monitoring is feasible and relevant

- Procedures that are appropriate and sufficient for monitoring the identified PRPs (what, how, when and by whom)

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Have you listed the PRPs where monitoring is feasible and relevant?
- Do you have procedures that are appropriate and sufficient for monitoring the identified PRPs, i.e. what, how, when and by whom?

8.3 Traceability system

The traceability system shall be able to uniquely identify incoming material from the suppliers and the first stage of the distribution route of the end product. When establishing and implementing the traceability system, the following shall be considered as a minimum:

a) Relation of lots of received materials, ingredients and intermediate products to the end products;

b) Reworking of materials/products;

c) Distribution of the end product.

The organization shall ensure that applicable statutory, regulatory and customer requirements are identified.

Documented information as evidence of the traceability system shall be retained for a defined period to include, as a minimum, the shelf life of the product. The organization shall verify and test the effectiveness of the traceability system.

NOTE Where appropriate, the verification of the system is expected to include the reconciliation of quantities of end products with the quantity of ingredients as evidence of effectiveness.

Practical advice:

Traceability allows organizations to track their end products forward, and raw materials, packaging or ingredients back through the supply chain. It is considered as a basic element for food safety.

The following terms are associated with a traceability system:

- External traceability: traceability between organizations (one step back, one step forward) providing the ability to identify the immediate, previous supplier of goods/units and the next immediate customer

Note: External traceability requirements do not include the final consumer.

- Internal traceability: traceability inside the organization, i.e. the ability to follow the movement within a single organization

Note: Within an organization, the transport or transfer steps are covered by the internal traceability of the organization that has the ownership of the goods/units (e.g. products, materials, reagents).

The size and nature of a lot/batch for each manufactured product is established by the manufacturing organization.

The organization shall have a system for traceability enabling the identification of product lots/batches or logistic units, their relation/link to lots/batches of raw materials/products, processing, delivery records, and shipping information and/or invoices.

Traceability records shall be retained for a defined period, which should be, at minimum, the shelf-life of the product plus any extra time required by the organization, customer, or statutory and regulatory requirements. They should be readily available for system assessment to enable the identification and location of potentially unsafe products in the event of a product withdrawal/recall (see Subclause 8.9.5 of ISO 22000). Records should be in accordance with the organization's document control program (see Subclause 7.5.3 of ISO 22000).

Traceability systems are tested through a traceability test/mock withdrawal/recall. Records of these tests should be retained.

Note: Traceability is essential for conducting an effective withdrawal/recall.

The organization should establish a format for traceability information and its flow (electronic or paper). This information may include:

- Identification of organizations involved
- Identification of products
- Identification of logistics units (e.g. batches/lots, pallets, containers, bulk)

Types of documented information supporting the implementation of the FSMS: example(s)

- Documented information (procedures) describing the identification system of the product/lot code and traceability
- Results of the evaluation tests for the effectiveness of the traceability system as an input for the management review
- Records/data used for traceability purposes (e.g. production sheets, delivery codes, packing records, lot codes, invoices). These may be hard copies or electronic copies

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Have you defined the mechanisms to ensure the traceability of the products (external and internal traceability) and the related documented information (records)?

- Does the traceability system meet regulatory requirements (if applicable)?
- Is verification of the effectiveness of the traceability system by internal audits foreseen:

- Is your traceability system effective?
- Is the traceability system efficient?
- Can the traceability system be sustained?

8.4 Emergency preparedness and response

8.4.1 General

Top management shall ensure procedures are in place to respond to potential emergency situations or incidents that can have an impact on food safety which are relevant to the role of the organization in the food chain.

Documented information shall be established and maintained to manage these situations and incidents.

8.4.2 Handling of emergencies and incidents

The organization shall:

a) Respond to actual emergency situations and incidents by:

1) Ensuring applicable statutory and regulatory requirements are identified;

2) Communicating internally;

3) Communicating externally (e.g. suppliers, customers, appropriate authorities, media);

b) Take action to reduce the consequences of the emergency situation, appropriate to the magnitude of the emergency or incident and the potential food safety impact;

c) Periodically test procedures where practical;

d) Review and, where necessary, update the documented information after the occurrence of any incident, emergency situation or tests.

NOTE Examples of emergency situations that can affect food safety and/or production are natural disasters, environmental accidents, bioterrorism, workplace accidents, public health emergencies and other accidents, e.g. interruption of essential services such as water, electricity or refrigeration supply.

Practical advice:

Emergency situations and potential incidents can be of very different natures, e.g. a disruption in the supply of raw materials, a break-down or accident, a strike by personnel, natural disasters, and a loss of utilities such as water and energy supplies. In ISO 22000, emergency preparedness addresses situations that could lead to unsafe food (see Subclause 8.4) and how to handle a potentially unsafe product (see Subclause 8.9.4).

These mechanisms enable the personnel confronted with emergency situations and potential incidents to be aware of the procedures to be followed, and thereby to avoid improvisation.

The organization should be aware of potential emergency situations, which can include fire, flooding, bioterrorism and sabotage, energy failure, vehicle incidents and contamination of the environment.

In the context of ISO 22000, a minimum emergency response includes:

- Communicating to the relevant staff and external organizations (e.g. authorities, fire brigade, media) according to the emergency procedure(s)
- Identifying the product/area affected by the emergency situation, including any potential contamination by the first responders, e.g. fire fighters, rescue team
- Handling product(s) as potentially unsafe products (see Subclause 8.9.4 of ISO 22000)
- Evaluating and restoring the affected area through correction and corrective action process (see Subclauses 8.9.2 and 8.9.3 of ISO 22000)
- Communicating to customers, if impacted

Simulation (mock) exercises should be used to verify the effectiveness of the emergency procedure response. The complexity of such exercises should be proportional to the complexity and the size of the organization, and the role in the food chain.

The emergency plan may include the possibility to divert production/service to another facility, if feasible.

Following all genuine or simulated/mock emergencies, the emergency preparedness team should meet to evaluate performance as part of the continual improvement process.

Type of documented information supporting the implementation of the FSMS: example(s)

- Emergency preparedness plan (with an up-to-date list of the team responsible for managing possible emergency situations and potential incidents, including the composition, organization and contact details).
- Minutes of the meetings held in relation to the preparation of action plans for diverse types of emergency situations and potential incidents (e.g. roles and missions, simulation exercises, training).

Records of practice exercises conducted according to the defined planning, and of the implementation and the effectiveness of the emergency preparedness plan

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Has the organization appointed an emergency response team and defined the contact details?
- Have you identified emergency situations and potential incidents?
- Have you formally defined the mechanisms (including a contact list) to confront food safety problems arising from emergency situations and potential incidents?
- Is the documented information for emergency response kept up to date?

8.5 Hazard control

8.5.1 Preliminary steps to enable hazard analysis

8.5.1.1 General

To carry out the hazard analysis, preliminary documented information shall be collected, maintained and updated by the food safety team. This shall include, but not be limited to:

a) Applicable statutory, regulatory and customer requirements;
b) The organization's products, processes and equipment;
c) Food safety hazards relevant to the FSMS.

8.5.1.2 Characteristics of raw materials, ingredients and product contact materials

The organization shall ensure that all applicable statutory and regulatory food safety requirements are identified for all raw materials, ingredients and product contact materials.

The organization shall maintain documented information concerning all raw materials, ingredients and product contact materials to the extent needed to conduct the hazard analysis (see 8.5.2), including the following, as appropriate:

a) Biological, chemical and physical characteristics;

b) Composition of formulated ingredients, including additives and processing aids;
c) Source (e.g. animal, mineral or vegetable);
d) Place of origin (provenance);
e) Method of production;
f) Method of packaging and delivery;
g) Storage conditions and shelf life;
h) Preparation and/or handling before use or processing;
i) Acceptance criteria related to food safety or specifications of purchased materials and ingredients appropriate to their intended use.

Practical advice:

This description should help in identifying the hazards to be controlled and the appropriate control measures. This is a pivotal step towards designing and implementing the FSMS. It is a key determinant of the hazard analysis and identification

The team should first describe the product. "The product" includes raw materials (including packaging materials), semi-processed products and end products. The description includes information relevant to the hazard analysis: product composition (physical, chemical and biological characteristics), processing to obtain the end product, shelf-life information, packaging material, packaging conditions, labelling instructions, distribution channels, intended use, and reasonably expected mishandling and/or misuse by consumers.

The team should seek information about the origin of raw materials to determine:

- If they originate from a region where specific contamination can arise (e.g. aflatoxin in cereals or peanuts, hepatitis virus on berries or in seafood)
- If the region of origin is considered to be free from a specific hazard
- If the transport conditions protect the raw material against contamination, e.g. by allergens
- The previous processing of the product
- If the established product specifications directly or indirectly indicate the hazard levels

The team should investigate the transportation and storage conditions used for the determination of shelf-life or durability dates. These are based on the end user (subsequent

processor or consumer, including at the consumer's home), and on information about the use of the product (e.g. how the end product is cooked before consumption).

For highly perishable products, the team must ensure that the chill/cold chain is in place from the organization to the consumer.

For food intended for purchase by another organization in the food chain, the team should also describe the expected use by that organization.

For food intended for purchase by the consumer, the team should also describe the expected mode for consumption and consumer categories. Part of this process is to determine whether consumers could consume the product raw or under- cooked, despite the labelling recommending that it should be well cooked. The team should also determine if the product is intended to be consumed by at-risk groups such as infants, the elderly, pregnant or immuno-compromised people, or animals with specific needs/cares.

Products could be grouped into similar families of products depending on the ingredients, processes and/or hazards.

Types of documented information supporting the implementation of the FSMS: example(s)

- End product specification: raw material, ingredients, product-contact material, packaging, allergen status
- Identification of statutory and regulatory food safety requirements.
- Supplier specifications
- Technical files of raw materials, ingredients, intermediate/semi-processed products and end products
- Certificates of compliance for packaging
- Certificates of conformity of food contact materials
- Intended use of the end product and the vulnerable consumer groups

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Have you described all the product characteristics in sufficient detail, including:

- Raw materials, ingredients?
- Packaging?

- Intermediate/semi processed products?
- End products?

- Have the intended use and reasonably expected handling conditions for the end product been documented, taking into account the vulnerable consumer groups

8.5.1.3 Characteristics of end products

The organization shall ensure that all applicable statutory and regulatory food safety requirements are identified for all the end products intended to be produced.

The organization shall maintain documented information concerning the characteristics of end products to the extent needed to conduct the hazard analysis (see 8.5.2), including information on the following, as appropriate:

a) Product name or similar identification;
b) Composition;
c) Biological, chemical and physical characteristics relevant for food safety;
d) Intended shelf life and storage conditions;
e) Packaging;
f) Labelling relating to food safety and/or instructions for handling, preparation and intended use;
g) Method of distribution and delivery.

8.5.1.4 Intended use

The intended use, including reasonably expected handling of the end product and any unintended use but reasonably expected mishandling and misuse of the end product, shall be considered and shall be maintained as documented information to the extent needed to conduct the hazard analysis (see 8.5.2).

Where appropriate, groups of consumers/users shall be identified for each product.

Groups of consumers/users known to be especially vulnerable to specific food safety hazards shall be identified.

8.5.1.5 Flow diagrams and description of processes

8.5.1.5.1 Preparation of the flow diagrams

The food safety team shall establish, maintain and update flow diagrams as documented information for the products or product categories and the processes covered by the FSMS.

Flow diagrams provide a graphic representation of the process. Flow diagrams shall be used when conducting the hazard analysis as a basis for evaluating the possible occurrence, increase, decrease or introduction of food safety hazards.

Flow diagrams shall be clear, accurate and sufficiently detailed to the extent needed to conduct the hazard analysis. Flow diagrams shall, as appropriate, include the following:

a) The sequence and interaction of the steps in the operation;
b) Any outsourced processes;
c) Where raw materials, ingredients, processing aids, packaging materials, utilities and intermediate products enter the flow;
d) Where reworking and recycling take place;
e) Where end products, intermediate products, by-products and waste are released or removed.

8.5.1.5.2 On-site confirmation of flow diagrams

The food safety team shall confirm on-site the accuracy of the flow diagrams, update the flow diagrams where appropriate and retain as documented information.

8.5.1.5.3 Description of processes and process environment

The food safety team shall describe, to the extent needed to conduct the hazard analysis:

a) The layout of premises, including food and non-food handling areas;
b) Processing equipment and contact materials, processing aids and flow of materials;
c) Existing PRPs, process parameters, control measures (if any) and/or the strictness with which they are applied, or procedures that can influence food safety;
d) External requirements (e.g. from statutory and regulatory authorities or customers) that can impact the choice and the strictness of the control measures.

The variations resulting from expected seasonal changes or shift patterns shall be included as appropriate.

The descriptions shall be updated as appropriate and maintained as documented information.

