

Guideline on Developing and Implementing Pre- requisite Program

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1. Preamble

The purpose of the guide is to provide support to food establishments in documenting and implementing a Food Safety Management according to international set standards. The Food Safety and Quality Authority of The Gambia adapted part of the guide from BTSF-Africa as a guide to good practices for the production of food that is safe for human consumption.

Food hygiene and company health

Food hygiene management should not be viewed strictly as a tool for protecting health and consumer life. By visibly implementing good practices, it can also contribute to company health:

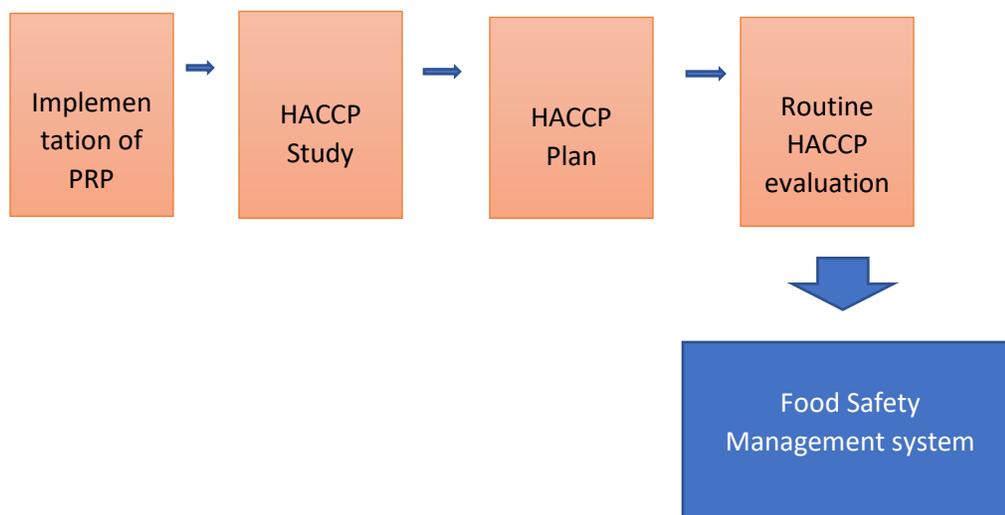
- By reducing losses
- By providing a guarantee of good management to consumer and to other partners of the company such as insurance companies
- By minimizing the risk of recall of defective products lots which can be virtually impossible within the framework of export exchanges

Companies that invest in hygiene control as a management tool also see strengthening of support and employee competence since the policy involves them in approaches that call on rigorous principles and require frequent review as well as in the resulting systematic prevention, monitoring and control activities.

The guide primarily covers the steps required to establish:

- Good hygiene and production practices implemented via the selected production method, usually qualifies as “prerequisites”
- A risk analysis method called HACCP (Hazard Analysis Critical Control Point) which has now been adopted worldwide thanks to its effectiveness in managing previously identified risks.

Figure 1: Practical Route for identifying gaps in food safety control systems



The term “prerequisite” has been adopted since HACCP methodology came into use because implementers of safe-food programs have found that the basic good practices need to be in place before HACCP is introduced in order to keep the HACCP analysis and resulting control methods within a manageable scale- in fact, HACCP is impossible without effective prerequisite establishment.

***Important note**

All food hygiene management programs lead to the implementation of systems that must be re-examined and potentially revised each time operators, the processes used (manufacturing, preservation, etc.) or regulations change. No system is perfect (100%). There is a tendency in companies to believe that all problems disappear when a risk management system is put in place.

*This simply isn't true!!!

In practice, no system should be considered safer than its weakest link. This means that you should use, re-use and continue to use the tools in this guideline.

***Remark**

The methodology described in this guide has been design to deliver an effective safe food system for all food producers.

There will be circumstances where producers use or develop, under their own responsibility, other methods of management.

This is, of course, perfectly acceptable so long as the method delivers:

- EFFECTIVE CONTROL;
- ANY EVIDENCE OF EFFECTIVENESS REQUIRED.

Guide to Good Practices

Construction of the guide to good practices

The production of safe food products requires that the HACCP system be built upon a solid foundation of prerequisite programs, otherwise your HACCP system will collapse/fail. Each segment of the food industry must provide the conditions necessary to protect food while it is under their control traditionally through the application of GMPs. These conditions and practices are now considered to be prerequisite to the development and implementation of effective HACCP plans. Prerequisite programs provide the basic environmental and operating conditions/activities that are necessary for the production of safe, wholesome food.

Prior to developing HACCP plans, the establishment shall develop and implement prerequisite programs to assist in controlling the likelihood of introducing food safety hazards to the product through the work environment and operational practices.

The prerequisite programs shall be documented, updated whenever there are changes associated with the prerequisite programs and reassessed at least annually.

The prerequisite program requirements outlined in this manual are generic in nature. Establishments must ensure that their prerequisite programs reflect the current work environment and operational practices within their establishment and comply with specific commodity policies, manuals, procedures and associated regulations.

The guide follows a logical route to defining the organization of good practices, which can be illustrated by the following diagrams:

KEY DEDUCTIONS OF THE DIAGRAM OF OUTBREAK OF ECONOMICAL LOSS OR FOOD- BORNE POISONING

- The concomitant intervention of the contamination and the multiplication is essential to the occurrence of a food accident
- This diagram explains the mechanism of action of all the preservation methods, which reciprocally establishes its validity
 - Total control of contamination or multiplication induces a long-lasting preservation (canning, freezing)
 - Partial control of only one factor or of both, induces a short-lasting preservation (refrigeration, pasteurization)

ACTION MODE & DURATION OF PRESERVATION METHODS

	Methods	mode & duration (long lasting or limited)
Cold	Refrigeration	Limitation of bacterial growth
	Freezing	Inhibition of growth
Heat	Canning	Total elimination of contamination
	Pasteurization	Reduction of contamination (followed by refrigeration)
	Hot chain	Inhibition of growth
Modified atmosphere	Vacuum package	Inhibition of adulteration aerobic flora
	Gas (CO ₂ , N ₂)	Inhibition of adulteration aerobic flora
stabilization	By sugar	Growth inhibition through lowering of A _w
	By salt	Growth inhibition through lowering of A _w
	By vinegar	Growth inhibition through lowering pH
Irradiation	Ionization	Total elimination of contamination
Dehydration	Drying	Growth inhibition through lowering of A _w
	Freeze-drying	Growth inhibition through lowering of A _w
Pressure	Ultra-high pressure	Total elimination of contamination

Important

Figure 3: five sets of control provisions

Common prerequisite programs may include, but are not limited to:

2. Building Standards and Equipment

a. Building and Environment conformity

The design of new buildings, or the improvement of the existing buildings and equipment, should respect the following principles:

➤ **General principle**

• **Environment and site location**

No establishment should be built in a location where it appears clearly that there is a threat for food safety. Establishments must not be located in areas which might be:

- Polluted or with industrial activities representing a serious threat to contamination of food
- Presenting risk of air pollution
- Prone to flooding
- A possible source of pest infestation
- Contaminated by solid or liquid waste or where such waste cannot be effectively removed

When possible, a protecting fence should be raised to protect the establishment from external pollution and contamination.

The establishment shall be situated close to sources of portable water and electricity and if possible in special designated industrial areas.

• **The plant should have at least four (4) doors:**

- One door for the entry of raw materials
- One door for the entry of production staff
- One door for shipment of finished products
- One for waste disposal
- A fifth one can be necessary, in some cases, for the reception of packaging materials.

**Note: The above recommendation depends on the size and production capacity of establishment. For smaller establishment, should have a minimum of two doors (one for entry of raw materials and the other for finished products). Disposal of raw materials can be done with one of the two doors but before and after operation.*

• **The onward flow principle.**

Successive production operations should ensure a forward progression of products, without back return, from the lowest level of development towards the highest one, from the least healthy conditions towards the healthiest one, from the least susceptible condition towards the most susceptible one.

In order not flout this rule, operators should not move from place to place- they should remain at work at the station at which they are placed.

- **No production line crisscross.**

Two (or more) production lines should not crisscross. They can be connected (e.g. assembly of composed products put into a previously washed package) or split (e.g. manufacturing lines of by-products obtained during the preparation of the main product).

- **Separation of cool and warm zones**

Areas where hot foodstuffs are handled shall be separated from those where cold foodstuffs are handled in order to avoid breaking the cold chain.

- **Separation of clean and dirty areas**

Waste produced at each stage of manufacture should be removed in the most direct way possible towards its treatment location(s) (e.g. dishwashing) or storage (e.g. waste handling).

***Remarks**

When the layout of the establishment does not allow the application of the last two principles above, it can be allowed to undertake processing activities in sequence- at different times- in the same area, provided that control measures are deployed to reduce the risk of cross contamination and maintain the cold chain.

- **Portable water supply**
 - A sufficient quality of portable water- hot and cold as appropriate- shall be available to the establishment.
 - Networks of potable water and non-portable water (e.g. used for steam production, cooling systems e.tc) must be clearly identified and separated (e.g. used color coding of pipes).
 - The portable water supply system shall satisfy the requirement of the standards laid down in section 4.4.1 of the standard CAC/RCP 1-1969, REV. 4 (2003). The quality of the potable water used in the process or cleaning purposes shall be:
 - Guaranteed by the supplier if taken from an external network, or
 - Demonstrated by results of analysis made by a recognized laboratory if the water supply is a well, or the other source, or intermediary storage tank belonging to the establishment.
 - Ice and steam to be in contact with foodstuffs must be made from potable water.

