
UNIT 10 HACCP PREREQUISITES AND GOOD HYGIENIC PRACTICES

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10.0 OBJECTIVES

After reading this unit, we shall be able to:

- grasp the requirements for good hygienic practices (GHP) and sanitation for food establishment;
 - understand the need for safety and quality procedures in the process and establishment as whole;
 - acquire skills to implement the basic food safety and quality practices in the food plant; and
 - design and develop practices and measures to ensure food is produced appropriately under hygienic conditions.
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10.1 INTRODUCTION

The food chain begins from agricultural farm or animal rearing unit. Therefore for the ultimate food served or sold in the markets either in processed form or fresh, it is necessary that the steps to prevent hazards should begin there itself. Thus, primary production should be managed to ensure that food is safe and suitable for its intended use. This also includes avoiding the use of areas where the environment poses a threat to the safety of food like breeding fish in a lake situated near industry emitting heavy metal waste. The control of contaminants, pests and diseases of animals and plants needs to be done in such a way as not to pose a threat to food safety. The main objective of having pre-requisites (PRPs) in place is to reduce the likelihood of introducing a hazard which may adversely affect the safety of food, or its suitability for consumption, at later stages of the food chain.

10.2 ENVIRONMENTAL HYGIENE

For producing safe food, we should consider potential sources of contamination from the environment throughout the food chain. In particular, primary food production should not be carried on in areas where the presence of potentially harmful substances would lead to an unacceptable level of such substances in food. The plant site should be chosen such that it is free from conditions that might interfere with the sanitary operation of the plant, including:

- no land use conflicts or potential conflicts with adjacent sites; and
- set reasonably apart from barnyards, waste disposal facilities, incompatible processing facilities, and any offensive trades.

This could include excessive dust, foul odours, smoke and other similar conditions. Generally, a minimum set-back of 30 meters is recommended from potential sources of contamination. However, a greater or lesser distance could be accepted depending on specific site conditions.

10.2.1 Hygienic Production of Food

The potential effects of primary production activities on the safety and suitability of food should be considered at all times. In particular, this includes identifying any specific points in such activities where there are more chances of contamination. We shall need to take specific measures to minimize these chances/instances. We have already discussed many physical, chemical and biological hazards which could contaminate food.

Specifically the producers/ processors should as far as practicable implement measures to:

- control contamination from air, soil, water, feedstuffs, fertilizers (including natural fertilizers), pesticides, veterinary drugs or any other agent used in primary production;
- control plant and animal health so that it does not pose a threat to human health through food consumption, or adversely affect the suitability of the product; and
- protect food sources from faecal and other contamination.

Care should be taken to manage wastes, and store harmful substances appropriately in such a way that the wastes should not get mixed with the product at any point in the chain. On-farm programmes which achieve specific food safety goals are becoming an important part of primary production and are being encouraged as Good Agricultural Practices/ Good Animal Husbandry Practices both by government, and private retail chains through contract farming.

10.2.2 Handling, Storage and Transportation

We should install and implement procedures for:

- cleaning and sorting food and food ingredients to segregate material which is unfit for human consumption;
- disposal of any rejected material in a hygienic and controlled manner; and
- preventing food and food ingredients from being contaminated by pests, or by chemical, physical or microbiological contaminants or other objectionable substances during handling, storage and transport.

10.2.3 Cleaning, Maintenance and Personnel Hygiene at Primary Production

There should be appropriate facilities and procedures to ensure that all necessary cleaning and maintenance work for raw material, plant and machinery is carried out effectively. Personnel hygiene is a very important aspect to be considered for any food safety and quality programme efficacy.

10.3 DESIGN AND FACILITIES IN THE ESTABLISHMENT

Attention to good hygienic design and construction, appropriate location, and the provision of adequate facilities, is necessary to enable hazards to be effectively controlled. Depending on the nature of the operations, and the risks associated

with them, premises, equipment and facilities should be located, designed and constructed to ensure that:

- contamination is minimized;
- design and layout permit appropriate maintenance, cleaning and disinfections and minimize air-borne contamination;
- surfaces and materials, in particular those in contact with food, are non-toxic in intended use and, where necessary, suitably durable, and easy to maintain and clean;
- where appropriate, suitable facilities are available for temperature, humidity and other controls; and
- there is effective protection against pest access and harbourage.