Practical advice:

All the process steps, from the reception of raw materials to delivery, must be identified. The process flow diagram will be helpful at the hazard identification step. Be sure to indicate where the raw materials, ingredients, intermediate/semi-processed products, rework and end products are held in warehouses and storage facilities. The diagram should be simple, using

boxes and arrows. Nevertheless, it should include everything that enters into the product composition or that comes into contact with the product, such as water, air, raw materials, ingredients, intermediate/semi-processed products and packaging materials. It is equally important to examine parallel process flows (with process characteristics) and reworking or recycling. The movement/transport from one process step to the next, should also be included: e.g. any temporary storage, conveyor belt, trolley, etc.

In addition to the flow diagram, it may be useful to depict the flows of ingredients, materials, containers, personnel, air, water, waste, etc. This can be carried out for each processing line. The flow representations frequently reveal that the flow of "clean" matter and/or personnel crosses the flow of "unclean" materials and/or people. This should lead the team to identify areas where contamination may occur, and suggest process improvements. For example, it is often possible to modify the way operations are conducted to minimize the probability of contamination transfer from an "unclean zone" to a "clean zone" by changing the sequence of operations, protecting the "clean zone" with appropriate covers.

Once the flow diagram is established, the team shall confirm on-site that it is accurate and comprehensive. Interviewing staff is useful. The flow diagram shall be updated when a change occurs in the process.

Types of documented information supporting the implementation of the FSMS: example(s)

- Description of processes and process environment
- On-site confirmation of the flow diagram

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Do the flow diagram(s) for each category of product or process contain all the necessary information (e.g. identification of possible cross-contamination)?
- Have all products and steps been documented?
- Have you verified the accuracy of the flow diagram on-site? (This should be carried out during different processing conditions)
- Has the food safety team described and recorded the control measures, or the procedures for food safety, for each step of the process?

8.5.2 Hazard analysis

8.5.2.1 General

The food safety team shall conduct a hazard analysis, based on the preliminary information, to determine the hazards that need to be controlled. The degree of control shall ensure food safety and, where appropriate, a combination of control measures shall be used.

8.5.2.2 Hazard identification and determination of acceptable levels

8.5.2.2.1 The organization shall identify and document all food safety hazards that are reasonably expected to occur in relation to the type of product, type of process and process environment.

The identification shall be based on:

a) The preliminary information and data collected in accordance with 8.5.1;

b) Experience;

c) Internal and external information including, to the extent possible, epidemiological, scientific and other historical data;

d) Information from the food chain on food safety hazards related to the safety of the end products, intermediate products and the food at the time of consumption;

e) Statutory, regulatory and customer requirements.

NOTE 1 Experience can include information from staff and external experts who are familiar with the product and/or processes in other facilities.

NOTE 2 Statutory and regulatory requirements can include food safety objectives (FSOs). The Codex Alimentarius Commission defines FSOs as "The maximum frequency and/or concentration of a hazard in a food at the time of consumption that provides or contributes to the appropriate level of protection (ALOP)".

Hazards should be considered in sufficient detail to enable hazard assessment and the selection of appropriate control measures.

8.5.2.2.2 The organization shall identify step(s) (e.g. receiving raw materials, processing, distribution and delivery) at which each food safety hazard can be present, be introduced, increase or persist.

When identifying hazards, the organization shall consider:

a) The stages preceding and following in the food chain;

b) All steps in the flow diagram;
c) The process equipment, utilities/services, process environment and persons.

8.5.2.2.3 The organization shall determine the acceptable level in the end product of each food safety hazard identified, whenever possible.

When determining acceptable levels, the organization shall:

a) Ensure that applicable statutory, regulatory and customer requirements are identified;
b) Consider the intended use of end products;
c) Consider any other relevant information.

The organization shall maintain documented information concerning the determination of acceptable levels and the justification for the acceptable levels.

Practical advice:

The team should rigorously identify all hazards that are reasonably expected to occur for each ingredient and input (air, water, etc.), and for each process step. The hazard list is the basis of the next step.

Where statutory and regulatory authorities have established maximum limits, objectives, targets, or end product and/or process criteria for a specific hazard/ product combination, the hazard in question automatically becomes relevant for that product. Other relevant information includes the history, guidelines for GHP, and epidemiological, validation or challenge studies, etc.

Information regarding the "acceptable level" of specific hazards is required. This enables an assessment of a given hazard and whether it needs to be controlled by the organization.

In order to ensure food safety, the "acceptable level" means the level of a specific food safety hazard not to be exceeded in the end product, whether provided by the organization, at a later stage in the food chain or during direct consumption by consumer. Different regulatory agencies may have their own defined acceptable levels of a hazard.

The acceptable level in the end product should be determined through information obtained from one or more of the following sources and should be kept as documented information:

- End product specifications (e.g. maximum levels and other criteria) specified by regulatory authorities in the country of sale
- Specifications or other information communicated by the organization constituting the next step in the food chain, in particular for end products intended for further

processing or for use other than direct consumption maximum acceptable levels established by the food safety team, taking into account the acceptable levels agreed on with the customer and/or established by law and regulations in order to protect the final consumer.

In the absence thereof, this should be obtained through scientific literature, professional experience and expert opinion

Types of documented information supporting the implementation of the FSMS: example(s)

- List of sources or references used to identify the hazards
- List of hazards and justifications for choosing them
- Justification for acceptable levels of hazards in the end product as established by the organization, a competent authority or by the customer

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Has your team identified, for each step of the process, all reasonably expected hazards to occur that are related to food safety?
- Has the team determined, documented and justified the acceptable level for each hazard?

8.5.2.3 Hazard assessment

The organization shall conduct, for each identified food safety hazard, a hazard assessment to determine whether its prevention or reduction to an acceptable level is essential.

The organization shall evaluate each food safety hazard with regard to:

a) The likelihood of its occurrence in the end product prior to application of control measures;

b) The severity of its adverse health effects in relation to the intended use (see 8.5.1.4).

The organization shall identify any significant food safety hazards.

The methodology used shall be described, and the result of the hazard assessment shall be maintained as documented information.

Practical advice:

The team should assess each individual hazard listed. The following should be taken into consideration:

- The source of the hazard, where and how it could be introduced into the product, and/or its environment
- The probability of the hazard occurring in the end product before the application of control measures (e.g. qualitative and/or quantitative prevalence, such as frequency of occurrence and typical levels, highest possible levels and/or statistical distribution of levels, the production or persistence of toxins, chemicals or physical debris, impact of the process step)
- The nature of the hazard (e.g. its ability to multiply, deteriorate and produce toxins)
- The severity of the adverse health effects that could be caused by the hazard

When evaluating the probability of a hazard occurring, consideration should be given to both the preceding and following steps of the specified operation. Consideration shall also be given to the process equipment, service activities and surroundings, as well as to the preceding and following links in the food chain. In addition, the organization should consider measures taken at preceding steps in the food chain (e.g. raw material suppliers, subcontractors). The organization should also consider other relevant initiatives (e.g. general environmental protection measures), and measures taken at subsequent steps in the food chain (e.g. further processing, transportation, distribution, consumption).

Finally, the team should identify every significant food safety hazard for which control is essential for the production of a safe food, and establish a control strategy for each of them.

It may be convenient to group hazards. The level of detail regarding hazards should be specified by each organization and be relevant to their needs, including the appropriate choice of control measures.

Types of documented information supporting the implementation of the FSMS: example(s)

- Description of the methodology used to identify the significant food safety hazards
- A record of the results of the hazard assessment

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Has each identified potential significant food safety hazard been assessed to determine if an additional control should be put in place to prevent or reduce it?

If a remaining significant food safety hazard has to be controlled through a further step in the food chain, has this information been passed on to the relevant interested parties?

8.5.2.4 Selection and categorization of control measure(s)

8.5.2.4.1 Based on the hazard assessment, the organization shall select an appropriate control measure or combination of control measures that will be capable of preventing or reducing the identified significant food safety hazards to defined acceptable levels.

The organization shall categorize the selected identified control measure(s) to be managed as OPRP(s) (see 3.30) or at CCPs (see 3.11).

The categorization shall be carried out using a systematic approach. For each of the control measures selected, there shall be an assessment of the following:

a) The likelihood of failure of its functioning;

b) The severity of the consequence in the case of failure of its functioning; this assessment shall include:

1) The effect on identified significant food safety hazards;

2) The location in relation to other control measure(s);

3) Whether it is specifically established and applied to reduce the hazards to an acceptable level;

4) Whether it is a single measure or is part of combination of control measure(s).

8.5.2.4.2 In addition, for each control measure, the systematic approach shall include an assessment of the feasibility of:

a) Establishing measurable critical limits and/or measurable/observable action criteria;
b) Monitoring to detect any failure to remain within critical limit and/or measurable/observable action criteria;
c) Applying timely corrections in case of failure.

The decision-making process and results of the selection and categorization of the control measures shall be maintained as documented information.

External requirements (e.g. statutory, regulatory and customer requirements) that can impact the choice and the strictness of the control measures shall also be maintained as documented information.

Practical advice:

For each hazard that has to be controlled (i.e. prevented from occurring, be inhibited, increased, or reduced in extent and/or frequency of occurrence), the team should assess which control measure(s) or combination(s) of control measures (including processing steps) can be effective in ensuring that the identified accept- able levels of significant food safety hazards in the end products are not exceeded. The food safety team shall make a list of the process steps where control measure(s), alone or combined, can be implemented to prevent/reduce contaminants ▸ Microbiological contaminants: Control measure(s) to inhibit microbiological growth (e.g. a temperature below 4°C or 40°F), and inactivate or destroy microorganisms (using processes such as chemical disinfection, heating, application of high pressure, filtration, use of visible or UV light, application of electric current, food composition changes such as acidification, reduction of water activity (aw)). Control measure(s) that may be used together to control bacteria, include: pH and aw, acidification with less stringent

Types of documented information supporting the implementation of the FSMS: example(s)

- A list, description and effectiveness of the selected control measure(s) or combination(s) of control measures, in order to prevent or reduce significant food safety hazards to acceptable levels

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Has the food safety team selected the required control measure(s) or combination(s) of control measures to prevent or reduce the significant food safety hazards previously identified to an acceptable level?

8.5.3 Validation of control measure(s) and combinations of control measures

The food safety team shall validate that the selected control measures are capable of achieving the intended control of the significant food safety hazard(s). This validation shall be done prior to implementation of control measure(s) and combinations of control measures

to be included in the hazard control plan (see 8.5.4) and after any change therein (see 7.4.2, 7.4.3, 10.2 and 10.3).

When the result of validation shows that the control measures(s) is (are) not capable of achieving the intended control, the food safety team shall modify and re-assess the control measure(s) and/or combination(s) of control measure(s).

The food safety team shall maintain the validation methodology and evidence of capability of the control measure(s) to achieve the intended control as documented information.

NOTE Modification can include changes in control measure(s) (i.e. process parameters, rigor and/or their combination) and/or change(s) in the manufacturing technologies for raw materials, end product characteristics, methods of distribution and intended use of the end products.

Practical advice:

Validation must be carried out prior to the application of the control measure(s) or combination(s) of control measure(s). The capability of control measure(s) or combination(s) of control measures to achieve the intended level of significant food safety hazard control shall then be measured and assessed.

Different methods can be used to validate the control measure(s) or combination(s) of control measures, such as a reference to the following:

- The literature (scientific or technical), such as previous validation studies
- The historical knowledge of the performance of the control measure(s) or combination(s) of control measures
- The statistically valid experimental data that demonstrate the adequacy of the control measure(s). Previous studies may have a different set of constraints in sources of variation (ingredients, process, and products) than those occurring during current production conditions. These constraints can limit the effectiveness of the validation study. Note: The equipment used shall be appropriate for the intended purpose.
- Mathematical modelling. This method is increasing in usefulness. For example, predictive microbiology can be used to validate the shelf-life of a product, or to determine alternative time/temperature combinations for heat treatment. However, a mathematical model may not be available for specific products or process conditions

The collection of data during the operation of the entire food production process is not a standalone validation method and should be combined with other validation method(s).

Validation studies shall be conducted before the actual food process is operated for the first time. However, the validation may not show the full extent of variation that can occur during the actual production.

Processes defined in regulatory documents or officially validated guides may be used as is, without re-validation. This is acceptable if the process conditions in the organization are the same as those defined in the guide.

When relying upon validations carried out by others, care should be taken to ensure that the conditions of the intended application are consistent with those of public reference validations.

If the expertise is not available in the organization, it is recommended that the organization utilizes external expertise. Each validation method has limitations, thus it is imperative that the most appropriate validation method be selected.

Validation must be re-established following new scientific or regulatory information, a system failure, or any significant change to the process or product. Changes to the process or product include, for example, changes in raw materials, a process step and organizational management, or changes implemented in response to a critical limit or in the conditions of use by end consumers.

Types of documented information supporting the implementation of the FSMS: example(s)

- Process of validation of control measure(s), or, combination(s) of control measures
- Reference to the validation method(s) used
- Validation reports

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Have the control measure(s) or combination(s) of control measures been validated? If so, then how?
- Is there a validation report or validation documented information?

- Have you demonstrated that the control measure(s) or combination(s) of control measures are capable of controlling the identified significant food safety hazards to acceptable levels (if operated correctly)?