- For fishery products, “clean sea water” may be used for the cleaning of products, equipment and utensils.

➤ **Construction Regulation and Standard**

- Floors shall be:
 - Smooth
 - Non-skid
 - Hard-wearing
 - Washable
 - Not subjected to rot
 - Water proof
 - With a slope allowing easy drainage of used waters towards the drainage system of the establishment.

The drainage system must be equipped with grids and U-bends so as to avoid:

- The obstruction of the network by waste,
- Reflux of waste water, and
- Pest from entering the premises.

***Remark**

Waste water treatment or pre-treatment systems must be installed where appropriate (legal requirements, environmental preservation laws etc.). Such systems might comprise filters, grease collectors, a purification plant or any adapted technology.

- Walls shall be:
 - Impervious with no toxic effect to intended use
 - Smooth
 - Washable
 - Light colored
 - Not subjected to rot
 - ‘shock resistant’ (up to 2 meters high)
 - Easy to clean and disinfect
 - Bonded to the floor by semicircular joints, with no nooks or crannies, to allow easy cleaning and drainage of wash and rinse water (see diagram below)
- Doors shall be:
 - Built in a smooth material resistant to impacts
 - Non-absorbent surfaces
 - Easy to clean and disinfect

- Built so as to avoid the entry of all kind of pest into the premises from outside the building
- Windows shall be:
 - Easy to clean and disinfect
 - Equipped with fly screens that can be dismantled for cleaning
 - Built so as to avoid the entry of all kind of pests into the premises from outside the building
 - Free from degradation that would cause contamination
- Ceilings shall be:
 - Built to minimize dirt and condensation, and the shedding of particles
 - Light colored
 - Easy to clean and disinfect
 - Smooth
- Passive or mechanical ventilation devices shall:
 - Ensure the elimination of steam and smoke
 - Reduce the risk of condensation and air-borne contamination of food
 - Ensure air does not flow from the most contaminated areas to the least contaminated areas
 - Contribute efficiently to regulating the temperature of food preparation areas
- Lightning shall be:
 - Bright to enable the undertaking to operate in a hygienic manner
 - Neutral in color (so as not to modify/alter the foodstuff color)
 - Protected from impacts and designed so as to avoid physical hazards (glass, plastic, etc.) from falling in the foodstuffs during processing.
- **Equipment conformity**
 - Equipment shall be:
 - Made of material with no toxic effect in intended use
 - Smooth
 - Not subjected to rot
 - Stainless
 - Washable (without nooks and crannies that are inaccessible for cleaning)

Compliance with these rules prohibits the use of undressed wood, cardboard or tape for the manufacture of furniture (or their use in temporary repairs).

Undressed wood of good quality can be accepted (if approved by the authority) in specified food processing sectors and situation, where it is traditionally in use. For example, bakeries, bread-making or cheese ripening rooms.

Equipment should not be placed adjacent to walls so as to allow for proper cleaning and for proper pest and cleaning inspection.

- Materials used to manufacture tables (food contact surfaces) shall be:
 - Made of from Non-toxic material
 - Smooth
 - Light colored
 - Impermeable
 - Not subjected to rot
 - Hard-wearing
 - Easy to clean and disinfect

Compliance with these rules prohibits the use of undressed wood or cardboard and porous or rough materials like rough concrete. The materials most often used are stainless steel, plastics and glazed earthenware tiles.

- Tools (used in food processing or preparation such as knives, cutters etc.) shall be:
 - Inalterable in all parts
 - Easy to clean and disinfect

The compliance with this principle prohibits the use of wood even for the handles of tools (e.g. knives with wooden handle). The materials most often used are stainless steel, aluminum and plastics. In some cases, traditional use of undressed wooden tools may be accepted (bakeries etc.)

- Machines shall:
 - Not be subject to deterioration, preferably stainless, definitely non-corrosive
 - Be easily dismantled
 - Be easy to clean and disinfect (without nooks and crannies that are inaccessible for cleaning)

Machines should not be installed against the walls so as to facilitate cleaning operations and limit harboring of pest.

Vehicles such as forklifts, used for handling in areas where foodstuffs are being processed or stored should not emit fumes presenting a food safety risk or health hazard.

➤ **Personnel hygiene and facilities and toilets**

Food establishments should have personnel hygiene facilities and toilets, in sufficient numbers to allow the personnel to maintain a level of personnel hygiene compatible with the handling of foodstuff. The facilities should be located in suitable areas so as to limit the risk of contamination of food processing and storage. They shall in particular have:

- Toilets/lavatories that are not connected to processing rooms/food preparation area. In short there should be a corridor between lavatories and other sensitive areas;
- Operational lavatories of hygienic designed;
- Adequate changing rooms for personnel, physically separated from toilets, with separate sections for each gender, and equipped with showers supplied with cold and hot water;
- Adequate means of hygienically washing and drying hands, including wash hand basins and a supply of hot and cold (or suitable temperature control) water;

- Hanging lockers, for each worker, with two compartments, so as to allow the separate storage of work clothing and personal clothes.
- Protective clothing such as coats, hairnets, waterproof boots, gloves, etc.

***Remark**

One hanging locker per operator is sufficient (for storing personal clothes) if clean work clothing is distributed at the start of each shift.

Doors of personnel hygiene facilities and toilets must never open directly in areas where foodstuff is handled.

➤ **Maintenance**

Conformity of premises and its equipment with the requirements can be assured through the application of a Maintenance Plan comprising of:

- A preventive maintenance plan applied routinely on all equipment and in particular those which have an essential role in the process: cooling, heating, hydraulic, mechanic and electrical systems.
- Record keeping book in which the personnel can easily report to the maintenance service, the breakdowns, damages and failures
- A record of daily preventive and corrective maintenance operations
- The calibration of measuring equipment used in the establishment.

Careful

Lubricants used for maintenance purpose must be food grade.

➤ **Storage of chemical substances**

All chemical substances, in particular those used for pest control, cleaning, disinfection operations shall be:

- Away from food preparation/processing, receiving and storage areas.
- Stored in a dedicated place which can be locked
- Handled so as to control the risk of contamination of foodstuff by these substances
- Labelled with indication of the active substance and rules for their safe use.

3. Pest Control Plan

Pests pose a major threat to the safety and suitability of food. Pest infestation can occur where there are breeding sites and a food supply. The most common pest found in food establishments are rodents and insects but in certain sectors (warehouses, hypermarkets or large spaces) birds and domestic animals. Good hygiene practices should be employed to avoid creating an environment conducive to pest. Good sanitation, inspection of incoming materials and good monitoring can minimize the likelihood of infestation and thereby limit the need for pesticides.

➤ **Passive control, surrounding and outbuildings keeping**

In order to control the settlement of pests in the surrounding, (i.e. not to provide them places of refuge and feed resources) it is necessary to maintain a non-attractive environment which includes:

- Isolated storage of unutilized materials, pallets and machines, without contact with the walls of the buildings.
- Design and maintenance of external spaces, including:
 - Elimination of holes and spaces in waste land with high vegetation
 - Regular cutting of grass lawns
 - The elimination of stagnant water
 - The absence of rags, paper, plastic films and other detritus abandoned on the ground, (sources of materials for the construction of rodent nests).
- Keeping of interior surfaces (racks, tops of pieces of furniture) clean so as not to leave feed sources for rodents and insects.
- Tidying and cleaning of technical buildings (machine shop, boiler room, refrigeration room, electrical cabinets etc.) to avoid rodent settlement.
- fly screens (wire mesh) at windows and suitable screens on access doors
- rigorous management of waste containers, which include:
 - frequent cleaning so as not to attract insects
 - storage in a clean and easily washable area equipped with a source of water and floor drainage system for waste water,
 - keeping them closed (to prevent use as a feed source by all types of pests)
 - not filling them into excess to avoid overflowing and dropping of food waste on the ground,
 - a waterproof design and easy to clean and disinfect
 - frequent removal from production areas.

*Note: waste disposal rooms/bins should be away from production area and easily collectable.

➤ **Active control**

Detection

- **Insects:**
 - Search for dead insects
 - Search for live insects in places of refuge (drawers)
 - Search and careful removal of bodies in electric insect traps collectors (insect-o-cutters)
- **Rodents:**
 - Search for rodents dropping or traces of urine
 - Search for attacks on foodstuffs (bite marks) or attractive conditions (torn open bags)
 - Presence of traces of grease of rodents on the usual passages
 - Search for nests of rodents

Rodent control plan

This plan is composed of a complete (set of) document(s), defining actions to be implemented, and it includes:

- Technical cards (instruction card on the use of chemicals) of rodent poisons utilized
- Procedure and scheduling of rodent control operations, including the checking and renewal of distributed poison baits, traps, and sticky boards
- A schedule and procedure for identification, evaluation and elimination of possible rodent infestation
- Implementation procedure of additional treatment in the event a residual infestation
- Establishment rodent control plan on which the locations of poison baits, traps, and sticky boards are identified
- Identification on walls of the premises in order to locate poison baits, traps, and sticky boards.