10.3.1 Location

Establishments

While deciding the location of the plant we need to consider any potential sources of contamination as well as the effectiveness of preventive measures to counter them if any. In particular, establishments should normally be located away from:

- environmentally polluted areas and industrial activities;
- areas subject to flooding unless sufficient safeguards are provided;
- areas prone to infestations of pests; and
- areas where wastes, either solid or liquid, cannot be removed effectively.

The general surroundings of a dairy plant should not attract rodents, flies and other insects which could then gain access to the dairy plant.

Building Exterior

- exterior structure shall be designed and maintained to prevent entry of pests.
- areas surrounding exterior of dairy plant shall be:
 - drained to minimize standing water;
 - free of uncontrolled vegetation, stored items, garbage, or any other condition in close proximity to the plant that could harbour pests; and
 - maintained to minimize creation of dust.

10.3.2 Equipment

Equipment should be located so that it:

- permits adequate maintenance and cleaning;
- functions in accordance with its intended use; and
- facilitates, good hygiene practices, including monitoring.

10.4 PREMISES AND ROOMS

10.4.1 Design and Layout

Where appropriate, the internal design and layout of food establishments should permit good food hygiene practices, including protection against cross-contamination between and during operations by foodstuffs.

10.4.2 Internal Structures and Fittings

Structures within food establishments should be soundly built of durable materials and be easy to maintain, clean and where appropriate, able to be disinfected. In particular, the following specific conditions should be satisfied where necessary to protect the safety and suitability of food:

A) Walls

- shall be smooth, washable and light coloured;
- suitable materials would include tile, concrete, plaster, sealed brick, or other equivalent materials;
- kept in good repair and cleanliness;
- free of flakes, pitting and cracks;
- the surfaces of walls, partitions and floors should be made of impervious materials with no toxic effect in intended use; and
- walls and partitions should have a smooth surface up to a height appropriate to the operation.

Properly finished walls and ceilings are more easily kept clean and as such, are more likely to be kept clean. A light coloured finish aids in the even distribution of light and the detection of unclean conditions which can then be corrected.

B) Floors

Floors of all rooms in which food materials are received, processed or stored shall:

- be constructed of sealed concrete or other equally impervious and easily cleanable material,
- be smooth and not allow for pooling of liquids,
- where applicable, be sufficiently sloped for liquids to drain. Generally, a minimum slope of 2% or more is recommended,
- floor to wall joints should be covered (generally a 15 cm extension is recommended) and sealed for ease of cleaning and maintenance, and
- be kept clean and in good repair.

Floors in storage rooms used for storing dry ingredients or packaging materials, or utility rooms (electrical service, etc.) shall be smooth and cleanable.

C) Ceilings and overhead fixtures should be constructed and finished to minimize the build up of dirt and condensation, and the shedding of particles.

D) Windows should be easy to clean, be constructed to minimize the build up of dirt and where necessary, be fitted with removable and cleanable insect-proof screens. Where necessary, windows should be fixed.

E) Doors should have smooth, non-absorbent surfaces, and be easy to clean and, where necessary, disinfect.

F) Working surfaces that come into direct contact with food should be in sound condition, durable and easy to clean, maintain and disinfect. They should be made of smooth, non-absorbent materials, and inert to the food, to detergents and disinfectants under normal operating conditions.

G) Floor Drains

- Floor drains shall be provided, where necessary, to effectively prevent accumulation of liquids.
- Drain lines shall be sloped, individually trapped, and properly vented to outside air.
- Floor drains shall be separate from sewage drains to a point outside the plant.
- Equipped with removable covers and located so that they are accessible for cleaning and sanitizing.
- For equipment discharging large volumes of water, drainage shall be designed to prevent flooding of surrounding areas.
- Shall be constructed such that there is no cross-connection between the drains or drain lines, and
 - the water supply,
 - the food product lines or equipment, or
 - the CIP system.