8.5.4 Hazard control plan (HACCP/OPRP plan)

8.5.4.1 General

The organization shall establish, implement and maintain a hazard control plan. The hazard control plan shall be maintained as documented information and shall include the following information for each control measure at each CCP or OPRP:

a) Food safety hazard(s) to be controlled at the CCP or by the OPRP;
b) Critical limit(s) at CCP or action criteria for OPRP;
c) Monitoring procedure(s);
d) Correction to be made if critical limits or action criteria are not met;
e) Responsibilities and authorities;
f) Records of monitoring.

8.5.4.2 Determination of critical limits and action criteria

Critical limits at CCPs and action criteria for OPRPs shall be specified. The rationale for their determination shall be maintained as documented information.

Critical limits at CCPs shall be measurable. Conformance with critical limits shall ensure that the acceptable level is not exceeded.

Action criteria for OPRPs shall be measurable or observable. Conformance with action criteria shall contribute to the assurance that the acceptable level is not exceeded.

8.5.4.3 Monitoring systems at CCPs and for OPRPs

At each CCP, a monitoring system shall be established for each control measure or combination of control measure(s) to detect any failure to remain within the critical limits. The system shall include all scheduled measurements relative to the critical limit(s).

For each OPRP, a monitoring system shall be established for the control measure or combination of control measure(s) to detect failure to meet the action criterion.

The monitoring system, at each CCP and for each OPRP, shall consist of documented information, including:

a) Measurements or observations that provide results within an adequate time frame;

b) Monitoring methods or devices used;

c) Applicable calibration methods or, for OPRPs, equivalent methods for verification of reliable measurements or observations (see 8.7);

d) Monitoring frequency;

e) Monitoring results;

f) Responsibility and authority related to monitoring;

g) Responsibility and authority related to evaluation of monitoring results.

At each CCP, the monitoring method and frequency shall be capable of timely detection of any failure to remain within critical limits, to allow timely isolation and evaluation of the product (see 8.9.4).

For each OPRP, the monitoring method and frequency shall be proportionate to the likelihood of failure and the severity of consequences.

When monitoring an OPRP is based on subjective data from observations (e.g. visual inspection), the method shall be supported by instructions or specifications.

Practical advice:

The significant food safety hazards identified by the hazard analysis have to be controlled using either OPRPs or CCPs. The correct functioning of the hazard control plan (HACCP/OPRP plan) should be included in the verification planning process.

An OPRP is a control measure or combination of control measures applied to prevent or reduce a significant food safety hazard to an acceptable level, and where action criterion and measurement or observation enable effective control of the process and/or product.

For each OPRP, the monitoring method and frequency shall be proportionate to the likelihood of any failure to meet action criterion and the severity of consequences.

A CCP is a step in the process at which control measure(s) is (are) applied to prevent or reduce a significant food safety hazard to an acceptable level, and defined critical limit(s) and measurement enable the application of corrections.

At each CCP, the monitoring method and frequency enable the timely detection of any failure to remain within critical limits, and allow for the timely isolation and handling of potentially unsafe products.

The control measures typically monitor processes through physical measures such as pH, time, temperature and observations by competent personnel.

One approach is to first determine which of the control measures identified are to be managed at CCPs. Those remaining must then be categorized as OPRPs. Figure 15 summarizes the relationship between OPRPs and CCPs.

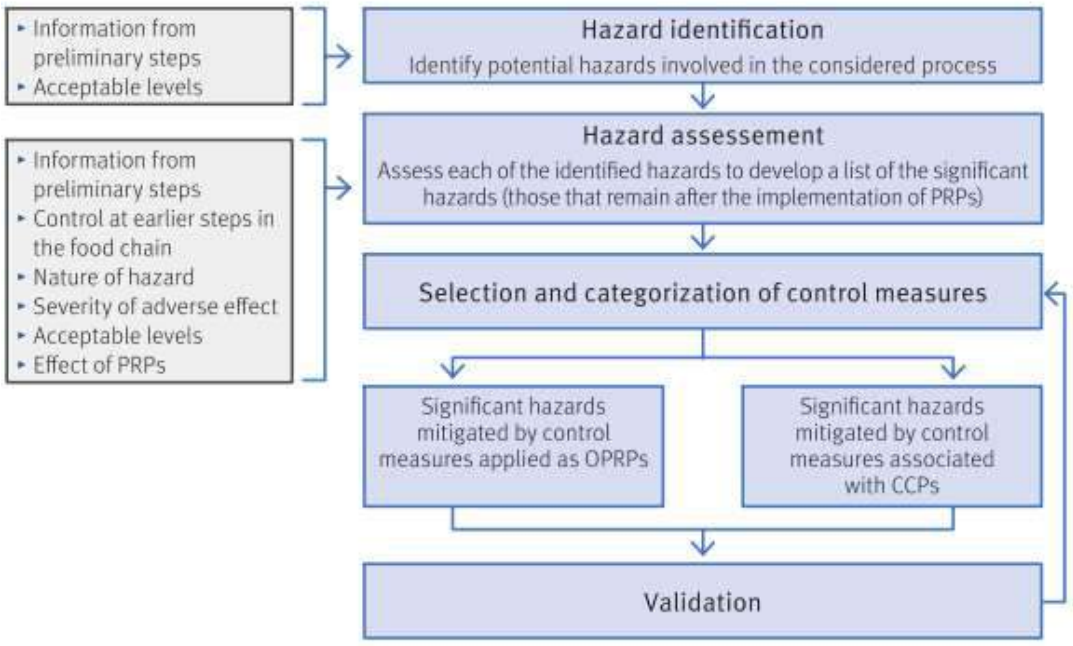


Figure 15: Categorize, manage, monitor and document the control measures

However, the categorization of control measures is not an exact discipline. The method used may vary depending on the organization, processes and products. The next step is implementing the control measures to be managed as OPRP(s) or at CCP(s).

The monitoring of OPRPs should be based on measurable or observable action criteria. Such criteria should correspond to any operational parameters used in the validation. Where action criterion is only observable (e.g. visual inspection), the observation process must be defined and documented (e.g. instructions, specifications). For each OPRP, the monitoring method and frequency shall be proportionate to the likelihood of any failure to meet action criterion(a) and the severity of consequences, and must be documented in the hazard control plan (see Sub-clause 8.5.4 of ISO 22000).

The management of CCP control measures is also defined in the hazard control plan. Monitoring of a CCP is based on the monitoring of established critical limits. Critical limits must be achievable as part of normal process operations and be validated as described earlier. For CCPs intended to control more than one significant food safety hazard, the critical limit(s) should be determined relative to each significant food safety hazard, and the most stringent limit applied in order to cover the worst-case scenario. At each CCP, the monitoring method and frequency must be capable of timely detection of any failure to remain within critical limits, to allow a timely isolation and evaluation of the product.

All results of monitoring (e.g. action criteria or critical limits) must be recorded by designated trained personnel.

Types of documented information supporting the implementation of the FSMS: example(s)

- Information on the methodology and parameters used to categorize the control measures into OPRPs and CCPs, including the rationale for the categorization shall be recorded
- A hazard control plan (HACCP/OPRP plan), comprising a sequential list of control measures (e.g. following the product flow), each of which includes:

- The name of the significant food safety hazard(s) that the control measure is intended to control
- A description of the monitoring procedure (parameter/method, limit(s), frequency)

- Monitoring records

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

Information on training of personnel in charge of the monitoring of action criteria for OPRPs and critical limits at each CCP

- Has the food safety team selected and documented a specific methodology to categorize control measures to be managed as OPRP(s) or at CCP(s)?
- Has the food safety team categorized each chosen control measure or combination of control measures?
- Has the food safety team established a hazard control plan (HACCP/OPRP plan) as controlled documented information?
- Has the food safety team determined action criterion/criteria for each OPRP and critical limit(s) at each CCP, and has it supplied the necessary instructions and support for its application?
- Do you have the monitoring records for the action criteria for OPRPs and for the critical limits at each CCP?
- Has the person in charge of monitoring been specifically trained for this procedure?

8.5.4.4 Actions when critical limits or action criteria are not met

The organization shall specify corrections (see 8.9.2) and corrective actions (see 8.9.3) to be taken when critical limits or action criterion are not met and shall ensure that:

a) The potentially unsafe products are not released (see 8.9.4);

b) The cause of nonconformity is identified;

c) The parameter(s) controlled at the CCP or by the OPRP is (are) returned within the critical limits or action criteria;

d) Recurrence is prevented.

The organization shall make corrections in accordance with 8.9.2 and corrective actions in accordance with 8.9.3.

8.5.4.5 Implementation of the hazard control plan

The organization shall implement and maintain the hazard control plan, and retain evidence of the implementation as documented information.

8.6 Updating the information specifying the PRPs and the hazard control plan

Following the establishment of the hazard control plan, the organization shall update the following information, if necessary:

a) Characteristics of raw materials, ingredients and product-contact materials;

b) Characteristics of end products;

c) Intended use;

d) Flow diagrams and descriptions of processes and process environment.

The organization shall ensure that the hazard control plan and/or the PRP(s) are up to date.

8.7 Control of monitoring and measuring

The organization shall provide evidence that the specified monitoring and measuring methods and equipment in use are adequate for the monitoring and measuring activities related to the PRP(s) and the hazard control plan.

The monitoring and measuring equipment used shall be:

a) Calibrated or verified at specified intervals prior to use;

b) Adjusted or re-adjusted as necessary;

c) Identified to enable the calibration status to be determined;

d) Safeguarded from adjustments that would invalidate the measurement results;

e) Protected from damage and deterioration.

The results of calibration and verification shall be retained as documented information. The calibration of all the equipment shall be traceable to international or national measurement standards; where no standards exist, the basis used for calibration or verification shall be retained as documented information.

The organization shall assess the validity of the previous measurement results when the equipment or process environment is found not to conform to requirements. The organization shall take appropriate action in relation to the equipment or process environment and any product affected by the nonconformance.

The assessment and resulting action shall be maintained as documented information.

Software used in monitoring and measuring within the FSMS shall be validated by the organization, software supplier or third party prior to use. Documented information on

validation activities shall be maintained by the organization and the software shall be updated in a timely manner.

Whenever there are changes, including software configuration/modifications to commercial off-the shelf software, they shall be authorized, documented and validated before implementation.

NOTE Commercial off-the-shelf software in general use within its designed application range can be considered to be sufficiently validated.

8.8 Verification related to PRPs and the hazard control plan

8.8.1 Verification

The organization shall establish, implement and maintain verification activities. The verification planning shall define purpose, methods, frequencies and responsibilities for the verification activities.

The verification activities shall confirm that:

a) The PRP(s) are implemented and effective;

b) The hazard control plan is implemented and effective;

c) Hazard levels are within identified acceptable levels;

d) Input to the hazard analysis is updated;

e) Other actions determined by the organization are implemented and effective.

The organization shall ensure that verification activities are not carried out by the person responsible for monitoring the same activities.

Verification results shall be retained as documented information and shall be communicated.

Where verification is based on testing of end product samples or direct process samples and where such test samples show nonconformity with the acceptable level of the food safety hazard (see 8.5.2.2), the organization shall handle the affected lot(s) of product as potentially unsafe (see 8.9.4.3) and apply corrective actions in accordance with 8.9.3.

8.8.2 Analysis of results of verification activities

The food safety team shall conduct an analysis of the results of verification that shall be used as an input to the performance evaluation of the FSMS (see 9.1.2).

Practical advice:

When an organization moves from a GHP/GMP-based system to a FSMS, a hazard analysis is required. In the FSMS, most of the GHP/GMP are likely to continue as PRPs and the organization may be required to implement new PRPs.

The objective of the PRPs' verification is to confirm that all the PRPs are implemented and operating as intended.

The verification should be made on-site by identified trained personnel under all operating conditions. They should be independent of the PRPs being verified, although they may be from the same work area or department.

The assessment of existing PRPs by the organization should be made through:

- Interviewing the manager(s) responsible for food safety operations
- Examining the available documented information (procedures, instructions and/or other documents)
- Examining the application of relevant existing practices

Examples of verification methods:

- Visual site inspection
- Environmental sampling (followed by testing and review of the results)
- Microbiological sampling (followed by testing and review of the results)
- Checking monitoring records (e.g. temperature)

Note: Internal audits can also be used.

The frequency of verification can be based on several factors, such as the variability of PRPs, variability and/or stability of the process, impact of correction time needed, feasibility, etc.

The verification results have to be documented.

Depending of the results of verification, it may be necessary to review the PRPs in place in the organization.

Types of documented information supporting the implementation of the FSMS: example(s)

- Results of the verification made for each identified PRP
- A report on the food safety audit or the compliance/non-compliance of the application of the PRPs

- Record(s) of actions taken in cases of non-compliance regarding the application of the PRPs

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

Have you verified the effective application of all identified PRPs?

Are the PRPs functioning as planned? If yes, how do you know?

8.9 Control of product and process nonconformities

8.9.1 General

The organization shall ensure that data derived from the monitoring of OPRPs and at CCPs are evaluated by designated persons who are competent and have the authority to initiate corrections and corrective actions.