Insect control plan

This plan is composed of a complete set of documents(s), defining actions and procedure to be implemented, and it includes:

- Technical cards (instruction card on the use of chemicals) of insecticides utilized
- The procedure and frequency of insect control operations (walls insecticides, paint application and renewal, premise insecticide spraying)
- Establishment plan on which the location of poisonous baits for crawling insects are identified

- Establishment an insect control plan on which the location of insect-o-cutters for flying insects are identified
- Procedure and frequency for emptying traps and trapped insects monitoring in order to evaluate infestation levels.

Note: Non-toxic baits are to be used in food preparations area

*Note: Where pest control cannot be manage by an internal expert, a certified external expert/contractor shall be contracted.

4. Supplier Control

Contractual Relationship with Supplier and Deliveries Control

➤ Raw material specification

Raw materials or intermediary products shall originate from a food establishment presenting equivalent guarantees in term of food safety. No raw material or ingredient should be accepted by an establishment if it is known to contain parasites, undesired micro-organism, pesticides, veterinary drugs or toxic, decomposed or extraneous substances which would not be reduced to an acceptable level by normal sorting and/or processing.

In order to have a sound basis for deliveries' control, the characteristics of ordered raw material need to be specified precisely with the supplier. The conditions for acceptance/rejection of batches also need to be clearly defined. Raw materials specification should include but not limited to:

- Labelling information (in particular with food safety official marks and information for traceability)
- Characteristics defined by type, volume, shape etc.
- Integrity of wrapping and material
- For imported foodstuffs, health certificates and import documentation in good order
- Storage temperature for perishable goods
- Bacteriological standards (legal or contractual) (possibly including contractual access to results of bacteriological control plans set by supplier)
- Formulation defining physico-chemical composition, presentation, particle or chunk size and variability constants (e.g. pH, A_w , salt or sugar concentration, viscosity of the liquid)
- Purity criteria, including absence of, or allowed levels of,
 - Residues (heavy metals, pesticides, hydrocarbons, solvents, veterinary drugs)
 - Foreign bodies (plastics, wood, glass, metal particles, insects, feathers, hairs)
- Actions and responsibilities in case of inspection failure (removal, replacement etc.)

- Specification for the production of raw material when appropriate, i.e. when such conditions may impact on the safety of foodstuff.

➤ **Preferential choice of supplier benefiting from:**

- Certification (e.g. ISO 9001, ISO 22000)
- National or international approval (e.g. FSQA of The Gambia, EU and USA approval)
- Other approval (Halal, vegetarian, GM free, retailer promoted assurance schemes etc.)
- Accreditation or a reference from a recognized customer.

Preventing chemical hazards on raw materials (an example)

In trying to prevent any chemical hazards on the raw materials, a banana chips factory decided to implement a series of measures, comprising the following elements:

- precisely specifying their requirement in terms of quality and safety (in written form);
- regularly checking the levels of those requirements in their raw materials;
- training the staff on collecting and peeling the bananas;
- advising their suppliers about their safety/quality requirement;
- regularly auditing their main suppliers and applying a premium price policy when buying their raw materials.

➤ **Preferential choice of supplier accepting customer visits of their production site**
Hazard(s) control on raw materials?

Small food companies/business are sometimes faced with the following questions:

- How to control the quality/safety of their raw materials when buying from several small suppliers?
- Is control at reception, or when buying the raw materials on the market a Critical Control Point (CCP)?
- How to set up effective control of the raw materials in both of the above cases?

Food SMEs should try to implement the following elements:

- Clarify their quality and safety specifications with their suppliers (in written form);
- Implement easy-to-check criteria (e.g. visual or simple measurements) at reception of the raw materials;
- Consider reception of a raw material to be a CCP only if no subsequent operation eliminates or reduces the hazard(s) and when you have got a parameter (t^0 , pH, a_w , etc.) to control.

Checks at reception/delivery checks

➤ Recording cards of delivery checks

The effective implementation of reception checks is achieved by the use of control/recording cards. This shall address at least the following criteria:

- Delivery temperature of the product (see Appendix- Calibration)
- Use-by-date or deadline of optimal use
- Labelling conformity and, in particular, official food safety mark,
- Batch identification marks necessary to operate any upstream and downstream traceability system
- Integrity of packaging material
- Cleanliness of delivery vehicles which must be specifically designed for the purpose of transporting foodstuffs (food grade materials for containers, thermal insulation, or refrigerated)

Other criteria can be checked according to their importance. Their number should be limited so as to ensure the most effective and efficient verification.

Details of parameter checked/inspected on deliveries may be recorded in a variety of ways, perhaps either on the check cards or by use of an inspection grid, printed from ink pad, on the reverse of delivery orders.

➤ Organoleptic criteria

Criteria listed in the “raw material requirement” must be confirmed and must be recorded. Products unfit for human consumption shall never be used in processes.

➤ Temperature controls at reception

Temperature measurement is necessary when the temperature of the food is essential to ensure food safety (food of animal origin). Temperature shall be measured in products themselves, or at their contacts, in the delivery vehicle or immediately after delivery.

Values indicated in Degree Celsius shall be respected with a tolerance of +/- 4°C at the time of delivery.

***Remark**

After the doors of the delivery vehicle are open, the inside temperature cannot be considered as a valid measure of product temperature.

➤ Other essential criteria

Other criteria may be essential to take into account during control at reception:

- If necessary, the production date or date of packaging (canned or frozen products) even in coded form.
- Labelling conformity and, in particular, official food safety marks.
- Where necessary, laboratory tests should be made to establish fitness for use.

➤ **Receiving (into storage) procedures for raw materials following delivery checks, and any initial decontamination operations**

Some care must be taken during introduction of raw material into storage:

- Maximum time duration following arrival of raw materials into temperature controlled storage (chill rooms and cold rooms) shall be defined and respected.
- Soiled packaging (outer cardboard boxes, wooden pallets or supports, etc.) shall be removed before placing raw materials in clean stores.
- If fruits or vegetables undergoes a decontamination treatment by steeping in disinfectant solution (chlorination, ozonization, etc.) the concentration of disinfectant and holding time (maximum and/or minimum) shall be defined and controlled for each batch.

➤ **Rejection procedures**

The application of a rejection procedure must correspond to the clauses drawn up by contract with supplier. The following needs to be recorded on rejection cards:

- Reference(s) to the rejected batch (identification and constitution);
- The reasons for rejection by reference to the conditions defined in the supply contract;
- Signature of the conveyer and the receiver.

5. Personnel Health Policy

Enforcement of staff (and management) health policy depends theoretically on food establishment occupational health care. It is nevertheless necessary to recommend the following provisions:

- Medical examination from a competent Hospital/Laboratory for every operator employed in handling or manufacturing of foodstuffs for every six months (i.e. twice annually); and
- If clinically or epidemiologically indicated medical examination of a food handler should be carried out.
- The systematic monitoring of staff for lesions caused by staphylococcus through clinical examinations of arms, hands, face, throat, and other exposed skin, to be carried out by a medical practitioner with appropriate food handling experience.
- The systematic monitoring of staff for potential Salmonella carries (probably subject to frequent periodic illness such as diarrhoea) by consultation with a medical practitioner and Health Certificate from a competent Hospital/Laboratory.
- Enforcement of detection procedures for employees likely to carry Staphylococcus or Salmonella, by way of bacteriological analysis.
- Medical treatment for those diagnosed positive with one of these two micro-organisms and temporary exclusion from process areas. It is recommended to do this without penalty so as to ensure staff confidence in the scheme.
- Availability of first aid kits, regularly resupplied, to allow the treatment of wounds and their protection with protective bandages.

- Temporary exclusion from process areas and medical treatment for employees with complex or infected/septic hand wounds and any clinical sign (coughing, diarrhoea, fever, etc.) when justified (recommended to do without penalty so as to ensure staff confidence in the scheme).
- Employees shall be aware of the need to signal any health incident (diarrhoea, vomiting, jaundice, fever, sore throat with fever, infected skin lesions, cuts, wounds or boil, discharges from the ear, eye or nose etc.) presenting a potential risk to the consumer to management, otherwise will be liable to penalties.

***Note:** People known, or suspected, to be suffering from, or to be a carrier of a disease or illness likely to be transmitted through food, should not be allowed to enter any food handling area if there is a likelihood of their contaminating food. Any person so affected should immediately report illness or symptoms of illness to the management.

6. Personnel Hygiene and Cleaning Plan

Hand Hygiene

Hands, which are frequently in direct contact with foodstuff, needs to be considered as the first operational tool. For this reason, detail attention must be given to staff cleanliness (just as with any equipment placed at the operator's disposal) and their washing practice. If not subjected to strict hygiene rules, hands constitute the first vector of contamination of foodstuffs by microorganisms (potentially pathogenic) passed on from the operator. The implementation of training to demonstrate the proper technique for hand washing and drying is recommended.

In order to reduce the risk of contamination from hands, waste bins equipped with opening mechanism and not needing the use of hands (pedal bins) must be installed in all areas where foodstuffs are being handled.