The accumulation of liquids on the floor of a dairy plant can lead to an unclean environment which increases the likelihood of contamination of the food products. Properly designed drains and drain lines can eliminate the accumulation of liquids. Trapping and venting of drains prevents sewer gases and pests from entering the plant. The need for the separation of floor drains from sewage drains is to prevent the contamination of the floor drains with human wastes. Human wastes can contain pathogenic bacteria. Contamination of the floor drains with this material increases the likelihood of contamination of the food plant environment with the waste material.

H) Overhead Utility Lines

- must be suspended away from work areas or areas of exposed food products to minimize the potential for contamination;
- where appropriate, insulated to prevent condensation and covered with suitable material for ease of cleaning; and
- lines carrying contaminated or hazardous materials, such as sewer or floor drain lines, should be located sufficiently distant from any product or product contact surfaces or other appropriate actions must be taken so as to ensure there is no risk of contamination.

I) Stairs

- must be located so as to minimize the risk of product contamination;
- constructed of impervious materials that are cleanable;
- catwalks or mezzanines located over processing areas, and where splashing or dripping could pose a contamination risk; and

- must be of solid masonry or metal construction.

Where appropriate, narrow raised walkways for overseeing (catwalks) and balconies (mezzanines) must be equipped with raised edges of a height sufficient to prevent the spread of contamination. Stairs, catwalks or mezzanines over or near work areas or exposed product can act as a source of contamination (eg. dust, dripping liquids) of food products. Raised edges or properly designed splash guards of a height sufficient to contain any splashing from filling to work areas or exposed product below can be effective in minimizing the risk of contamination. Stairs, catwalks or mezzanines should be constructed of materials easy to clean.

J) Exterior Openings

- All doors leading to the outside shall be self-closing and tight fitting.
- Doors, windows and all other openings leading to the outside shall be pest proofed with effective means such as:
 - screening,
 - electric screen panels,
 - fans or air curtains which provide sufficient velocity so as to prevent entrance of flies,
 - strip curtains, or
 - any other method which prevents entrance of pests.

Freedom from pests in the dairy plant reduces the likelihood of contamination of dairy products. Pests may carry pathogenic organisms on and within their bodies. These pathogens could be spread through the plant, including in the equipment as the pests move about the plant.

K) Ventilation

- Adequate ventilation is required to prevent excessive dust accumulation, odours, aerosols or build-up of condensation droplets on equipment, walls and ceilings.
- Designed to cause the direction of air flow to be from the processing areas outward to other areas of the plant.
- Air intakes and outlets shall be located to minimize the chance of contamination.
- Air intakes and outlets and filters shall be maintained to minimize contamination.
- Control ambient temperature.
- Control humidity to ensure the safety and suitability of food.

Ventilation systems should be designed and constructed so that air does not flow from contaminated areas to clean areas and, where necessary, they can be adequately maintained and cleaned. Unclean air, excessive dust, odours, or build-up of condensation are all potential sources of contamination for dairy products. Air supplied to the processing plant should be of sufficient quality so as not to contaminate the equipment or the dairy products, and result in a positive air pressure in the processing areas.

10.4.3 Temporary/ Mobile Premises and Vending Machines

Premises and structures covered here include market stalls, mobile sales and street vending vehicles, temporary premises in which food is handled such as tents, vending carts and marquees. Such premises and structures should be located, designed and constructed to avoid, as far as reasonably practicable, contaminating food and harbouring pests.

This is more applicable in the current Indian scenario where the small scale food vendors and other such establishments are mobilized to cater safe and quality food.

In applying these specific conditions and requirements, any food hygiene hazards associated with such facilities should be adequately controlled to ensure the safety and suitability of food.



Check Your Progress Exercise 1

Note: a) Use the space below for your answers.

b) Compare your answers with those given at the end of the unit.

1) State the objectives of having Prerequisite programme for HACCP.

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2) List any four suggestions for a food plant for the stairs.

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3) How does the location of the food safety plant affect food safety?

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10.5 EQUIPMENTS

10.5.1 General

Equipments and containers (other than once-only use containers and packaging) coming into contact with food, should be designed and constructed to ensure that, where necessary, they can be adequately cleaned, disinfected and maintained

to avoid the contamination of food. Equipment and containers should be made of materials with no toxic effect in intended use. Where necessary, equipment should be durable and movable or capable of being disassembled to allow for maintenance, cleaning, disinfection, monitoring and, for example, to facilitate inspection for pests.