8.9.2 Corrections

8.9.2.1 The organization shall ensure that when critical limits at CCP(s) and/or action criteria for OPRPs are not met, the products affected are identified and controlled with regard to their use and release.

The organization shall establish, maintain and update documented information that includes:

a) A method of identification, assessment and correction for affected products to ensure their proper handling;

b) Arrangements for review of the corrections carried out.

8.9.2.2 When critical limits at CCPs are not met, affected products shall be identified and handled as potentially unsafe products (see 8.9.4).

8.9.2.3 Where action criteria for an OPRP are not met, the following shall be carried out:

a) Determination of the consequences of that failure with respect to food safety;

b) Determination of the cause(s) of failure;

c) Identification of the affected products and handling in accordance with 8.9.4.

The organization shall retain results of the evaluation as documented information.

8.9.2.4 Documented information shall be retained to describe corrections made on nonconforming products and processes, including:

a) The nature of the nonconformity;

b) The cause(s) of the failure;

c) The consequences as a result of the nonconformity.

8.9.3 Corrective actions

The need for corrective actions shall be evaluated when critical limits at CCP(s) and/or action criteria for OPRPs are not met.

The organization shall establish and maintain documented information that specifies appropriate actions to identify and eliminate the cause of detected nonconformities, to prevent recurrence, and to return the process to control after a nonconformity is identified.

These actions shall include:

a) Reviewing nonconformities identified by customer and/or consumer complaints and/or regulatory inspection reports;

b) Reviewing trends in monitoring results that can indicate loss of control;

c) Determining the cause(s) of nonconformities;

d) Determining and implementing actions to ensure that nonconformities do not recur;

e) Documenting the results of corrective actions taken;

f) Verifying corrective actions taken to ensure that they are effective.

The organization shall retain documented information on all corrective actions.

8.9.4 Handling of potentially unsafe products

8.9.4.1 General

The organization shall take action(s) to prevent potentially unsafe products from entering the food chain, unless it can demonstrate that:

a) The food safety hazard(s) of concern is (are) reduced to the defined acceptable levels;

b) The food safety hazard(s) of concern will be reduced to identified acceptable levels prior to entering the food chain; or

c) The product still meets the defined acceptable level(s) of the food safety hazard(s) of concern despite the nonconformity.

The organization shall retain products that have been identified as potentially unsafe under its control until the products have been evaluated and the disposition has been determined.

If products that have left the control of the organization are subsequently determined to be unsafe, the organization shall notify relevant interested parties and initiate a withdrawal/recall (see 8.9.5).

The controls and related responses from relevant interested parties and authorization for dealing with potentially unsafe products shall be retained as documented information.

8.9.4.2 Evaluation for release

Each lot of products affected by the nonconformity shall be evaluated.

Products affected by failure to remain within critical limits at CCPs shall not be released, but shall be handled in accordance with 8.9.4.3.

Products affected by failure to meet action criterion for OPRPs shall only be released as safe when any of the following conditions apply:

a) Evidence other than the monitoring system demonstrates that the control measures have been effective;

b) Evidence shows that the combined effect of the control measures for that particular product conforms to the performance intended (i.e. identified acceptable levels);

c) The results of sampling, analysis and/or other verification activities demonstrate that the affected products conform to the identified acceptable levels for the food safety hazard(s) concerned.

Results of evaluation for release of products shall be retained as documented information.

8.9.4.3 Disposition of nonconforming products

Products that are not acceptable for release shall be:

a) Reprocessed or further processed within or outside the organization to ensure that the food safety hazard is reduced to acceptable levels; or

b) Redirected for other use as long as food safety in the food chain is not affected; or

c) Destroyed and/or disposed as waste.

Documented information on the disposition of nonconforming products, including the identification of the person(s) with approving authority shall be retained.

8.9.5 Withdrawal/recall

The organization shall be able to ensure the timely withdrawal/recall of lots of end products that have been identified as potentially unsafe, by appointing competent person(s) having the authority to initiate and carry out the withdrawal/recall.

The organization shall establish and maintain documented information for:

a) Notifying relevant interested parties (e.g. statutory and regulatory authorities, customers and/or consumers);

b) Handling withdrawn/recalled products as well as products still in stock;

c) Performing the sequence of actions to be taken.

Withdrawn/recalled products and end products still in stock shall be secured or held under the control of the organization until they are managed in accordance with 8.9.4.3.

The cause, extent and result of a withdrawal/recall shall be retained as documented information and reported to the top management as input for the management review (see 9.3).

The organization shall verify the implementation and effectiveness of withdrawals/recalls through the use of appropriate techniques (e.g. mock withdrawal/recall or practice withdrawal/recall) and retain documented information.

Practical advice:

Product withdrawal/recall can be very chaotic. Therefore, organizations should develop a withdrawal/recall plan that addresses all the activities that have to be conducted during the withdrawal/recall.

For example:

- Making a decision to initiate a withdrawal/recall
- Developing a plan to effectively recover products that have lef the control of the organization
- Developing a plan to inform customers and the media about the withdrawal/recall
- Informing regulatory agencies of the withdrawal/recall
- Developing a plan to determine the effectiveness of the withdrawal/recall

- Developing a plan to handle and properly dispose of unsafe products

The key steps in conducting a successful withdrawal/recall, which should be also included in the execution of the mock withdrawal/recall, are:

- Convening a withdrawal/recall committee
- Assessing the hazard
- Determining the nature of withdrawal/recall
- Determining who should be notified of the withdrawal/recall
- Determining the mechanics of notification and recovery
- Post p withdrawal/recall reporting

An efficient and effective system of traceability is indispensable when carrying out a product withdrawal/recall.

The organization must be compliant with all regulatory requirements for withdrawal/recall. These requirements may include contacting regulatory authorities, informing customers of the withdrawal/recall, conducting the withdrawal/recall, and keeping records to determine the effectiveness of the withdrawal/recall. If the organization exports food, withdrawal/recall plans should be developed to enable the withdrawal/recall of products in the targeted export countries.

Personnel with the authority to launch a withdrawal/recall should be identified.

The organization should define and maintain a contact list for the withdrawal/ recall activities (e.g. distributors, wholesalers, retailers, storage and distribution network, suppliers, authorities, the media).

Personnel executing the withdrawal/recall should be designated, trained and competent.

Establish documented information for handling unsafe products that are impacted by the withdrawal/recall:

- From sources beyond the control of organization (e.g. distributors, wholesalers, retailers, consumers)
- From sources under the control of the organization, including in-stock products (e.g. storage and distribution network)

Ensure that the product does not accidentally re-enter the food chain and does not contaminate other foods during handling.

A simulated/mock withdrawal/recall should be used to verify the effectiveness of the withdrawal/recall mechanism. The organization should identify performance standards to conduct a simulated/mock withdrawal/recall (e.g. the number of hours required determine the location of the product involved in the withdrawal/ recall). The organization should ensure that it can conduct a simulated/mock withdrawal/recall by tracing one step backwards to the supplier and one step forward to the customer.

For a mock withdrawal/recall, there is no need to directly involve the customers or authorities, but to test just the interfaces with customers and authorities. Following a genuine or simulated/mock withdrawal/recall, the withdrawal/recall team should meet to evaluate performance as part of the continual improvement process (communication, quantity and location of withdrawn/recalled products, efficiency).

Implementation of the FSMS: example(s)

- Documented information describing the withdrawal/recall mechanisms (what to do, who, when and how)
- Updated contact information of all members of the withdrawal/recall team
- Updated record (list) of external contacts (both suppliers and customers)
- Documented information for handling unsafe products impacted by the withdrawal/recall
- Records of each withdrawal/recall event (including the cause, extent and success of withdrawal/recall)
- Evaluation at regular intervals of the effectiveness of the withdrawal/ recall mechanism
- Meeting minutes from all post-withdrawal/recall reviews
- Copy of media releases, if relevant

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Have you defined the mechanism to ensure the withdrawal/recall of products?

- Has the withdrawal/recall procedure been tested for effectiveness?
- Are the contacts for withdrawal/recall valid and up to date?

9. Performance evaluation

9.1 Monitoring, measurement, analysis and evaluation

9.1.1 General

The organization shall determine:

a) What needs to be monitored and measured?

b) The methods for monitoring, measurement, analysis and evaluation, as applicable, to ensure valid results;

c) When the monitoring and measuring shall be performed;

d) When the results from monitoring and measurement shall be analyzed and evaluated;

e) Who shall analyze and evaluate the results from monitoring and measurement.

The organization shall retain appropriate documented information as evidence of the results.

The organization shall evaluate the performance and the effectiveness of the FSMS.

9.1.2 Analysis and evaluation

The organization shall analyze and evaluate appropriate data and information arising from monitoring and measurement, including the results of verification activities related to PRPs and the hazard control plan (see 8.8 and 8.5.4), the internal audits (see 9.2) and external audits.

The analysis shall be carried out:

a) To confirm that the overall performance of the system meets the planned arrangements and the FSMS requirements established by the organization;

b) To identify the need for updating or improving the FSMS;

c) To identify trends which indicate a higher incidence of potentially unsafe products or process failures;

d) To establish information for planning of the internal audit program related to the status and importance of areas to be audited;

e) To provide evidence that corrections and corrective actions are effective.

The results of the analysis and the resulting activities shall be retained as documented information.

The results shall be reported to top management and used as input to the management review (see 9.3) and the updating of the FSMS (see 10.3).

NOTE Methods to analyze data can include statistical techniques.

9.2 Internal audit

9.2.1 The organization shall conduct internal audits at planned intervals to provide information on whether the FSMS:

a) Conforms to:

1) The organization's own requirements for its FSMS;

2) The requirements of this document;

b) Is effectively implemented and maintained.

9.2.2 The organization shall:

a) Plan, establish, implement and maintain (an) audit program (s), including the frequency, methods, responsibilities, planning requirements and reporting, which shall take into consideration the importance of the processes concerned, changes in the FSMS, and the results of monitoring, measurement and previous audits;
b) Define the audit criteria and scope for each audit;
c) Select competent auditors and conduct audits to ensure objectivity and the impartiality of the audit process;
d) Ensure that the results of the audits are reported to the food safety team and relevant management;
e) Retain documented information as evidence of the implementation of the audit program and the audit results;
f) Make the necessary correction and take the necessary corrective action within the agreed time frame;
g) Determine if the FSMS meets the intent of the food safety policy (see 5.2) and objectives of the FSMS (see 6.2).

Follow-up activities by the organization shall include the verification of the actions taken and the reporting of the verification results.

NOTE ISO 19011 provides guidelines for auditing management systems.

Practical advice:

Food companies are generally involved in a large number of audits (in-house/external audits). The scope of internal audits may include: pre-operational activities, facilities, personnel hygiene, pest control audits, etc. All of these audits should be linked to form an audit system. For example, one input into the ISO 22000-based internal audit are the corrective actions identified during other audits. This linkage allows the auditor to determine if the corrective actions are effective.

It is not necessary for the ISO 22000 internal audit to be completed at one time.

The organization may wish to implement it over a full year. However, best practice is that all clauses of the ISO 22000 should be audited at least once per year before the certification audit.

The organization must establish a frequency of auditing the various clauses of ISO 22000. Some clauses, such as management review, may be audited only once a year, however, others, such as the verification of CCPs, should be audited more frequently.

Due to the importance of the processes, the audit planning should use documented information (e.g. procedures) and sectors of activity, relative to their importance and the risks incurred.

The audit reports must be easy to use as they are a tool for improvement and for on-site activity.

When conducting internal audits (see Sub-clause 9.2 of ISO 22000) sound audit principles should be observed. Auditors should be competent to perform the audit. They should be independent of the work or processes being audited, although they may be from the same work area or department. In a small business with only one or two people at management level, this requirement may not be achievable. In such case, it is suggested that, in carrying out the duties of an auditor, the manager should step back from direct involvement in the business operations and be very objective about the audit.

Seeking the cooperation of another small business could be an alternative approach. In this way, each organization would audit the other organization. This can be valuable if there are good relations between the two organizations.

External parties (e.g. professional organizations, consultants) might also be able to provide independent auditors.

When conducting the ISO 22000-based internal audit, the internal auditor may want to use the same audit techniques as those used by the certification body auditor. This can help employees to familiarize themselves with participating in a management system audit.

Types of documented information supporting the implementation of the FSMS: example(s)

- List of qualified auditors, including competency and training records
- Internal audit documented information (procedure)
- Internal audit program
- Internal audit reports, including findings (conformity and nonconformity)
- Corrections and corrective actions regarding the nonconformity findings
- Follow-up report on the completion and evidence provided, regarding the effective closure of the nonconformity findings

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Have you described the internal audit documented information (procedure)?
- Are your internal auditors trained and competent for this exercise?
- Have you respected your program of internal audits?
- Have you used nonconformities identified by internal audits to correct and/or improve your practices and the FSMS of your organization?

9.3 Management review

9.3.1 General

Top management shall review the organization's FSMS, at planned intervals, to ensure its continuing suitability, adequacy and effectiveness.