➤ Wash Hand Basin

Wash hand basins shall conform to the following principles:

- The number of wash hand basins shall be adequate for the number of personnel having direct contact with food been processed.
- Water flow shall not be operated by hand, but by foot or knee or by an automatic presence detector and shall be supplied, where appropriate, with hot and cold water (at a suitable controlled temperature).
- Liquid (or foam) soap shall be bactericidal but not a skin irritant (thereby excluding toilet soaps without bactericidal effect).
- Soap dispensers shall be placed in a position adjacent wash hand basin.
- A second dispensers reserved for disinfecting solution (e.g. alcohol solution) can be associated with the liquid soap dispenser.

- The device devoted for hand drying must be of single use (paper towels being practically the only possible solution).
- Nailbrushes complete the wash-stand equipment. They should be entirely made from synthetic matter (handle and bristles) and need to be kept in a dilute clean disinfectant solution, renewed for each work period.

➤ **Hand washing procedure**

- Wetted, liquid soap-smear hands must be rubbed for 20 seconds (the operator: 01...02...03...up to 20).
- The rinsing of hands, which are rubbed under running water, must last a minimum of 10 seconds (counting...).
- Wiping of the hands is not systematic, not being necessary for certain types of activities.
- If a disinfectant solution is used, it shall be allowed to dry naturally on the hands.
- Control of hand cleanliness can be achieved by means of visual inspection, and/or microbiological test, implemented if necessary under the authority of a medical officer.

➤ **Hand washing frequency**

With effective hand washing taking a long time, strict definition of the frequency and circumstances of this procedure is needed. Hands must be effectively washed whenever and wherever their contamination is practically certain. This washing, carried out immediately after dirty operations, will restore hands to satisfactory cleanliness and will prevent any points in contact with hands from gross contamination. If these contact points are themselves grossly contaminated, hand hygiene not possible because, as work continues, they are immediately re-contaminated. Therefore, the best course of action in that case is clean and disinfect those contact points otherwise hand hygiene and washing frequency will be rendered ineffective.

➤ **Complete hand washing after dirty operations (or dirty situations)**

(Practically the same in all branches of the food industry)

- Arrival at the work station
- Passing through and/or using toilets or changing rooms
- After nose blowing
- After dustbin handling
- After handling cardboard boxes delivery (cardboard box bases are often very dirty)
- After handling shell eggs (frequently contaminated by salmonellae)
- After handling non-cleaned vegetables direct from the soil
- After handling game or poultry 'in fur or feather'
- While passing from raw food production areas to cooked food product area (i.e. from low risk to high risk areas)
- In this case materials used (cutting boards, knives, etc.) must similarly be changed or correctly cleaned.

➤ **Quick hand washing before conducting clean operations**

There is a multiplicity of clean operations, each specific to a branch of food industry (e.g. cooked meat cutting, assembly of pastry making etc.). Whilst remaining at work within the confines of an appointed process, only a quick hand washing procedure is necessary, so long as operators

systematically take care to wash their hands after previous dirty operations and if contact point hygiene control is maintained.

➤ **Hands contact points hygiene**

- Hands contact points shall be listed (handles of refrigerators or doors, kitchen utensil handles, machines, electric switches, etc.)
- These contact points must be the object of meticulous daily cleaning (even after each resumption of work at the work station or with a change of operator).

➤ **Personal Behaviors**

People engaged in food handling activities should refrain from behavior which could result in contamination of food, for example:

- No smoking, spitting, snuffing, eating, chewing, sneezing or coughing over unprotected food at work stations, in work places or whenever wearing work clothes.
- No food tasting involving hand-to-mouth.
- To different No nail varnish (or perfume- this is not a hygiene concern, but is one of potential food taint).
- Maintain neat short finger nails.
- No rings, jewelry or watches to be worn (even if wearing work gloves)
- The washing of gloved hands must be carried out with the same procedure as for bare hands.
- No reuse of disposable gloves after use.
- Never use perfume on hands to avoid transmitting smell or abnormal taste to food being prepared/processed.

Personal effects such as jewelry, watches, pins or other items should not be worn or brought into food handling areas if they pose a threat to the safety and suitability of food

Work clothing Hygiene

In agro-food industries, clothing can be a major vector involved in food contamination. Work clothing's when not clean, can be a source of contamination for hands whenever it is used to wipe them. In certain sectors, such as butchery, clothing is in direct contact with handled carcasses (e.g. in shouldering carcasses when loading/off-loading delivery vehicles).

Work clothing design and its management must respect specific principles:

- It is of a standard type and be provided by the company, and is adapted to the different activities of the food establishment.
- It is put in a locker/compartiment of cupboard and must be physically separated from personal clothing. The locker shall be maintained clean, shall not contain unprotected food and be designed to prevent access to pests.
- Its color, or the color of one of its element (cap, overall etc.) may be specific to a work station or zone of assignment of operators (e.g. "clean" and "dirty" areas).
- It includes a cap or net which covers the hair- this includes snoods for moustaches and beards (head covering may also be devoted to other purposes, such as shock proof helmets).

- It includes shoes (crush proof and non-skid) which are only worn in the factory (foot wear shall not contaminate work wear in a locker).
- It is laundered by the company or under its responsibility (e.g. by contract with an industrial laundry- in this case the wash method shall be defined to ensure that the laundry is not cross contaminated from dirty clothing or from other sources).
- It is hard-wearing to mechanical actions (tear) and frequent washing and ignition proof.
- Obligation to wear compulsory work attire (or protective clothing for visitors) shall be notified through posting at entry points to food processing areas.
- Operation shall never enter or leave the establishment with their work attire.

Hygiene of boots and shoes and shoes

- Permanent devices (boots/shoes washstands) or movable ones (trays), containing a disinfecting solution, must allow cleaning/disinfection of shoes or boots before getting into the production zone.
- Concentration of disinfectants shall be controlled and maintained at an effective level during the whole processing time.

Visitors

Visitors to food manufacturing, processing or handling areas should, where appropriate, wear protective clothing and adhere to the other personal hygiene provisions in this section.

Premises Hygiene- The Cleaning Plan

Good hygiene of buildings and equipment involves the enforcement of a cleaning plan.

Important

- There are at least two copies of the cleaning plan in the factory:
 - A complete version of the document, held and updated by the department of quality management, and to which technical cards of cleaning and disinfection products used are attached, as well as directions for the use of the machines used in cleaning processes.
 - A divided version, allowing each cleaning operative of the cleaning plan to have the part(s) which relates to his/her duty.
- In the cleaning plan file, task checklists are included, as well as expected results of surface microbiological tests.
- The execution of cleaning tasks must be followed up by recorded checks by the operative, immediately monitoring its effectiveness.
- Conducting microbiological analyses of surfaces makes it possible to check the effectiveness of the cleaning plan.

The method as 'W.W.W.W.W.H' (mnemonic- fives Wives and one Husband) makes it possible to draft a suitable cleaning plan. These letters stand for six questions (When? Who? What? Where? Why? and How?) that direct the development of the plan.

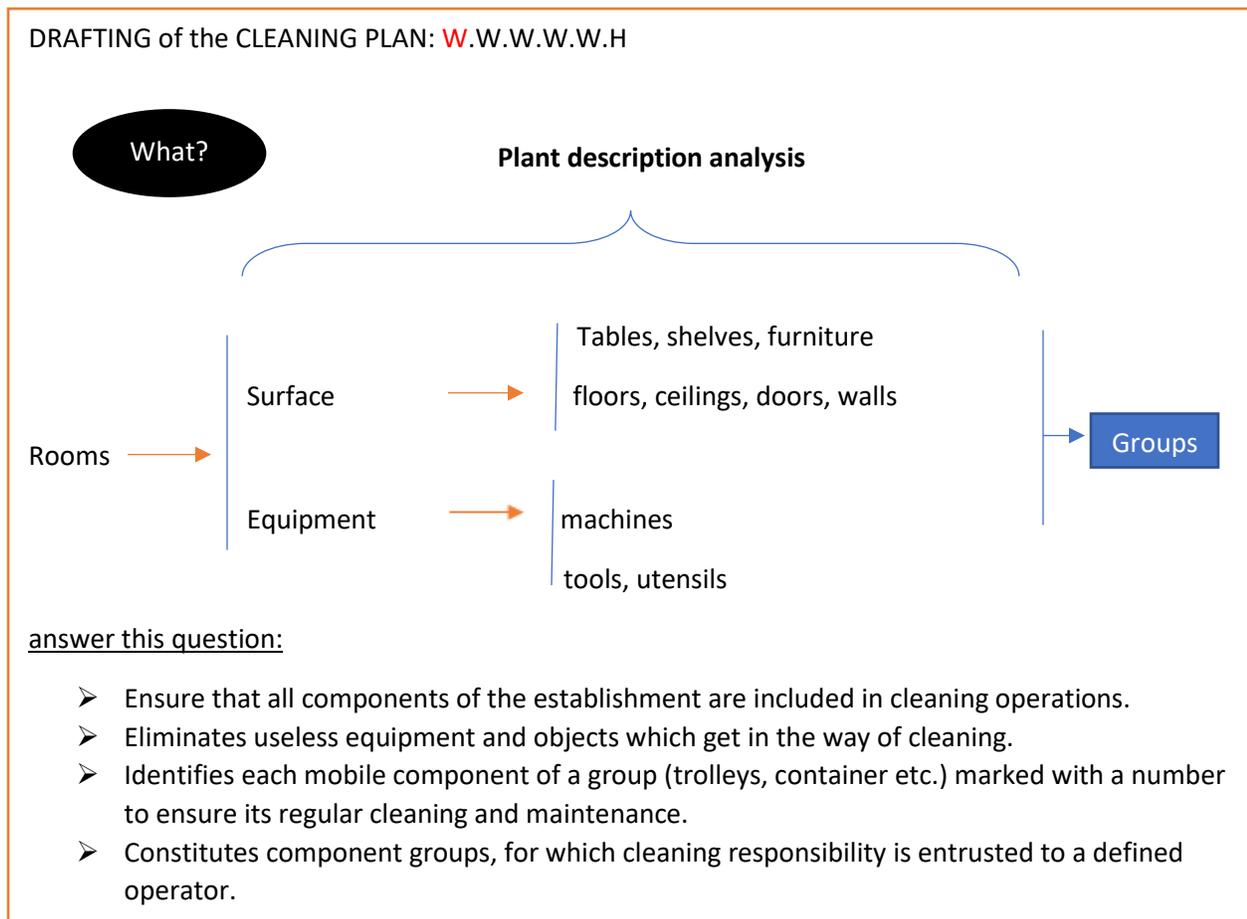
The choice of the first question (asked for When? Or Who? or What?) defines the process of organizing tasks in the cleaning plan:

'When?' -cleaning tasks be organized by day, by week, by month (by schedule)

'Who?' -cleaning tasks will be assigned by operator, by team...

'What?' -cleaning tasks will be organized according to building, department and equipment

➤ 'W.W.W.W.W.H.' method application



➤ **Tool cleanliness during production time**

During use, manual tools need to be subjected to cleaning and frequent disinfection practices by rinsing and putting in a hot water sterilizer (82°C):

- The same tool is regularly cleaned and decontaminated by placing in the sterilizer.
- Or several tools are used and placed in the sterilizer alternately.
- Or all tools are changed periodically to be replaced by tools which have been cleaned and disinfected (every hour, every 30 minutes, etc...).

These operations of cleaning and disinfection of manual tool shall be carried out:

- After work on a soiled product (e.g. hide cutting in slaughter-house).
- Before passing from working on raw foodstuffs to cooked foodstuffs.
- In some operations, such as hide removal in an abattoir, operators are required to pass the tool from one hand to the other. In this case the secondary hand, already soiled, becomes the operating hand which holds the tool. Care needs to be taken to ensure effective cleaning of both tool and hand.

Checking Hygiene/cleanliness by management (Practical hints)

- Select 20 to 30 control criteria for hygiene/cleanliness that you will assess visually (or by simple measurement e.g. t^o)
- Build-up a quarterly diagram with 13 columns (13 week/quarter) and as many lines as your control criteria (C).
- Select one person, responsible to perform the checks for the quarter (change this person once every quarter, you could train a person from another department of the factory/company to perform the checks). Perform the assessment each week the same day at the same hour.
- Each time a control criteria is checked, two possible answers:
 - The assessment is positive, that is a + (in blue)
 - The assessment is negative, that is a – (in red).

W	1	2	3	4	5	6	7	8	9	10	11	12	13
C1	+	+	+	+	+	-	-	-	-	+	+	+	+
C2	+	+	+	+	+	+	+	+	+	+	-	-	+
C3	+	-	+	+	+	+	+	+	+	+	+	+	+
C4	+	+	-	-	-	-	-	+	+	+	+	+	+
C5	+	+	+	+	+	+	+	+	-	+	-	-	+

Preventing contamination by chemical and physical hazards

➤ Contamination by physical hazards

Preventive measures shall be taken to avoid contamination of food by extraneous harmful substances, for example by:

- Use of metal detectors
- Use of sieving, sorting by gravity or filtration for glass, plastics, mineral, foreign matter or wooden particles as well as dead insects.

➤ **Contamination by chemical hazards**

The design of the establishment, process and equipment, as well as the program of preventive maintenance or cleaning/disinfection shall avoid the contamination of foodstuffs by chemical substances. This includes:

- Preventing contamination by cryogenic fluids,
- Preventing contamination by hydrocarbon or lubricants,
- Preventing contamination by residues of cleaning and disinfecting substances.

Preventing contamination by packaging materials

Key principles shall be respected as regards the safety of packaging material:

- They shall be stored in hygienic conditions, so as to avoid their deterioration and the contamination of foodstuffs with which they are put in contact.
- They shall be designed to ensure an optimal protection of foodstuffs to reduce contamination, prevent damages and allow an appropriate labeling.
- They shall not transfer to foodstuffs any toxic substances (plasticizers, ink, glue, injected gas in the packaging)
- When reused they shall be easy to clean and disinfected. When these conditions are not met, they shall not be reused.

7. Hot and Cold Technology and Foodstuff Formulation

Cold chain technology

The application of cold chain technology allows a routine control of physical parameters (time and temperatures), their monitoring and recording. The monitoring of these parameters (and their record), for each batch stored or processed, allows the introduction of CCPs, if a HACCP risk analysis indicates that this is necessary.

In general, cold storage (frozen or chill) is reserved for high quality products. Cold application (freezing or chilling) needs to be conducted as quickly as possible and the appropriate low temperatures maintained continuously until further processing or consumption. This continuous application shall be, when feasible demonstrated by temperature measuring and recording either manually or by automated devices.

If necessary, food establishments in the primary production sector (fishery or dairy products) must be equipped so as to ensure cold storage of collected products and their maintenance at appropriate temperatures.

➤ **Chilling**

Chilling is the application of non-freezing cold temperature conditions to preserve foodstuffs. This technique only allows for the slowing down (not cessation) of deterioration. Consequently, it can be applied to foodstuffs only for relatively short periods according to the type, such as 2 or 3 days for only minced meat, and perhaps a few weeks for some pasteurized products.

- To avoid taint by other odor, or contamination from the cold storage ventilation, or dehydration, chilled stored products must be protected by:
 - Food wrapping film;
 - By an entire packaging wrap.
- Any stacking of containers of unprotected foodstuffs must be avoided in order to prevent contamination of foodstuffs in lower containers from dirty bases of upper containers.
- If at all possible products of different food groups (meats, vegetables, fish, etc.) needs to be stored in separate cold rooms.
- In the absence of separate chill storage rooms, it is necessary to store each type of product on specific rack so as to avoid cross-contamination (especially vertically) by any exuded lipids, with the most contaminated products on the lower racks in order to minimize contamination by gravity.
- 'FIFO' (first in/first out) must be followed for each type of product.
- The Alternative to FIFO is the use of products of the same type in order of expiry date.
- 'FIFO' is fulfilled by effective control of product turnover, made possible by enforcement of a traceability system.
- Expiry dates on cold product's packaging must be rigorously respected.
- Storage in cold stores shall allow an appropriate air circulation between the products.
- Storage of unprotected foodstuffs directly on the floor (as well as packed products) must be rigorously prohibited, because it presents:
 - An obstacle to cleaning the floor;
 - Subsequently, a source of contamination of work surfaces when products are used;
 - A potential source of contamination of hands during the handling of heavy or bulky products; and
 - Possible contamination of product.
- Ventilation ducts of chill rooms, and air dispersal socks in chilled work rooms must be regularly cleared of dust and be washed, to avoid the spread of spores of molds accumulated on grids, ventilators and sock materials.
- Storage conditions must guarantee an adequate humidity for each type of food (meat, cereals etc.).
- The temperature of chill rooms must be regularly recorded for monitoring purposes, if possible by the use of automated devices (automatic graph or computerized record) for continuous recording.
- Alternatively, by direct temperature measurement and recording carried out on the stored product, at least once per day but preferably more frequently (based on the degree of confidence on the refrigerating equipment involved and use patterns of the store).

➤ **Quick Chilling**

This rapid cooling technique relates mainly to products cooked in advance, and to pasteurized products, after partial microbial decontamination by a heating process. In practice, it is used to reduce microbial activity (especially multiplication) by a quick reduction of temperatures, but also the reduction of water activity on the surface of foodstuffs. This second aspect is largely in abattoirs (cooling-off). Its use must respect particular principles:

- The operation of a fast cooling chamber (or other suitable method) whereby the internal temperature of products must go down from 63 °C (or more) to 10 °C (or less) in under 2 hours.
- Reheating of refrigerated prepared foodstuffs must allow the core temperature of ≤ 3 °C of the product to be brought to ≥ 63 °C in a maximum one hour.
- Dividing the mass of product into smaller quantities makes the achievement of good rapid chilling performance possible.
- To ensure the attainment of the required performances, for each batch of production identified, core product temperature shall be systematically monitored and recorded, from chill start to finish.
- This monitoring, for each batch processed and then through storage, allows implementation of CCPs, if an HACCP risk analysis indicates that this is necessary.

➤ **Freezing**

Freezing inhibits virtually all microbial activity (through low temperature and the effective withdrawal of available water). It is also strongly retards deterioration of biochemical origin (such as rancidity).

Consequently, the frozen product can be successfully preserved for several months (generally for up to 12 months, although longer periods can provide acceptable product subject to strict control and possible testing).