10.5.2 Food Control and Monitoring Equipments

In addition to the general requirements in above paragraph, equipment used to cook, heat treat, cool, store or freeze, should be designed to achieve the required food temperatures as rapidly as necessary in the interests of food safety and suitability, and maintain them effectively. Such equipment should also be designed to allow temperatures to be monitored and controlled. Where necessary, such equipment should have effective means of controlling and monitoring humidity, air-flow and any other characteristic likely to have a detrimental effect on the safety or suitability of food. These requirements are intended to ensure that:

- harmful or undesirable micro-organisms or their toxins are eliminated or reduced to safe levels or their survival and growth are effectively controlled;
- where appropriate, critical limits established in HACCP-based plans can be monitored; and
- temperatures and other conditions necessary to food safety and suitability can be rapidly achieved and maintained.

For example, a dairy plant HTST pasteurizer's Safety Thermal Limit Recorder (STLR).

- 1) Shall be designed, installed and operated to:
 - record the temperature of the product in the sensing chamber,
 - monitor, control, indicate, and record the position of the flow diversion device, and
 - supply the source of power for the flow control device and the flow diversion device solenoid during forward flow.
- 2) The recording chart shall provide an accurate record of the processing temperature. Generally, this is achieved by:
 - time scale divisions that are not more than 15 minutes and spaced not less than 6.4 mm apart at the flow diversion temperature,
 - pens that produce a line not greater than 0.7 mm wide,
 - temperature charts graduated 0.5°C (1.0°F) divisions,
 - a temperature range or span on the recording chart that is not less than 17°C (30°F) with the actual diversion temperature being 7°C (12°F) within the temperature span limits,
 - where resistance thermal devices (RTD's) are used, they shall be of the fail safe type (utilizing two separate RTD's), and
 - shall be equipped with a positive mechanism to prevent chart slippage and manual rotation.
- 3) Shall be tested on installation and at a frequency as specified in the procedures recommended by the authorities.

- 4) The circular chart must rotate one revolution in not more than 12 hours.
- 5) The control panel for the STLR must be sealable.

10.5.3 Containers for Waste and Inedible Substances

Containers for waste, by-products and inedible or dangerous substances, should be specifically identifiable, suitably constructed and, where appropriate, made of impervious material. Containers used to hold dangerous substances should be identified and, where appropriate, be lockable to prevent malicious or accidental contamination of food.

- Sewage disposal systems shall meet all local or provincial requirements.
- Disposal of sewage and solid wastes shall be done in a sanitary manner and not expose the plant environment or the food products to risk of contamination.

Solid waste containers **within** the plant shall be:

- sufficient in number, accessible, and be emptied daily or when full;
- designed to prevent the attraction of pests or contribute to airborne contamination; and
- garbage storage rooms and containers shall be emptied, cleaned and sanitized on a regular basis.

Solid waste containers located **outside** the plant shall be:

- equipped with covers and closed when not in use;
- maintained in a manner not to attract pests; and
- emptied, cleaned and sanitized regularly.

10.6 UTILITIES

10.6.1 Water Supply

An adequate water supply is necessary to ensure effective cleaning and other processing operations. As such, it must be supplied in quantities that encourage adequate rinsing and cleaning. The water supply used in cleaning and other processing operations must be of a safe and sanitary quality in order to avoid the contamination of the equipment, containers, or food products.

There have been instances where cross-connections between the water supply and the CIP system have contaminated the water supply. Inadequate controls over automatic chlorinator systems could result in a water supply that is non-potable.

- An adequate supply of potable water with appropriate facilities for its storage, distribution and temperature control, should be available whenever necessary to ensure the safety and suitability of food.
- Potable water should be as specified in the latest edition of PFA Guidelines for Drinking Water Quality, or water of a higher standard.
- Non-potable water (for use in, for example, fire control, steam production, refrigeration and other similar purposes where it would not contaminate food), shall have a separate system. Non-potable water systems shall be

identified and shall not connect with, or allow reflux into, potable water systems.