9.3.2 Management review input

The management review shall consider:

a) The status of actions from previous management reviews;

b) Changes in external and internal issues that are relevant to the FSMS, including changes in the organization and its context (see 4.1);

c) Information on the performance and the effectiveness of the FSMS, including trends in:

1) Result of system updating activities (see 4.4 and 10.3);

2) Monitoring and measurement results;

3) Analysis of the results of verification activities related to PRPs and the hazard control plan (see 8.8.2);

4) Nonconformities and corrective actions;

5) Audit results (internal and external);

6) Inspections (e.g. regulatory, customer);

7) The performance of external providers;

8) The review of risks and opportunities and of the effectiveness of actions taken to address them (see 6.1);

9) The extent to which objectives of the FSMS have been met;

d) The adequacy of resources;

e) Any emergency situation, incident (see 8.4.2) or withdrawal/recall (see 8.9.5) that occurred;

f) Relevant information obtained through external (see 7.4.2) and internal (see 7.4.3) communication, including requests and complaints from interested parties;

g) Opportunities for continual improvement.

The data shall be presented in a manner that enables top management to relate the information to stated objectives of the FSMS.

9.3.3 Management review output

The outputs of the management review shall include:

a) Decisions and actions related to continual improvement opportunities;

b) Any need for updates and changes to the FSMS, including resource needs and revision of the food safety policy and objectives of the FSMS.

The organization shall retain documented information as evidence of the results of management reviews.

Practical advice:

The objective of the management review is to assess whether the FSMS has been operating in an effective manner, and if the goals and objectives of the FSMS have been met. Using this information, top management provides direction on how to improve the FSMS, and establishes further food safety goals.

Types of documented information supporting the implementation of the FSMS: example(s)

- Documented information (procedure) for corrective actions (description of the method of improvement)
- Record form listing improvement actions and their implementation.
- Information sheets on corrective actions
- Management review reports
- Minutes of food safety team meetings

What questions do you need to ask yourself (to which an affirmative reply is required) before continuing?

- Do you have corrective actions for nonconformities (internal/external) or customer complaints?
- Will the revised planned actions improve the FSMS?
- Does the frequency of the FSMS performance evaluation enable its continual improvement and updating

10. Improvement

10.1 Nonconformity and corrective action

10.1.1 When a nonconformity occurs, the organization shall:

a) React to the nonconformity and, as applicable:

1) Take action to control and correct it;

2) Deal with the consequences;

b) Evaluate the need for action to eliminate the cause(s) of the nonconformity, in order that it does not recur or occur elsewhere, by:

1) Reviewing the nonconformity;

2) Determining the causes of the nonconformity;

3) Determining if similar nonconformities exist, or could potentially occur;

c) Implement any action needed;

d) Review the effectiveness of any corrective action taken;

e) Make changes to the FSMS, if necessary.

Corrective actions shall be appropriate to the effects of the nonconformities encountered.

10.1.2 The organization shall retain documented information as evidence of:

a) The nature of the nonconformities and any subsequent actions taken;
b) The results of any corrective action.

10.2 Continual improvement

The organization shall continually improve the suitability, adequacy and effectiveness of the FSMS.

Top management shall ensure that the organization continually improves the effectiveness of the FSMS through the use of communication (see 7.4), management review (see 9.3), internal audit (see 9.2), analysis of results of verification activities (see 8.8.2), validation of control measure(s) and combination(s) of control measure(s) (see 8.5.3), corrective actions (see 8.9.3) and FSMS updating (see 10.3).

10.3 Update of the food safety management system

Top management shall ensure that the FSMS is continually updated. To achieve this, the food safety team shall evaluate the FSMS at planned intervals. The team shall consider whether it is necessary to review the hazard analysis (see 8.5.2), the established hazard control plan (see 8.5.4) and the established PRPs (see 8.2). The updating activities shall be based on:

a) Input from communication, external as well as internal (see 7.4);

b) Input from other information concerning the suitability, adequacy and effectiveness of the FSMS;

c) Output from the analysis of results of verification activities (see 9.1.2);

d) Output from management review (see 9.3).

System updating activities shall be retained as documented information and reported as input to the management review (see 9.3).

5. References

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ISO 9000:2015, Quality management systems — Fundamentals and vocabulary

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ISO 19011, Guidelines for auditing management systems

ISO/TS 22002 (all parts), Prerequisite programs on food safety

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ISO Guide 73:2009, Risk management — Vocabulary

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https://www.food.gov.uk/sites/default/files/media/document/fitnesstoworkguide.pdf

6. Annexes

Annex 1 – Standards and specifications that must be met in potable water

1. Natural properties

	Parameters	Permissible Limits
1	color	Null
2	Taste	Accepted
3	Odor	Null
4	Turbidity	1 (NTU)
5	pH	8.5 : 6.5

2. Inorganic substances that have an effect on palatability

	Parameters	Permissible Limits (mg/l)
1	Dissolved Solids at 120 □C	1000
2	Total hardness as $CaCO_3$	500
3	Calcium Hardness as $CaCO_3$	350
4	Magnesium Hardness as $CaCO_3$	150
5	Sulfate So_4	250
6	Chlorides Cl	250
7	Iron Fe	0.3
8	Manganese Mn	0.4
9	Copper Cu	2
10	Zinc Zn	3
11	Sodium Na	200
12	Aluminium Al	0.2

3. Chemicals that have an impact on public health

a) Inorganic materials

	Parameters		Permissible Limits (mg/l)
1	Lead	Pb	0.01
2	Mercury	Hg	0.001
3	Arsenic	As	0.01
4	Cyanide	CN	0.05
5	Cadmium	Cd	0.003
6	Selenium	Se	0.01
7	Chromium	Cr	0.05
8	Ammonia as	(NH3)	.05
9	Nitrate as	(NO3)	45
10	Nitrite as	(NO2)	0.2
11	Fluorides	F	0.8
12	Antimony	Sb	0.02
13	Barium	Ba	0.7
14	Boron	B	0.5
15	Nickel	Ni	0.02
16	Molybdenum	Mo	0.07

b) Organic Materials

	Parameters	Permissible Limits (mg/l)
1	Alachlor	0.02
2	Aldicarb	0.01
3	Aldrin and dieldrin	0.00003
4	Atrazine	0.002
5	Bentazone	0.03
6	Carbofuran	0.007
7	Chlordane	0.0002
8	Chlorotoluron	0.03
9	D.D.T	0.001
10	1,2 Dibromo 3- chloropropane (DBCP)	0.001
11	2,4- Dichlorophenoxyacetic acid (2,4 D)	0.03
12	1,2Dichloropropa (1,2- DCP)	0.02
13	1,3 - Dichloropropene (1,3-DCP)	0.02
14	Hexachlorobenzene	0.001
15	Isoproturon	0.009
16	Lindane	0.002
17	Methylchlorophenoxyacetic acid (MCPA)	0.002
18	Methoxychlor	0.02
19	Metolachlor	0.01
20	Molinate	0.006
21	Pendimethalin	0.02
22	Pentachlorophenol	0.009
23	Permethrin	.002
24	Propanil	0.02
25	Pyriproxyfen	0.3
26	Simazine	0.002
27	Trifluralin	0.02
28	DB-2,4	0.09
29	2,4- Dichloroprop	0.1
30	Fenoprop	0.009
31	Mecoprop	0.01
32	2,4,5-T	0.009
33	Monochloramine	3
34	Chlorine	5
35	Bromate	0.01
36	Chlorite	0.7
37	2,4,6- Trichlorophenol	0.2

	Parameters	Permissible Limits (mg/l)
38	Trihalomethanes	0.1
39	Dichloroacetate	0.05
40	Trichloroacetate	.01
41	Trichloroacetaldehyde	0.01
42	Dichloroacetonitrile	0.02
43	Dibromoacetonitrile	0.07
44	Trichloroacetonitrile	0.001
45	Carbon tetrachloride	0.004
46	Dichloromethane	0.02
47	1,2 Dichloroethane	0.03
48	1,1,1 Trichloroethane	0.07
49	Vinyl Chloride	0.0003
50	1,1 Dichloroethene	0.03
51	1,2 Dichloroethene	0.05
52	Tetrachloroethene	0.04
53	Toluene	0.7
54	Benzene	0.01
55	Benzo[a]pyrene	0.0007
56	Monochlorobenzene	0.3
57	1,2 Dichlorobenzene	1
58	1,4 Dichlorobenzene	0.3
59	Trichlorobenzenes (Total)	0.02
60	Di (2-ethylehexyle)adipate	0.08
61	Di (2-ethylehexyle)phthalate	0.008
62	crylamide	0.0005
63	Epichlorohydrin	0.0004
64	Hexachlorobutadiene	0.0006
65	Edetic acid (EDTA)	0.6
66	Triacetic Nitril	0.2
67	Endrin	0.0006
68	Chlorate	0.7
69	Bromoform	0.1
70	Chloroform	3.0
71	Chloralhydrate	0.01
72	Dimethoate	0.006
73	Formaldehyde	0.9
74	Cyanogen Chloride	0.007
75	Tributyltin Oxide	0.002
76	Phenol	0.002
77	Di-and Trichloramine	0.005
78	Xylenes	0.5

	Parameters	Permissible Limits (mg/l)
79	Ethylbenzene	0.3
80	Styrene	0.02
81	Bromodichloromethane	0.06
82	Trichloroethene	0.02

4. Microbiological criteria

	Type of examination	Measurement method used	Permissible Limits
1	Total bacterial count	Poured plate method	• Not more than 50 cells/1 cm3 at 37°C for 24 hours • Not more than 50 cells/1 cm3 at 22 °C for 48 hours
2	Evidence of total coliform contamination (total coliform form)	MF or MPN	• 95% of the samples examined during the year must be completely free of bacteria in 100 cm3 of Total Coli sample form colon. • Also, none of the samples must contain more than 2 cells/100 cm3, provided that this is not repeated in successive samples from the same source.
	Colon bacteria faecalis (Basil Typical colon)		All samples must be free of typical Bacillus coli
	Faecal streptococci bacteria		All samples must be free of fecal streptococcus bacteria
3	Biological examination • When examining water samples for algae		The percentage of microcystin should not exceed 1 microgram/L. This analysis is performed in the event of a sudden growth of blue-green algae or the presence of High numbers of them.
	Upon examination Water Microscopically		It must be completely free of protozoa and all stages of disease-causing worms.

5. Radioactive materials

	Type of examination	Permissible Limits
1	(α) derivatives	0.1 picocuries/liter
2	(β) derivatives	1.0 picocuries/liter

Annex 2 - Blank HACCP forms

FORM 1

PRODUCT DESCRIPTION

Company Name:	**Title: Form 1 – Product Description**	
	Completed/Amended By:	**Date:**
	Approved By:	**Date:**
PRODUCT DESCRIPTION		
1. Product Name		
2. Important Product Characteristics		
3. End Use		
4. Packaging		
5. Shelf life		
6. How & Where it will be sold		
7. Labelling instructions		
8. Transportation and Special distribution control		

FORM 2

PRODUCT INGREDIENTS AND INCOMING MATERIAL

Company Name:	Title: **Form 2 – List of Product Ingredients and Incoming Materials**	
	Completed/Amended By:	Date:
	Approved By:	Date:

LIST OF PRODUCT INGREDIENTS AND INCOMING MATERIALS

Market Product	**Other Ingredients**
Packaging Materials & Accessories	**Other Incoming Materials**

FORM 3

FLOW DIAGRAM

PRODUCT NAME(S):

DATE: _____ APPROVED BY: _____

FORM 4

PLANT SCHEMATIC/FLOOR PLAN

PRODUCT NAME(S):

DATE: _____ APPROVED BY: _____

FORM 5

HAZARD IDENTIFICATION: BIOLOGICAL HAZARDS

PRODUCT NAME(S):

List all biological hazards related to ingredients, incoming material, processing, product flow, etc.

Identified biological hazards	**Controlled at**

DATE: _____ APPROVED BY: _____

FORM 6

HAZARD IDENTIFICATION: CHEMICAL HAZARDS

PRODUCT NAME(S):

List all chemical hazards related to ingredients, incoming material, processing, product flow, etc.

Identified chemical hazards	**Controlled at**

DATE: _____ APPROVED BY: _____

FORM 7

HAZARD IDENTIFICATION: PHYSICAL HAZARDS

PRODUCT NAME(S):

List all physical hazards related to ingredients, incoming material, processing, product flow, etc.

Identified physical hazards	**Controlled at**

DATE: _____ APPROVED BY: _____

FORM 8

CCP DETERMINATION

Process step/ incoming material	**Category and identified hazard**	**Question 1**	**Question 2**	**Question 3**	**Question 4**	**CCP number**

FORM 9

UNADDRESSED HAZARDS

PRODUCT NAME(S):

List any biological, chemical and/or physical hazards that are not controlled at the establishment.