However, certain principles must be respected in using this technique:

- The core temperature must be reduced below freezing point as quickly as possible
- Dividing the mass of product into smaller quantities makes the achievement of good rapid freezing performance possible
- Maintaining air circulation around each product piece when divided.
- Freezing in a frozen cold store does not produce foodstuffs of good organoleptic quality, due to cell breakdown caused by a slow freezing rate. It is also prejudicial to the quality of frozen products already within store.
- Bulky foodstuffs may be divided into smaller unit sizes to obtain better performance of the freezing process.
- Foodstuffs intended to be frozen should be placed in protective package before the freezing process, to avoid surface deterioration by cold burn.
- FIFO (see chilling above) principles should be maintained.
- The temperature of the storage freezers must be regularly checked by:
 - Using automated devices (automatic graphs or computerized record) for continuous recording, or

- Direct measurement and recording of temperatures, checked between two surfaces of the stored foodstuffs held tight together, at least once per day, by using thermometer probes.

➤ **Storage of chilled/frozen foodstuffs**

Storage temperature is a key parameter to ensure the safety of perishable refrigerated foodstuffs (especially food of animal origin). Temperature must be measured in the food itself by using contact probes.

Indicated temperature values, measured in degree Celsius shall be respected with a tolerance of +/- 2 °C during storage. The indicated values are upper limits to be respected. Using lower temperatures may allow a better preservation of foodstuffs stored for longer periods.

***Remark**

After the doors of the cold store are open, the inside temperature cannot be considered as a valid measure of product temperature.

➤ **Refrigerated transport vehicles**

Refrigerated transport vehicle must be considered as mobile cold stores. The performance characteristics must be identical to a fixed cold store. The transport vehicles must be frequently cleaned, scheduled and be recorded.

➤ **Defrosting**

Frozen foodstuffs are generally not usable in its state and a frequently subjected to defrosting phase prior to use. Defrosting is a slower process than freezing and therefore product undergoing treatment tends to be in a vulnerable state for longer than in freezing. This process can be of hazard.

It must be carried out using appropriate methods, in conditions of controlled temperature, so as to ensure that all parts of the product undergoing defrosting do not rise above normal positive cold storage temperature, or is carried out quickly enough not to compromise food safety.

Defrosting can be carried out:

- By placing large frozen pieces in a chill room well in advance of expected use (without causing potential risk of contamination to other stored products).
- By microwave technology.
- By direct cooking of frozen product.
- For small pieces, frozen in a protective package, a hot water bath actively kept to the boil can be used.

***Important**

Defrosting shall **NEVER** be applied:

- At an ambient temperature;
- In a moderately warm water bath.

Heat Processing Technology

There are three main techniques based on the use of heat:

- Cooking
- Pasteurization
- Sterilization in can, bottle or other pack.

They present similarities:

- They reduce the microbial flora of the food product.
- Their effect can be quantified by a reference rate (cooking rate, pasteurizing rate, or sterilizing rate).
- This quantified rate results from the combined effect of time and temperature.
- The application of these technologies allows, for each manufactured or stored batch, routine control of physical parameters (time and temperature) and their recording. This monitoring, for each batch processed and then through storage, allows implementation of CCPs, if a HACCP risk analysis indicates that this is necessary.
- The application of these technologies is subjected to common rules and some particular rules.

➤ **Rules suitable for cooking**

- The temperature and duration time of cooking must be the subject to measurement and recording for monitoring purpose.
- Cooked products meant for immediate consumption must be kept at a temperature $\geq 63^{\circ}\text{C}$ for not more than 2 hours.
- Constant unit volumes of food batches, makes it possible to reproduce identical cooking conditions for all manufactured batches.
- Cooking in advance shall never be followed by a slow cooling process.
- Foodstuffs prepared and cooked in advance must imperatively be chilled rapidly in the conditions defined above (Quick Chilling). Quick chilling cells or any method with similar performances must be used

➤ **Suitable rules common to pasteurization and canning**

- Reduction effect of these two methods on the microbial flora of foodstuffs, can be quantified by reference value:
 - pasteurization value
 - Sterilization value
- Preliminary series of test makes it possible to establish a reference scale of sterilization/pasteurization parameters for each type of product.
- The evolution of the 'time/temperature' combination for an effective processing must be checked and recorded by:
 - Measurements carried out at regular intervals
 - The layout of a graph plotted by automated devices.

- Canned food must undergo a sterilization process guaranteeing their stability in their usual storage conditions.
- Shelf life of pasteurized products is defined by the food operator (under his responsibility), on the basis of:
 - The pasteurization value obtained through the treatment (time/temperature) applied.
 - Stability tests by incubation or aging test through prolonged storage of the product.
- The complete sealing of the packages (cans, bottles, jars etc.) in to which products for processing are placed must be ensured and controlled.
- Each manufactured batch shall be composed of identical products:
 - Of the same chemical and physical composition, (formula, viscosity etc.)
 - Of the same size
 - Of the same shape
 - In the same packaging materials

Control by foodstuff formulation (composition)

Foodstuff formulation dictates the physico-chemical characteristics of the products, use in food preservation, including:

- pH(acidity). The control of acidity standard value of foodstuffs must be guaranteed, either by direct measurement of this parameter (pH meter), or by measuring the raw materials in its formulation.
- A_w (water activity) corresponding to water availability for microbial activity. The control of the standard A_w value of products for which the control of this parameter is essential (salted, dried or sweetened products) must be guaranteed, either by direct measurement of this parameter, or by measuring the raw materials entering in its formulation.
- Viscosity. The efficiency of a sterilization or pasteurization process applied to a food product containing a liquid phase depends on its viscosity. The lower the viscosity is, the quicker the heat transfer in all parts of the product will be.
- Nutrient content:
 - Proteins
 - Carbohydrates and other microbial growth factors.
- Content of inhibiting elements:
 - Nitrites
 - Fatty acids
 - High salt levels
 - High sugar levels.
- Some of these parameters, fluctuation of which have a direct effect on microbial activity, are easily and quickly quantifiable and thus be exploited for the implementation of control at CCPs.

- To guarantee the precision of formulation, measurements of component ingredients are needed:
 - Volume
 - Weight
- For finished products, or for work-in-progress, some measurements are also taken, such as:
 - Acidity (pH)
 - Water activity (A_w)
 - Viscosity
 - Liquid density (as a measure of dissolved solutes)
 - Temperature (T°)

8. Packaging, Labelling, Traceability and Recall procedures

Packaging

Material used for food packaging must be food grade and suitable for the intended purpose. In addition to the packaging material being food grade it shall be:

- Free from contamination
- Able to maintain product quality
- In accordance with the Food Safety and Quality Act, 2011 and other existing regulations.
- Able to maintain the food safety functions of the product i.e. protect the food from external contamination and prolong the self-life of the product.

Labeling rules

Labelling of prepackaged foods should be with clear instructions to enable the next person in the food chain to handle, display, store and use the product safely and must be in compliance with **FSQA requirement on labelling**. It shall in particular contain:

- Product name
- Product composition or list of ingredients in which all ingredients shall be listed in descending order of ingoing weight (m/m) at the time of manufacture of the food.
- Storage temperature for perishable foodstuffs.
- The country of origin and the health mark of the establishment where it has been produced if such a mark exists, or the name and address of the establishment.
- A “*Best before date*” (Date of minimum durability; i.e. the date which signifies the end of the period under any defined storage conditions during which the product will remain fully marketable and will retain any specific qualities for which tacit or express claim have been made. However, beyond the date the food may still be perfectly satisfactory) or “*Use-by-date*” (Recommended last consumption date, Expiry date; i.e. the date which signifies the end of the estimated period under any stated storage condition, after which the product probably will not have quality attributes normally

expected by the consumer. After this date, the food should not be regarded as marketable).

- Production date or packaging date in clear or in code.
- The batch number.

Labelling may contain non-compulsory information such as information for the use and claims in accordance with national regulation for food labeling.

Traceability and Recall

Food establishment shall be implementing two different treatment process simultaneously:

- The processing of foodstuffs which leads to a finished product using raw materials.
- The gathering (at the level of suppliers and inside the enterprise) and management information relating to the foodstuffs and its transmission to the end user with the finished product, in the form of traceability information.

Managing efficient management of this information is essential to establish recall procedures, to design and deploy a Food Safety Management System which can be based on the HACCP method. It is recommended to establishment a simplified audit procedure, regularly implemented so as to check the effectiveness and efficiency of the traceability system. This procedure should comprise:

- An upstream traceability test on raw materials stored in the enterprise.
- A downstream traceability test on batches of dispatched finished products.

***Note: For more detail guide on traceability, refer to FSQA guideline on traceability [FSQA-GL 3 (2016)] and recall [FSQA-GL 4 (2016)]**

9. Finish Product Analysis- Own Check

Sampling Plans

Sampling plans shall be risk-based and shall:

- Address finished products (and if necessary raw materials or semi-finished products) as well as the work environment (equipment, tools, table etc.)
- Refer to standards methods of analysis applied by Codex, which shall be equivalent to those laid down in national legislations (Food Safety and Quality Act, 2011 and other applicable regulations).
- **Microbiological-** Refer to qualitative (list of generic flora to be detected) and quantitative (maximum limits for the presence of pathogens) microbiological criteria.
- **Chemical-** Refer to qualitative (list of chemical to be detected) and quantitative (maximum limits for the presence of the chemical) physicochemical parameters.