Unaddressed hazard from previous list	**Identified methods of addressing the hazard (e.g. cooking Instructions, public education, use by date, etc.)**

DATE: _____ APPROVED BY: _____

FORM 10

HACCP PLAN

PRODUCT NAME(S):

Process step	**CCP No.**	**Hazard description**	**Critical limits**	**Monitoring procedures**	**Deviation procedures**	**HACCP records**

DATE: _____ APPROVED BY: _____

Annex 3 – Food Safety Checklist

Prepared by: **Date:**

Sat. = When checked and satisfactory **Unsat. = When checked and unsatisfactory**

Parameters	**Sat**	**Unsat.**
Delivery of food		
Documentation of certificate of origin, receipts, and expiry date of goods checked	■	■
Cleanliness of delivery area	■	■
Comments:		
Garbage area		
Maintenance of structure	■	■
Cleanliness of structure	■	■
Insects absent	■	■
Rodents absent	■	■
Collection frequency	■	■
Comments:		
Washing-up area		
Maintenance of fittings	■	■
Cleanliness of fittings	■	■
Pre-scraping carried out	■	■
Dish washer provided	■	■
Machine temperatures adequate, rinse temperatures above 82˚C	■	■
Equipment sanitized by chemical or heat (60˚C) if hand washed	■	■
Tap water of sufficient quantity	■	■
Protective gloves available for manual dish washing	■	■
Comments:		

Parameters	Sat	Unsat.
Clean equipment and utensil storage		
Maintenance and structure	■	■
Cleanliness of structure	■	■
Maintenance of fittings	■	■
Cleanliness of fittings	■	■
Stored equipment protected from dust and dirt	■	■
Proper colour-coded wipe/polish cloths available and used	■	■
Comments:		
Bulk dry store		
Maintenance of structure	■	■
Cleanliness of structure	■	■
Maintenance of fittings	■	■
Cleanliness of fittings	■	■
Cleanliness of stored goods	■	■
Temperature satisfactory	■	■
No goods stored on the ground/floor	■	■
Comments:		
Cold rooms and refrigerators		
Maintenance of structure	■	■
Cleanliness of structure	■	■
Cleanliness of shelves	■	■
Food in cold room stored, no more than 10˚C	■	■
Fridge temperature below 5˚C		
Raw and cooked foods adequately separated and covered		
Thermometer provided and in working order		
Door seals clean and in good condition		

Parameters	**Sat**	**Unsat.**
Temperature log kept and satisfactory (in hot areas, morning and evening temperature is not adequate; should include reading from the hottest part of the day during summer season)		
Comments:	■	■
	■	■
Freezers	■	■
Maintenance of structure	■	■
Cleanliness of structure	■	■
Cleanliness of shelves	■	■
Food stored above floor level		
Raw and cooked foods adequately separated and covered		
Door seals clean and in good condition		
Frozen foods thawed in cold room before use	■	■
Temperature below -18˚C	■	■
Temperature log kept and satisfactory	■	■
Thermometer provided and in working order	■	■
Comments:	■	■
	■	■
Kitchen	■	■
Maintenance of structure		
Cleanliness of structure		
Maintenance of fittings		
Cleanliness of fittings	■	■
Sink provided	■	■
Room temperature satisfactory during preparation of meals, ambient temperature around 26˚C	■	■
Sufficient hot water at the correct temperature provided	■	■
Drains sufficient and working		
Well lit work surfaces		
Cleaning program in place and well communicated to staff		

Parameters	**Sat**	**Unsat.**
Ventilation working satisfactorily	■	■
Ventilator hoods have grease filters	■	■
Designated hand washing sinks with liquid soap, pedal bin and paper towels, water temperature between 45 and 49˚C	■	■
Comments:		
Beverage/ice area		
Maintenance of structure	■	■
Cleanliness of structure	■	■
Maintenance of fittings	■	■
Cleanliness of fittings	■	■
Water supply to ice machine satisfactory	■	■
Ice scoop stored satisfactorily	■	■
Cold drinks machine regularly dismantled and sanitized	■	■
Comments:		
Toilets		
Maintenance of structure	■	■
Cleanliness of structure	■	■
Maintenance of fittings	■	■
Cleanliness of fittings	■	■
Aerially disconnected from food production area	■	■
Hot and cold water provided	■	■
Soap and nail brushes provided	■	■
Single user towels provided	■	■
‘NOW WASH YOUR HANDS’ sign displayed	■	■
Floors dry	■	■
Comments:		

Parameters	Sat	Unsat.
Miscellaneous overall		
Kitchen/dining facilities sufficient for the number of people served	■	■
Kitchen staff sufficient for the number of meals prepared	■	■
Changing facilities provided for staff	■	■
No equipment or pots stored directly on the floor	■	■
Electronic fly killers installed	■	■
Premises rodent/animal proofed	■	■
Full air-conditioning provided	■	■
Food expiry dates satisfactory	■	■
Pest control satisfactory	■	■
Water supply safe for drinking	■	■
Date of last water samples taken	■	■
Power supplies properly maintained	■	■
Cutting and chopping boards colour coded	■	■
Chopping knives colour coded	■	■
Comments:		
Procedures		
Written cleaning schedule in use	■	■
Worktops, cutting boards and other small equipment sanitized after use	■	■
Re-usable dry stores items examined before re-use		
Stock rotation of perishable items		
Perishable out of refrigeration to a minimum		
Frozen meat/fish/poultry defrosted in the refrigerator		
Rice to be used is freshly cooked		
Bain-maries/heating cupboards/hot plates working and at correct temperatures		
'NO SMOKING' sign in food production area		
'NO SMOKING' in food production areas enforced		

Parameters	**Sat**	**Unsat.**
Toxic items (cleaning materials) labelled correctly and stored in proper places	■	■
Safety data sheets of cleaning agents available in the correct language	■	■
Contents of opened food cans transferred to proper containers once opened	■	■
Main rule: food should be cooked hot and served hot: cooked food not allowed to reach a temperature below 63˚C	■	■
Cooked food has reached a temperature of at least 75˚C before being transferred to bain-maries	■	■
Thermometers and probes, including probe wipes, available to check food temperature	■	■
Basic first-aid equipment available to kitchen staff	■	■
Firefighting equipment available and working	■	■
Fire escapes not blocked	■	■
Comments:		
	■	■
Staff		
Appearance	■	■
Protective clothing, including shoes (not open sandals), and light coloured uniforms	■	■
Protective clothing and uniforms properly laundered	■	■
Head coverings	■	■
Medically examined prior to employment and then at least yearly	■	■
Stool tests included in medical examination	■	■
Infected food handlers excluded from work until cleared	■	■
Food handlers vaccinated (specify according to local regulation)	■	■
Comments:		
Corrective actions to be taken		

Annex 4 – Food Hygiene Inspection Checklist

Parameters	Yes / No
Hand washing facilities	
Are wash hand basins readily accessible and clean, and free of utensils/food waste?	
Is there sufficient hot (43–49˚C) and cold water?	
Have soap and drying facilities been supplied and replenished?	
Are wash hand basins installed with taps that are not hand operated (e.g. surgeon's taps or foot-operated)?	
Storage and display temperature control—chilled and frozen	
Are all refrigerators holding food at or below 5˚C?	
Are all freezers holding food at or below -18˚C?	
Are refrigerators and freezers loaded to ensure that there is unobstructed air flow?	
Are the door seals of all chillers and freezers clean and intact?	
Are all the evaporator fins free from a build-up of ice?	
Can the emergency door release of walk-in refrigerators and freezers be operated effectively?	
Are storage temperatures recorded a minimum of three times a day and documents readily accessible?	
Are actual food temperatures being taken (using probe or infra-red thermometers) and recorded?	
Is corrective action taken and noted when correct food storage/display temperatures have not been achieved?	
Are chilled foods not exposed to ambient temperature for more than 20 minutes during preparation and storage?	
Is the cold display equipment maintaining food at a temperature of 5˚C or below?	
Are cold foods transferred to remote canteens in insulated boxes?	
Salad and fruit preparation	
Is the water used for salad preparation of drinking-water quality (potable)?	
Is a chemical sanitizer available and used to disinfect salad products and fruit (excluding oranges, etc. where the peel isn't eaten)?	
Is the strength of the sanitizer checked (e.g. are test strips available to confirm this)?	
Are damaged/poor quality fruit and salads removed prior to sanitizing?	
Temperature control—cooking	
Are food temperatures checked immediately after cooking? (Should be 75˚C or above)	

Parameters	Yes / No
Temperature control—cooking	
Are actual food temperatures being taken (using probe or infra-red thermometers) and recorded?	
Is corrective action taken and noted when correct cooking temperature has not been achieved?	
Does cooking start less than 5 hours before service starts?	
Is everything cooked today for service today?	
Hot holding and hot display	
Is hot holding/hot display equipment turned on at least an hour before food is placed into it, and checked each hour that it is in use?	
Is the hot holding/hot display equipment maintaining food at a temperature of 63˚C or above?	
Are actual hot display food temperatures being recorded and records readily accessible?	
Is corrective action taken and noted when the correct food storage temperature has not been achieved?	
Are the hot holding cabinets in a clean, serviceable condition (e.g. door seals clean, undamaged and in contact with the door)?	
Are the water reservoirs for the hot holding cabinets filled and maintained with hot water during use?	
Are hot foods transferred to remote canteens in insulated boxes?	
Indicators of heating, ventilation and air-conditioning (HVAC) failures	
Are doors and windows closed in air-conditioned food preparation areas?	
Is the air temperature in food preparation areas below 25˚C?	
Are grease filters clean and present in the extraction hoods?	
Cross-contamination	
Are color-coded cleaning cloths available (e.g. RED=raw, BLUE=cooked/ready to eat, YELLOW=toilets)?	
Are color-coded chopping boards available (e.g. RED=raw, BLUE=fish, GREEN=salads, WHITE=ready to eat)?	
Are color-coded knives available (e.g. RED=raw, BLUE=fish, GREEN=salads, BLACK=ready to eat)?	
Is the color-coded equipment being used correctly as above?	
Are chopping boards in good condition (e.g. free from deep scoring)?	
Physical/chemical contaminants	
Are glass objects in the food production/service areas (e.g. bottles, glass shelves or sneeze guards) free from damage or chips?	
Are glass breakages (including ceramics) recorded?	

Parameters	Yes / No
Are all lights provided with intact diffuser covers?	
Are the diffusers free from dead insects?	
Is food kept above floor level (e.g. stackable containers of meat or prepared vegetables)?	
Are bags of raw ingredients stored on impervious material pallets (not wood)?	
Are bagged products, once opened, decanted into storage bins to avoid pests?	
Are cleaning chemicals and equipment kept in a separate store away from food storage and preparation areas?	
Personal hygiene	
Do food handlers wash their hands on entering a food preparation room? (Observe)	
Do food handlers wash their hands between handling raw and ready-to-eat foods? (Observe)	
Check the hands of 5 food handlers. Are cuts protected by a blue plaster?	
Are food handlers free from jewelry (a plain wedding band and plain sleeper earrings are acceptable)?	
Are food handlers free from excessive cosmetics and perfume?	
Is suitable headwear for hair provided and used by everyone in the kitchen?	
Are uniforms in an undamaged, clean condition?	
Provision of hot water	
Is hot water continuously available for pot washing (e.g. does not run out)?	
Is the temperature of water at pot/dish washing sinks at or above 60˚C?	
Is the automated dishwasher rinse cycle at or above 82˚C?	
Cleaning	
Is the cleaning schedule followed?	
Is ‘clean as you go’ appropriately implemented (e.g. spot cleaning)?	
Is detailed cleaning of utensils and equipment performed to an acceptable standard?	
Is general cleaning (e.g. walls, tiles, floors, etc.) performed to an acceptable standard?	
Pest control	
Are the facilities free from flying insects?	

Parameters	**Yes / No**
Is the facility free of the evidence of pest activity (e.g. no droppings, insect bodies, fur, feathers, and product damage)?	
Are all open windows fitted with a fly screen?	
Are all electronic fly killers switched on?	
Training	
Are routine toolbox talks being conducted and recorded?	
Refuse arrangements	
Do waste bins have lids?	
Are kitchen waste bins pedal operated?	
Are waste bins positioned close to wash hand basins and work benches?	
Are waste bins emptied before they are overflowing?	
Is the external waste holding area clean and tidy?	
Goods receipt	
Are produce temperatures, shelf life dates and packaging condition checked and recorded for each delivery?	
Are accepted chilled products received at 5˚C or lower?	
Are accepted frozen goods received at temperatures of -15˚C or lower?	
Are chilled and frozen goods delivered in a refrigerated vehicle?	
Are all goods received within manufacturer expiry/use-by date?	
Are goods in store rooms undamaged and complete with labelling?	
Is there a register of rejected goods indicating reason for rejection and action taken?	
Non-conformances	**Date corrected**

Annex 5 – Food Safety Audit Report

Food safety audit report	
Catering Company:	**Location:**
Company Contact:	**Date:**
Catering Contact:	**Audit performed by:**

Policy and organization		**Comments**
Food Safety Policy Statement	Does the Food Safety Policy state the Caterers' intentions to meet their obligations to produce safe and legal foodstuffs and their responsibilities to those they serve? Is the policy document translated into the local language(s) and signed by senior management? Is the policy clear with regard to employee responsibilities and cascaded down to supervisory staff and key personnel? Is the document unambiguous, readily available and reviewed no more than 2 years ago?	
Hazard Analysis Critical Control Point (HACCP)		
HACCP	Has the caterer established a documented HACCP system which is compatible with the following 7 HACCP principles:	
	Conducting a hazard analysis?	
	Determining the critical control points?	
	Establishing critical limits?	
	Establishing a system to monitor control of the CCP?	
	Establishing the corrective action to be taken when monitoring indicates that a particular CCP is not under control?	
	Establishing procedures of verification to confirm that the HACCP system is working effectively?	
	Establishing documentation concerning all procedures and records appropriate to these principles and their application?	
	In formulating the HACCP plan, has reference been made to ensure that local/national legislation codes of practice or guidelines are taken into account?	
	Has HACCP been implemented through the caterer's Food Safety Management Plan?	