- **Physical-** Refer to qualitative (list of physical matter to be detected) and quantitative (maximum limits for the presence of the physical hazards) parameters.

Products

Bacteriological and chemical testing carried out on finished products is generally characterized by a relatively long response time. As a result, it is not possible to await the receipt of tests results to affect production control, nor even to wait for them for product release.

Consequently, test on finished products have an assessment function of GHP, as well as on the operating HACCP plan. Unfavorable results do not make it possible to employ corrective actions on finished product, but must lead to re-evaluation and improvement of GHP implementation, as well as the HACCP plan. Within the framework of risk analysis carried out in a HACCP study, bacteriological and chemical test on products at different production stages makes it possible to evaluate the impact of each process activity/step, in terms of risk reduction or increase.

Surfaces

Bacteriological testing carried out on tools or equipment surfaces are characterized by a relatively long response time. As a result, it is not possible to await the receipt of test results to affect production control, nor even to wait for product release. Consequently, test on tool or equipment surfaces have an assessment function on GHP, as well as on operating on the HACCP plan. Unfavorable results do not make it possible to employ corrective actions on finished product, but must lead to re-evaluation and improvement of the factory-cleaning plan.

Figure 5: Consistency criteria for bacteriological analysis of foodstuffs

Interpretation of the Flora

- Total aerobic mesophilic flora:
 - is an indication of total contamination;
 - it reaches high values in any case of failure of the hot or cold thermal process chains (refrigeration, delayed hot distribution, cooling etc.)
 - the return to normal values will be obtained by reinforcement of thermal process chain control.
- Total coliforms:
 - is an indication of possible faecal contamination;
 - to correct such a variance, it is necessary to seek out and control the sources of faecal contamination (e.g. dirty operator's hands, animal gut content, ground spread manure contaminating green vegetables, egg shells, etc.)
- Faecal coliforms:
 - is an indication of definite faecal contamination;
 - to correct such a variance, it is necessary to seek out and control the sources of faecal contamination (e.g. dirty operator's hands, animal gut content, ground spread manure contaminating green vegetables, egg shells, etc.)
- Staphylococcus aureus:
 - Is responsible for food poisoning;
 - Is particularly of human origin, often in partnership with faecal coliforms;

- to correct such a variance, it is necessary to seek out and control the sources of human origin contamination (e.g. dirty operator's hands, etc.)
- Clostridium perfringens (anaerobic sulphite reducing bacteria):
 - Is responsible for food poisoning incidents;
 - Is of faecal or ground origin and is frequently in spore form;
 - To correct such a variance, it is necessary to seek out and control the sources of faecal contamination (e.g. dirty operator's hands, animal gut content, ground spread manure contaminating green vegetables, egg shells, etc.)
- Salmonellae:
 - Are responsible for serious food poisoning incidents;
 - Are of faecal origin and most of the times associated to poultry/egg and related products;
 - To correct this anomaly, it is necessary to seek and control the sources of faecal contamination (e.g. dirty operator's hands, animal gut content, ground spread manure contaminating green vegetables, poultry/egg shells or poultry products, etc.)

Figure 6: Consistency criteria for chemical analysis of foodstuffs

Interpretation

- Total aerobic mesophilic flora:
 - is an indication of total contamination.

10. Transportation

Measures should be taken where necessary to: – protect food from potential sources of contamination; – protect food from damage likely to render the food unsuitable for consumption; and – provide an environment which effectively controls the growth of pathogenic or spoilage micro-organisms and the production of toxins in food.

Food may become contaminated, or may not reach its destination in a suitable condition for consumption, unless effective control measures are taken during transport, even where adequate hygiene control measures have been taken earlier in the food chain.

Food must be adequately protected during transportation. The type of conveyances or containers required depends the nature of the food and condition under which it has to be transported. Where necessary, conveyances and bulk containers should be designed and constructed so that they:

- do not contaminate foods or packaging;
- can be effectively cleaned and, where necessary, disinfected;
- permit effective separation of different foods or foods from non-food items where necessary during transport;
- provide effective protection from contamination, including dust and fumes;

- can effectively maintain the temperature, humidity, atmosphere and other conditions necessary to protect food from harmful or undesirable microbial growth and deterioration likely to render it unsuitable for consumption; and
- allow any necessary temperature, humidity and other conditions to be checked.

Use and Maintenance of transport Vehicle or container

Conveyances and containers for transporting food should be kept in an appropriate state of cleanliness, repair and condition. Where the same conveyance or container is used for transporting different foods, or non-foods, effective cleaning and, where necessary, disinfection should take place between loads.

11. Staff Training

A training plan on general principles of food hygiene shall be designed and implemented in every food business. Each person shall receive training at a level of complexity matching his/her responsibilities in the implementation of food safety measures in the establishment. The following simple principles can be followed to plan, design and implement staff training.

Sequence to be followed

- Analyze the training needs, taking into account the specific context of the enterprise and the different staff needs to be addressed.
- Establish a training plan with clearly defined objectives and indicators.
 - Example: train all the seasonal personnel in hygiene before they are sent to production. The indicator in this case is the number of persons who have attended the session and the different skills to be acquired.
- Design and organize the session. This is where the training tools and materials are prepared and the logical arrangements made.
- Carry-out the training.
- Assess the effects and establish for each person a record of training.

Training program

The following factors are to be taken into account in assessing the level of training required:

- The nature of the food been prepared/processed/packaged in a particular establishment and the ability of the food to sustain growth of pathogenic or spoilage micro-organism.
- The manner in which the food is handle and packaged, including the probability of contamination (physical, chemical and biological).
- The extent and nature of processing or further preparation before final consumption.
- The conditions under which the final product will be stored.
- The expected length of time before consumption.

A few tips for trainers

- 2 weeks before the session, confirm the implementation conditions, i.e. dates, list of participants, room etc.
- A week before the session, make sure all the equipment and materials to be distributed are available.
- A day before the session, the trainers should ask themselves the following question and make sure they are implemented:
 - Is equipment in place?
 - Is the room ready to receive the trainees?
 - Is the material to be distributed ready?
- Every morning (if the session lasts several days) make a synthesis of the previous day, answer questions, and present the program of the day.
- During the session, alternate the functions (producer, regulator, and facilitator), explain difficult points, have exercises done by the trainees, listen carefully to the trainees and answer all questions asked.

Awareness and Responsibilities

Food hygiene training is fundamentally important. All personnel should be aware of their role and responsibility in protecting food from contamination or deterioration. Food handlers should have the necessary knowledge and skills to enable them to handle food hygienically. Those who handle strong cleaning chemicals or other potentially hazardous chemicals should be instructed in safe handling techniques.

Instructions and supervision

- There should be periodic assessment on the effectiveness of the training.
- Instruction programs should be made as well as routine supervision and checks to ensure that the procedures are being carried out effectively.
- Managers and supervisors of food processes should have the necessary knowledge of food hygiene principles and practices to be able to judge potential risks and take necessary action to remedy the deficiencies.

Assessment of the training

- Evaluate if the trainees have acquired the necessary skills and/or competence.
- Measure deviations using the indicators defined in the beginning of your training.

Refresher training

- The training programs should be routinely reviewed and updated where necessary.
- There should be systems in place to ensure that food handlers remain aware of all procedures necessary to maintain the safety and suitability of the food prepared/processed/packaged in a particular establishment.

12. Documentation and Record Keeping

All the above prerequisites program must be implemented and documented. Where necessary, appropriate records of processing, production and distribution should be kept and retained for a period that exceeds the shelf-life of the product. Documentation can enhance the credibility and effectiveness of the food safety control system. The following below are guides to documenting PRPs:

Documentation

- Documentation and record-keeping should be appropriate to the nature and size of operation. They should also assist the business in verifying that controls are in place and are being maintained.
- Records play an essential role in determining whether the food operation conforms to its PRPs.
- Documentation can enhance the credibility and effectiveness of the food safety control system.
- It is important to point out the committed errors and the changes made. It seeks to reflect the history of the process and assess the causes of deviations.
- Documentation should facilitate replication of activities and contributes to establish best practices allowing continuous improvements.

Record keeping

- Records should be legible and should accurately reflect the actual events conditions and activities
- Any changes to records should be traceable.
- Records should be kept in a secure location, maintained and readily available for a period of time that the shelf life of the product.
- Each entry on a record should be signed and dated by the responsible person at the time the specific event occurred.
- Records could be in electronic format, as long as they can be retrieved upon request. They should be password protected and should be backed up frequently on a set schedule.
- The operator should establish record keep procedure to demonstrate all the activities related to PRPS.

13. Operational Prerequisite Programs (OPRP)

Most food safety incidents are associated with poor management of PRPs. Therefore, every establishment should ensure that the PRPs are effectively implemented and to do that you need OPRP.

Operational prerequisite programs (OPRPs) are prerequisite programs (PRPs) that are essential. They are essential because a hazard analysis has shown that they are necessary in order to control specific food safety hazards.