Hazard Analysis Critical Control Point (HACCP)		Comments
	Is the site catering supervision/management or nominated team/company representative able to demonstrate competence in the understanding of the HACCP principles and their application?	
	Are the critical control points identified in relation to food preparation controlled and monitored within the critical limits stated in the HACCP plan?	
	Where critical limits have been exceeded (e.g. high temperatures), has action been taken and recorded?	
Site		
Site	Are the catering facilities located where they are not affected by the activities of other businesses (e.g. dust and smells) or in an environment which is not conducive to minimum standards of food hygiene (e.g. insect or pest populations which may lead to infestation)?	
	Is the site secure to ensure only authorized personnel can enter the food preparation areas?	
	Are yards and driveways in good condition, well drained and capable of easy cleaning to prevent contamination in the vicinity of the catering premises?	
	Are all buildings associated with the catering operation surrounded by clear space of at least 1 meter to minimize pest activity?	
Catering facility design specifications		
Design and product flow	Is the catering workflow from delivery of ingredients to service arranged to minimize product contamination and facilitate working safely?	
	Do the premises allow for safe working space and storage? Does this enable all operations to be carried out properly under safe hygienic conditions to minimize potential physical, chemical or microbiological contamination (e.g. effective segregation between bakery and butchery operations)?	
	Are the facilities for plate and utensil washing and general-purpose cleaning (where appropriate) adequately segregated from production and preparation?	
Walls	Are walls designed, constructed, finished and maintained to prevent the accumulation of dirt to reduce condensation and mould growth and to facilitate cleaning?	
	Are floor/wall junctions and corners coved to facilitate cleaning? (Cavities in the surface of walls should be avoided to prevent debris from lodging and pest harbourage). If not coved, are the wall/floor junctions clean?	

Catering facility design specifications		Comments
Floors	Are floors designed so they are safe, slip resistant, easily cleanable, impervious and maintained in good repair?	
	Are floors designed so that water can drain and no pools of water are evident?	
Drainage	Larger catering facilities (e.g. more than 500 meals per day): has drainage been installed in the food preparation area to remove water from dishwashers and sinks, and to allow floors to drain effectively after cleaning?	
Ceilings	Have ceilings and overheads been designed, constructed, finished and maintained to prevent the accumulation of dirt to reduce condensation and mold growth and to facilitate cleaning?	
Windows	Where windows are designed to be openable for ventilation purposes, are they adequately screened to prevent the ingress of pests?	
Doors	Are all external doors close fitting or adequately proofed? Are external doors to food preparation and storage areas kept closed?	
Lighting	Has adequate lighting been provided for all working areas?	
	Are all bulbs and strip lights, including those on electric fly killer units protected by shatterproof plastic diffusers or sleeve covers?	
Ventilation / air-conditioning	Have mechanical ventilation and air-conditioning been provided in product storage and all processing and dining environments?	
Contamination control	Has the use of wood within food preparation areas (where appropriate) been eliminated?	
	Has the use of glass been minimized in food preparation areas? Are procedures in place to ensure Ingredients are not decanted directly into cooking and mixing equipment?	
	Is crockery checked for cracks and chips and removed if damaged?	
Water supply		
Main	Are all water supplies used for cleaning, or in connection with any operation in the preparation of food, potable (safely drinkable), having either been drawn from mains supply or suitably treated according to their source?	
	Is the quality of water, steam or ice that comes into contact with food regularly monitored to ensure they present no risk to product safety?	

Water supply		**Comments**
bottled	Is the bottled water purchased from an approved source?	
	Are the water dispensers subject to regular cleaning and sanitizing to an approved program and procedure?	
Equipment		
Equipment	Is all equipment constructed of non-flaking, non-corrosive and non-reacting materials? Are materials used in the construction of all equipment food grade?	
	Is equipment positioned so as to give access under, inside and around for ease of cleaning and servicing? (Equipment should preferably be moveable unless sealed below and above.)	
	Is equipment fit for purpose and maintained/serviced in accordance with the manufacturer's instructions? Is equipment designed to keep food at a specific temperature able to achieve this in the environment in which it is located?	
Maintenance		
Maintenance	Has all equipment been maintained effectively? Is reactive maintenance relied upon or is a planned preventative maintenance schedule in place for all major items of equipment? (This should include which items of equipment are to be maintained, the frequency of preventative maintenance and the ordering of parts in advance which are known to fail or need regular replacement, e.g. heating elements).	
	Does the plan include HVAC, compressors, chillers, freezers, hot holding, hot display and blast chillers?	
	Are outside contractors and all engineers made aware of, and do they adhere to, the caterer's food hygiene standards when in food preparation areas? Discuss.	
	Is cleaning or replacement of light fittings done outside food preparation times?	
	Is all preventative planned maintenance documented and copies of the associated paperwork given to the caterer for verification purposes?	
Product specifications		
Purchased goods	Are specifications for high-risk foods agreed and documented? Does imported food meet the standards relevant to any import agreements? Is imported food used only as intended (e.g. imported meats may only be used for catering meals)? No food shall be supplied to a third party.	

Product specifications		**Comments**
	Are all foods supplied direct from manufacturers or their approved agents? (All documentation must be supplied on request to prove authenticity and traceability. The onus shall be on the caterer to prove they have purchased foodstuffs in good faith and with integrity from approved suppliers).	
Purchase	Do the receipt documents and/or product labelling facilitate correct stock rotation? Does the caterer make every attempt to ensure traceability and authenticity of raw ingredients?	
	Can avoidance be achieved of cross-contamination by ingredients which would constitute a safety issue (e.g. peanuts) or which will cause significant consumer dissatisfaction (e.g. meat in vegetarian products, incorrect handling or mixing of Halal foods with non-Halal foods)?	
	Is there a list of approved suppliers which also includes details and means of approval?	
	Are raw material acceptance criteria and procedures documented?	
	Are sufficient quantities of food maintained to permit the efficient operation of the unit? (The caterer should ensure continuity of supply, notwithstanding seasonal variations.)	
	Are all foods and ingredients of the agreed quality demanded? (For example, imported meats shall not be substituted by local supplies without the knowledge of the client, irrespective of quality.)	
Receipt		
Receipt	Do all food ingredients have labels on their packaging or, where package labelling is not practical, are they supplied with accompanying information identifying the supplier/source?	
	Is there a system to ensure that any quality/food safety issues are followed up with the supplier and recorded?	
Food handling		
Storage (all types)	Are all foods stored so as to ensure food safety? Is attention given to correct temperature control and the avoidance of cross-contamination?	
	Are separate storage facilities provided for the storage of chemicals?	
	Are damaged, soiled and infested products segregated immediately and disposed of or returned to the supplier?	

Food handling		**Comments**
Preparation	Are procedures implemented to ensure that cross-contamination is prevented during preparation and that food is not exposed for any excess period of time, to minimize temperature and risk to health?	
	Are all raw and ready-to-eat foods handled separately?	
	Does defrosting take place in chillers, chilled areas or defrosting cabinets? Does the caterer ensure that foods are not subject to soaking in their own juices or defrosted by washing in warm water? (Defrosted items should not be refrozen without an intermediate processing stage such as cooking)	
Cooking	Is food adequately cooked to a minimum temperature of 75˚C? How is this managed?	
Cooling / freezing	Are procedures implemented to ensure that food is adequately cooled as quickly as possible to minimize any growth of pathogenic bacteria? Is there sufficient capacity provided for batch cooling and freezing?	
	Is food intended for freezing frozen as soon as possible after the cooking process?	
Hot holding	Are procedures implemented to ensure that food (where required) is hot held (+63˚C) to prevent any growth of pathogenic bacteria?	
Re-heating	Is re-heating avoided and only undertaken under strict controls? (The practice of re- cooking due to sporadic power interruptions is wholly unacceptable and all efforts must be made to ensure power supplies to kitchens are continuous.)	
Post preparation chilled and frozen storage	Are procedures implemented to ensure that cold ready-to-eat food (e.g. salads) is maintained at a safe temperature and for a safe period of time?	
Service	Are procedures implemented to ensure that food is maintained at a safe temperature (either hot or cold) as appropriate during the period of time it is on display?	
	Are corrective actions implemented to avoid recurrence of a non-conformance and adequate documentation kept of the action taken?	
	Are procedures in place to regulate the disposal of left-over foodstuffs following a period of time on display?	
	Is a complaints or suggestions book maintained within the dining room and examined daily? Are all complaints investigated and the necessary corrective actions taken by site management?	

Food handling		**Comments**
Recipes	To enable investigation in the event of a problem arising, are recipes maintained in writing and kept available for all foods produced within the facility? (Chefs must adhere to the recipe formulation.)	
	Are all meals of sufficient quality, quantity and variety in accordance with agreed menus?	
Food samples	Are food samples (from the menu) of high-risk foods taken (discuss how often)	
Temperatures		
Temperatures	Do temperatures comply with temperature requirements as stated in the 'Action Tracking Parameters'?	
	In circumstances where temperature and or time control is critical to product safety, quality, attribute or legality (e.g. cooking, freezing or blast chilling), is temperature and/or time recording used for monitoring?	
	Are cooking, cooling and freezing procedures undertaken to minimize bacterial growth and maximize quality?	
	Are ambient temperatures in food preparation areas maintained at or below 25˚C?	
Calibration		
Calibration	Is all temperature monitoring equipment calibrated on an annual basis?	
Transportation		
Caterer transport	Is refrigerated transport capable of maintaining product temperature within specification under maximum load while the product is stored and transported on the vehicle?	
	Is all food transported in such a way that it is protected from the external environment?	
	Are vehicles pre-chilled before loading of non-ambient foods?	
	Are documented maintenance, cleaning and hygiene procedures maintained for all vehicles?	
Personal hygiene and training		
Changing facilities	Are changing facilities provided for all personnel whether they are staff, contractor or visitor, prior to entry to food preparation areas?	
	Are hand-washing facilities provided near to the food preparation entrance? Do wash hand basins have hot and cold water or water at a temperature of 43–49˚C, soap and hand drying facilities?	

Personal hygiene and training		**Comments**
	Do toilets not open directly into a food preparation area? (However, a ventilated ante- space is deemed acceptable.) Toilets shall also be equipped with a separate wash hand basin, with water at a temperature 43–49˚C, soap and drying facilities.	
Health assessment and illness prevention	Prior to food handling, do food handlers undergo fitness for task health assessment?	
	Does the caterer have a procedure for the notification by employees (including temporary employees) of any relevant infectious disease or conditions from which they may be suffering or have been in contact with?	
	Do employees receive and sign for a copy of the caterer's hygiene rules and their agreement to report infections and illness? (The caterer should have these available at all times.)	
	Is vaccination and health certification completed prior to employment and kept up to date?	
Protective clothing	Is protective clothing and footwear provided for all food handlers and those working with food? (Open toe sandals are not acceptable and personal footwear must not be allowed in food premises with the exception of visitors.)	
	Is clothing clean, light colored, washable and regularly washed? (Buttons and pockets should be avoided.) Are separate tabards or aprons provided to allow ingress and egress for food preparation areas without the need for changing?	
	Is all hair (where appropriate) fully contained in a hat or hairnet to prevent product contamination?	
	Is protective clothing (where possible) laundered on site or by a contract laundry in a manner that will ensure food safety? (It is acceptable for staff to launder their own protective clothing if the cleanliness of clothing is monitored.)	
	The use of gloves by food handlers should be checked (with the exception of those working on food service). It is imperative that staff who handle food wash their hands regularly (especially when changing tasks). Staff engaged in food service may wear gloves during food service times but only on the basis that it provides an elevated perception of hygiene assurance to the customer. Discuss.	

Personal hygiene and training		**Comments**
Personal hygiene	Is smoking banned and managed properly in food preparation and storage areas? Check outside the rear door for signs of smoking and discuss issues especially around lack of hand washing.	
	Are fingernails kept short, clean and unvarnished? Are false nails not permitted?	
	Are jewelry and watches not permitted to be worn with the exception of a plain wedding band and one piece sleeper earrings? (These may be permitted at the discretion of the caterer.)	
	Are all cuts and grazes on exposed skin covered by a detectable blue plaster?	
	Is eating and drinking banned or managed properly in food preparation areas?	
Training	Are all personnel (including temporary personnel and contractors) appropriately trained in food hygiene and health and safety prior to commencing work? Are they adequately supervised and instructed during the working period?	
	Prior to employment, do all food handlers receive food hygiene induction training?	
	Is ongoing hygiene training commensurate with the activities of the food handler completed? Staff must be competent in the duties they have been employed for. (No food handler must engage in any activity for which they have not been trained.)	
	Are all supervisors and managers trained appropriately?	
	Are staff using prescribed dangerous machines (e.g. slicers and bandsaws)? Are they trained in their use and authorized to use them?	
Audits and control		
Internal audits	Does the caterer undertake internal audits? Discuss the benefits.	
	Are the results of previous internal audits available for inspection?	
	Are corrective actions relating to these audits progressed to satisfactory completion?	
Records	Are records (e.g. temperatures) legible and genuine? (Do the records look consistent?) Retrospective completion of records can be an issue and cross-checking against temperatures taken on the day is an indicator. Emphasize the importance of management follow-up in all instances of incomplete or retrospective recording, including the potential to bring the operator into disrepute.	
	Does the caterer operate, keep, review, maintain etc. records relating to product safety legality and quality	

Audits and control		**Comments**
Corrective action	Are corrective actions undertaken as soon as is reasonably practicable to prevent further occurrence of non-conformity, and is an action tracking system maintained?	
Cleaning and hygiene	Is there a cleaning schedule in place for the cleaning and sanitizing of all food preparation and service areas, facilities and equipment? Is it followed and managed properly with respect to: • what is to be cleaned, when and how, by whom and where cleaning shall take place; • Equipment cleaning in accordance with manufacturer's instructions using food grade chemicals? • staff trained in cleaning, COSHH awareness and availability of material safety data sheets; and • Staff understanding and undertaking 'clean as they go'?	
Waste disposal		
Waste disposal	Is waste disposed of regularly to minimize the accumulation of waste? (Waste should be deposited at an authorized site. All waste and refuse must be removed (ideally daily) by a licensed waste carrier directly to an authorized place of tipping. The final place of disposal should be known.	
	Are external food waste collection containers and compactors closed and/or covered at the time of the audit?	
Pest control, birds and feral animals		
Pest control, birds and feral animals	Do staff understand food pests and how they contaminate food and/or the measures they need to undertake in order to prevent this? Discuss with a member of staff or management.	
	Do staff understand the importance of housekeeping (e.g. clean as you go), keeping lids on bins and keeping food off the floor and the avoidance of attracting pests near to food premises?	
	Are all potential points of entry (e.g. around pipes, under doors and drainage works) regularly checked for wear, tear and pest ingress/egress? Are drains fitted with screens and traps to prevent pest entry?	
	Are all inward deliveries checked for pest damage? Are all decanted foods (flour, sugar, etc.) placed in light colored bins (to refract light onto potential foreign bodies) with tightly fitting lids?	

Pest control, birds and feral animals		**Comments**
	Are electric fly killers operating, are they maintained and the tubes changed every year prior to the insect season? Are they sited near to entrances and exits to attract incoming flying insects? (Under no circumstance must they be sited above food contact surfaces or bread packing stations. They must be switched on all day including times of the day where the facility is not is use)	
	Are all inward deliveries checked for pest damage? Are all decanted foods (flour, sugar, etc.) placed in light colored bins (to refract light onto potential foreign bodies) with tightly fitting lids?	
	Are all inward deliveries checked for pest damage? Are all decanted foods (flour, sugar, etc.) placed in light colored bins (to refract light onto potential foreign bodies) with tightly fitting lids?	
	Are the services of a competent pest control contractor (preferably a member of a trade organization) engaged in order to make more thorough assessments of potential pest activity? Visits should be carried out with a minimum frequency of 6 times per year (8 for larger premises). The contractor should also be available on 24-hour call- out in the event of a possible infestation or immediate treatment being required.	
Laboratories		
Laboratories used for support	Does the caterer undertake or subcontract food sampling? Discuss.	
	Are laboratories used for food and water sampling accredited to operate to BS ISO EN 17025 or do they have other acceptable methods of operation and quality control?	
Technical support		
Technical support	Does the caterer have a system in place to ensure that they are regularly informed of all relevant legislation, food safety issues, legislative, scientific and technical developments and industry codes of a practice?	
	Is the caterer able to demonstrate an adequate level of technical support either in- house or by subcontract specialist services? (It is essential that the technical support is capable of meeting the needs of the business and dealing with foreseeable problems.)	

Annex 6 – Key Performance Indicators

Examples of Key Performance Indicators				
	Key Performance Indicator	**Rationale**	**Performance target**	**Monitoring frequency**
KPI-1	**Suitability of catering facilities**	Caterer's facilities must be 'fit for purpose' and meet the technical requirements laid out in the section 'facilities and equipment'.	100% compliance.	Pre-qualification or renewal of contract.
KPI-2	**Meet legal compliance**	COMPANY and its contractors should comply with local regulations and/or with the COMPANY Food and Water Management guidance, whichever is the more stringent.	100% compliance.	During pre-qualification and periodically depending on risk.
KPI-3	**Health status of staff**	Health status of staff can jeopardize food and water safety.	All health and vaccination certificates must be up to date.	Pre-qualification and periodically depending on risk.
KPI-4	**Temperature control documentation**	Food temperatures are critical to food safety, and robust measurements and recording are required at all stages from delivery to service.	Records available for all items identified under 'key controls'. Temperatures should be recorded three times each day.	Pre-qualification and periodically depending on risk.
KPI-5	**Cleaning schedules**	Robust cleaning schedules must be in place. The schedule should state what, how, when and who cleans equipment.	Records of cleaning activities supported by visual observation.	Periodically depending on risk and findings from inspections and audits.
KPI-6	**Training**	All levels of catering staff should meet the standards set out in the training matrix.	100% compliance. (No exception for prospective caterer. Existing caterer allowed three months to confirm qualification).	Pre-qualification and periodically depending on staff turnover.
KPI-7	**Documented HACCP and Food Safety Policy**	HACCP is an acknowledged international minimum standard for food service and catering and is the standard required by COMPANY. Food safety policy is required to set out the caterer's practices and procedures.	100% compliance. (No exception for prospective caterer. Existing caterer allowed three months to confirm qualification).	Pre-qualification and periodically depending on risk and findings from audits.

Annex 7 – Action Tracking Parameters

Action tracking parameters				
Criteria	**Example**	**Green**	**Yellow**	**Red**
Blast chilling, refrigerators/walk in chillers	Equipment capable of being able to rapidly reduce and/or maintain food temperatures between 1 °C and 5 °C.	Available and working within specification.	Available but maintaining food temperatures between 5˚C and 8˚C.	Not available or maintaining food temperatures above 8˚C.
Chilled food temperature	Food should not be left out at ambient temperature for more than 20 minutes, and temperature checked on delivery.	5˚C or below	Between 5˚C and 8˚C Food left at ambient temperature for more than 20 minutes.	Above 8˚C
Cleaning	Robust cleaning schedule in place, and catering grade cleaning products available and used.	Cleaning schedule in place and catering grade chemicals in use.	Cleaning schedule available but not implemented, or non-catering grade chemicals in use.	No evidence of organized cleaning and use of non- catering grade chemicals.
Cooking too far in advance	Food should be cooked as close to consumption as possible. Cooking far in advance due to power cuts is not acceptable.	Food cooked as late as possible before service and/or during service.	Completion of cooking more than an hour prior to service with adequate temperature controls in place.	Completion of cooking more than an hour prior to service with inadequate temperature control.
Cross-contamination	Controlled through the use of color-coded chopping boards, knives and cleaning cloths. Raw foods stored below cooked (ready to eat) foods or physically segregated.	Provision and effective segregation of color-coded chopping boards, knives, cloths and correct food storage.	Color-coded equipment provided but used incorrectly.	No color-coded equipment available. Cross-contamination between raw and cooked.
Fitness for work	All food handlers are vaccinated and medically screened periodically and prior to commencement of work.	Full compliance. Valid certificates/documentation available in facility.	Program in place but documentation incomplete or expired.	No evidence of compliance.
Freezers/walk in freezers	Should be easily capable of storing food at or below -18˚C	-18˚C or lower	Between -18˚C and -12˚C	Above -12˚C
Hand washing provision	Wash hand basins (WHB) should be unobstructed and sited near entrances and provided with liquid soap dispensers, hand drying facilities and waste bin.	Located near entrances, accessible and with soap and hand drying facilities.	Not located near to entrances but with soap and drying facilities.	No soap or drying facilities available at WHB.
Heating, ventilation, air conditioning	Air temperatures in kitchen being maintained at 25˚C or below and capable of removing cooking vapors.	Kitchen temperatures at 25˚C or less. Vapors being extracted.	Kitchen temperatures between 25˚C and 30˚C.	Kitchen temperatures above 30˚C or inadequate extraction of cooking vapors.

Action tracking parameters *(continued)*				
Criteria	**Example**	**Green**	**Yellow**	**Red**
Hot and cold displays	Should be able to keep food hot (above 63˚C) and cold (below 5˚C).	63˚C or above / 5˚C or below	Between 60˚C and 63˚C / 5˚C and 8˚C	Below 60˚C / above 8˚C
Hot food temperature control	Cooked food to achieve a core temperature of 75˚C and to be kept at 63˚C or above for no more than 4 hours.	75˚C or above on completion of cooking. Food kept at 63˚C or above for less than 4 hours.	Between 70˚C and 75˚C on completion of cooking. Food kept above 63˚C for more than 4 hours.	Less than 70˚C on completion of cooking. Food held below 63˚C.
Hot holding cabinets	Should be able to keep hot food at 63˚C or above.	Cabinet maintaining temperature above 63˚C.	Cabinet maintaining temperature between 60˚C and 63˚C.	Cabinet not achieving 60˚C, or cabinets required but not provided.
Hot water provision	Capacity and temperatures should be appropriate to use.	82˚C (disinfection sinks and dishwashers) 60˚C (detergent sinks) 43˚C–49˚C (WHB). Available at all times.	60˚C (disinfection sinks and dishwashers) 40˚C–43˚C (WHB). Sporadic hot water availability.	<60˚C (disinfection sinks and dishwashers). <40˚C or >49˚C (WHB). Inadequate supply.
Personal hygiene	Staff washing their hands on entering food preparation areas, change of task and after using the toilet.	Staff observed engaging in correct hand washing during visit.	Staff not washing hands thoroughly or regularly.	Staff not washing hands after visiting toilet or handling refuse.
Pest control	Facility should be pest free and designed to keep pests out.	Effective pest control measures in place.	Pest activity identified but control measures in place.	Evidence of uncontrolled pest presence and/or an absence of control measure.
Physical / chemical contaminants	Effective control of cleaning chemicals (e.g. MSDS in place), glass, ceramics, wood, decanted ingredients etc.	Control over potential contaminants. Dedicated chemical storage.	Procedure in place but not fully implemented.	No MSDS in place. Chemicals stored with food. No physical contaminant control. Significant potential for contamination.
Refuse arrangements	Bins effectively distributed within the kitchen. External bins enclosed and kept away from kitchen.	Lidded external bins stored away from entrances; appropriate internal bins.	Bins with manual lids in use internally. Some refuse strewn outside.	Waste bins overflowing. External food bins open, attracting pests.
Salad preparation	Potable water and sanitizer used to disinfect and rinse salad vegetables.	Sanitizer and potable water used to disinfect and rinse salad vegetables.	Potable water available but rinsing not carried out.	Potable water/salad washing/sanitizer not used.

Action tracking parameters *(continued)*				
Criteria	**Example**	**Green**	**Yellow**	**Red**
Structure and layout	There should be a linear workflow that allows staff to work without compromising food safety.	Easily capable of providing safe food for the intended number of customers.	Poor layout with most tasks being conducted in one area.	Area too small to meet the demand. Risk of contamination, E.g. cooked food and raw foods prepared in same area.
Training	Supervisors trained to *Food Safety for Managers* level and all food handlers given a minimum of an induction and 6 hours food hygiene training.	Supervisors have attained *Food Safety for Managers* level and food handlers trained.	Supervisors about to take *Food Safety for Managers* course, and food handlers trained with training program implemented.	Supervisors have not attended *Food Safety for Managers* and/or no training program in place for food handlers.

Annex 8 – Catering Action Report

Catering Action Report					
Report No:			**Urgent action required:**		
Site Visited:			**Action required:**		
			Work in hand or not imminent:		
Date of Inspection:			**Facility provider responsible:**		
Inspected by:			**Caterer responsible**:		
Area / Location / Issue	**Defect / Non-conformance**	**Action**	**Action by**	**Target date**	**Status**
Blast chillers/refrigerators/ walk-in chillers					
Chilled food temperature					
Cleaning					
Cooking food too far in advance					
Cross-contamination					
Fitness for work					
Freezers/walk-in freezers					
Hand washing provision					
Heating, ventilation, air-conditioning					
Hot and cold displays					
Hot food temperature					
Hot holding cabinets					
Hot water provision					

Area / Location / Issue	Defect / Non-conformance	Action	Action by	Target date	Status
Personal hygiene					
Pest control					
Physical/chemical contamination					
Refuse arrangements					
Salad preparation					
Structure and layout					
Training					