OPRPs are used to reduce the likelihood that products will be exposed to hazards, that they will be contaminated, and that hazards will proliferate. OPRPs are also used to reduce the likelihood that the processing environment will be exposed to hazards, that it will be contaminated, and that hazards will proliferate in that environment.

Consider using an operational prerequisite program (OPRP) to manage a control measure:

- If strict control is *not* needed.
- If your control measure is *unlikely* to fail in the future.
- If a control failure would *not* have severe consequences.
- If monitoring and rapid corrective action is *not* feasible.
- If your control measure does *not* need to be able to cope with significant processing variability.
- If your control measure is *not* designed to eliminate or reduce the level of a specific food safety hazard.
- If your control measure's place in the system makes it convenient to make it part of your OPRP.
- If a control measure helps to boost the effectiveness of another control measure that is also part of your OPRP.

If the above conditions do not apply to your specific control measure, consider using your HACCP plan to manage it.

*Note 1: Anything that is a PRP and is identified as crucial should be identified as OPRP. They are the CCP of the GMP and GHP world.

*Note 2: HACCP plans use critical control points (CCPs) and critical limits to control food safety hazards, while OPRPs do not.

How do we monitor and verify OPRP (pest control, hand sanitizing, effectiveness of cleaning etc.)?

Here is an innovative and verification technologies tips:

- E-monitoring of any inspection point (examples)
 - E-pest monitoring
 - Remote Video monitoring
 - ATP Bio- luminescence cleanliness monitoring etc.

These technological advancements can effectively help in monitoring PRPs that are crucial in eliminating or reducing food safety hazards to safe levels. They can help the establishment be aware of a food safety problem as it is occurring and address it there and then.

ANNEX I - Standard Operating Procedure Example

Plant Name: “Samoo” Restaurant	Issued date: 12/07/2018	Page: 22 of 38
Product: Omelet-Plain, cheese and cheese Biscuit	Address: 28 Kairaba Avenue, The Gambia	Product code:
Form Name: Sanitation Control (Assemble, Wrap table sanitization)		
Location: food Contact surfaces such as tables		
Purpose: cleaning and sanitizing of the assembly and wrapping table is important to remove potential allergens and reduce microbial cross-contamination or recontamination with environmental pathogen that may impact product safety.		
Frequency: <ul style="list-style-type: none"> ○ Cleaning: At lunch break, after cheese Omelet Biscuit production, and at the end of daily production ○ Sanitizing: before operations begins, at lunch break, after cheese omelet Biscuit production and at the end of daily production. 		
Responsible person: Sanitation team member		
Procedure: <p>Note: blue cleaning tools are to be used ONLY for cleaning after cheese biscuit run to reduce the potential for unintentional allergen transfer.</p> <p><u>Cleaning</u></p> <ol style="list-style-type: none"> 1. Remove unused packaging materials to an area at the end of the shift to prevent it from getting wet. Cover it during the lunch clean up. 2. Remove gross soil with a squeegee. 3. Wipe table surface with a clean cloth dipped into ABC cleaning solution (Y ml/gallon). 4. Rinse table with potable and clean water. Detergent remaining on the surface can inactive the sanitizer. <p><u>Sanitizing</u></p> <ol style="list-style-type: none"> 1. Spray table surface with 200-ppm quaternary ammonium compound solution, ensuring that the entire surface is covered. 2. Allow table to air dry, about 5 minutes. Contact time required per table – 1 minute. 		

<p>Monitoring: (at frequency indicated above)</p> <ul style="list-style-type: none"> ○ Inspect table for residual soil and cleanliness. Record on Daily sanitation sheet. ○ Use test strip to measure the quat concentration BEFORE application. Record on Daily Sanitation Sheet.
<p>Correction:</p> <ul style="list-style-type: none"> ○ If residual soil is observed on the table, re-clean and sanitize. ○ if quat is not at the proper concentration, make a new solution.
<p>Records: Daily Sanitation sheet</p>
<p>Verification: Supervisor reviews and sign Daily sanitization Sheet within 7 working days</p>

Standard Operating Procedure sample Template

Plant Name:	Issued date:	Page:
Product:	Address:	Product code:
Form Name:		
Location:		
Purpose:		
Frequency:		
Responsible person:		
Procedure:		
Monitoring: (at frequency indicated above)		

Correction:
Records:
Verification:

Annex II-Gap Assessment Template

Audit grid Indicator (AGI)

sa = satisfactory

ac = acceptable

ns = non satisfactory

ab = absence

na = not applicable

Considered criteria	AGI	Comments	Documents associated to these criteria	AGI	Comments
1. Building					
1.1 Conformity of the premises: general organization: <ul style="list-style-type: none"> - Conformity of the establishment immediate surrounding - Doors in sufficient numbers - Compliance with the onward flow principle - Separation of clean and unclean sector - No crisscross of the production line 			Plan of establishment showing: <ul style="list-style-type: none"> - Drinking water supply - Waste water drain off - Identification of rooms - Position of workstation and equipment - Position of changing room and toilets - Location of inputs/outputs of flow (staff, finish products, raw materials etc.) - Flowchart of flows (staff, raw materials, 		

<ul style="list-style-type: none"> - Separation of hot zone and cold zone 			<p>waste, packaging materials etc.)</p>		
<p>1.2 conformity of the premises: construction:</p> <ul style="list-style-type: none"> - wall coverings: smooth, light colored, washable, resistant, non-absorbent - floor coverings: smooth, light colored, washable, resistant, non-absorbent - floor and walls joined by round gorge assemblages - floor grids and U-bends to collect waste water - ventilation devices ensuring steam and smoke elimination - doors and windows conform - light bright and neutral in color 			<p>Explanatory leaflet of materials used and techniques of construction employed (SOP)</p>		
<p>1.3 Conformity of the premises: equipment and furniture</p> <ul style="list-style-type: none"> - Materials: inalterable, non-absorbent, and easy to clean and disinfect - Furniture: smooth, 			<p>Explanatory leaflet of the equipment and furniture (SOP and material specifications)</p>		

<p>washable, resistant</p> <ul style="list-style-type: none"> - Work surfaces: smooth, washable, resistant, easy to clean and disinfect - Machine: resistant, easy to clean and disinfect 					
1.4 Lawful or normative conformity			<p>Documents attesting of:</p> <ul style="list-style-type: none"> - National approval - Foreign country importation approval - Certificate of voluntary setting in conformity with specific food safety standards 		
1.5 Maintenance of building and equipment			Daybook of technical maintenance of buildings and equipment (SOP and monitoring forms)		
2. Supplies					
2.1 contractual relationship with suppliers					
2.2 raw material specifications			<ul style="list-style-type: none"> - contracts past with suppliers - criteria of acceptance of batches - planned corrective actions for any cases of loss of control - cards of specification of raw materials - composition - microbiological standards - residue limit contents - Conditioning (type's volume, weight etc.) 		

			<ul style="list-style-type: none"> - preserving conditions - lifespan/shelf life - organization of stock turnover 		
2.3 checking of deliveries			<p>Monitoring forms/acceptance checklist for:</p> <ul style="list-style-type: none"> - recording cards of control deliverables - temperature of delivered products - intact conditions - compliance with consumption deadlines - labelling compliance with food safety requirements - cleanliness of delivery vehicle 		
2.4 water portability			<ul style="list-style-type: none"> - analysis or certificate of water portability 		
3. Implementation of a traceability system					
3.1 System of upstream traceability			<p>Specimen of simulation test of upstream traceability</p> <ul style="list-style-type: none"> - An upstream traceability - Recordings relating to upstream traceability - Delivery control card - Listing of raw material stock 		
3.2 System of downstream traceability			<p>Specimen of simulation test of downstream traceability</p> <ul style="list-style-type: none"> - A downstream traceability plan - Recordings relating to downstream traceability - Customers purchase orders - Listing of finished product stock 		

			- Customers invoices		
4. Pest Control					
4.1 implementation of a pest control plan - management of the outdoor dustbins, absence of waste on the ground - management of materials and equipment outdoor storage			- Pest control plan - Insect control plan - Intervention forms of pest control company/unit		
5. Control of staff originated contamination					
5.1 Medical follow-up of the staff members			- Individual health certificate for food handling ability		
5.2 Plan of staff training			- Time table and content of training activities - Staff members vocational training certificates		
5.3 clothing hygiene: - Standard work clothing supplied by the company - Washing of clothing by the company or under its responsibility - Management of clean and dirty clothing - Lockers with two compartments - Boots/shoes washstands in conformity with standards			- In-house management procedure of clothing or washing supplier contract		
5.4 compliance with GHP and GMP			- specific GHP and GMP approved guides of the production sector or in-		

			house manual of the GHP and GMP of the company		
6. Hands and premises cleaning					
6.1 Hands <ul style="list-style-type: none"> - Handwashing facility in conformity with standards or regulations - Hand washing procedures 			Posting of hand washing instructions near hand washing stations		
6.2 Premises <ul style="list-style-type: none"> - Enforcement of cleaning plan - Microbiological control of effectiveness of cleaning 			Sum of written cleaning procedure comprised in cleaning plan <ul style="list-style-type: none"> - Check-grids of good execution of cleaning tasks - Weekly check-grids of visual cleanliness of equipment surfaces - Reports of microbiological controls of surfaces 		