- Hot and cold water, under adequate pressure, and in sufficient quantities, shall be provided.
- Water samples shall be tested at a government or accredited laboratory and at a frequency deemed necessary by the regulatory agency.
- Only potable water shall be used in contact with product or product contact surfaces.
- There shall be no possibility of a cross-contamination between the water supply and CIP systems.
- Where automatic chlorinator systems are used, controls and procedures shall be established to ensure quality control for water potability. These include:
 - an automatic metering device for adding chlorine in the correct concentration, and
 - at least once daily, tests shall be made using a reliable chlorine test kit to determine the free residual chlorine level.

Records of residual chlorine tests should be maintained.

10.6.2 Drainage and Waste Disposal

Adequate drainage and waste disposal systems and facilities should be provided. They should be designed and constructed so that the risk of contaminating food or the potable water supply is avoided. You may recall that we have already discussed some specific points for consideration in section 10.4.2 G.

10.6.3 Cleaning

Adequate facilities, suitably designated, should be provided for cleaning food, utensils and equipment. Cleaning facilities should be:

- adequately designed, constructed, and maintained to prevent contamination,
- provided with potable water at temperatures appropriate for the cleaning chemicals used. Generally a minimum of 60°C is recommended when hot water is required, and
- adequately separated from food storage, processing and packaging areas to prevent contamination.

The cleaning machinery should preferably be constructed of corrosion resistant materials capable of being easily cleaned.

These features provide suitable environmental conditions, permit adequate cleaning and sanitation, minimize migration of extraneous material, prevent access by pests, and allow employees to fulfil their duties. Regular maintenance of cleaning facilities is required to maintain adequacy of the premises.

There should be written procedures and specifications for the cleaning-in-place (CIP) and Cleaning-out-of-Place for all production and storage areas of the plant including specific equipment, lines etc.

- the personnel responsible,

- areas to be cleaned,
- the frequency of the activity,
- the chemicals and concentrations used,
- mixing instructions for chemical solutions,
- temperature requirements, and
- procedures for cleaning and sanitizing.

Special sanitation and housekeeping procedures required during production shall be specified within the written programme.

The effectiveness of the cleaning program should be monitored and verified. Generally, this is accomplished by (although not limited to) routine inspection of premises and equipment and/or microbiological testing. Corrective action shall be taken where deficiencies are identified through monitoring. The plant personnel should maintain records that verify the cleaning program. These should be maintained for a minimum of one year or until after expiration of the date code if more than one year or as determined by the regulatory agency.

10.6.4 Personnel Hygiene Facilities and Toilets

Personnel hygiene facilities should be available to ensure that an appropriate degree of personal hygiene can be maintained and to avoid contaminating food. Where appropriate, facilities should include:

Hand washing: There should be accessible hand washing stations at appropriate locations, with potable running water at a suitable sanitary temperature. Soap/ other hand sanitizing solutions, sanitary hand drying equipment or facilities for employees to wash and dry hand are required. The water control devices/ taps should be such that recontamination of hands is prevented. Garbage bin is to be provided if disposable hand towels are provided to dry hands. Also easily understandable signs to remind the employees to wash hands in correct manner should be installed.

Wash rooms and Toilet rooms: Wash rooms and toilet rooms should be separated from and should not open directly into the food storage, handling and processing areas. Wash rooms should be provided with adequate handwashing facilities, covered garbage bins, and easily understandable signs to serve as reminders to the employees. Separate facilities for men and women employees are recommended.

Change rooms: Change rooms for the employees to change their personal clothing into uniforms and footwear should be provided. Lockable or suitable storage racks should be provided to store clothing, footwear and other personal items. The designs to these lockers should be such as to facilitate easy cleaning. Separate change rooms for men and women should be present. Preferably, these changing rooms should be in continuum with the production area.

Lunch rooms and Break rooms: Designated lunch and break rooms should be designated for employees. The Lunch rooms should be neat, with appropriate facilities for food storage and covered garbage bins. If smoking is permitted in the lunch/ break rooms, it should be restricted to these areas and provided with ashtrays.

All such facilities should be suitably located and designated.

10.6.5 Temperature Control

Depending on the nature of the food operations undertaken, adequate facilities should be available for heating, cooling, cooking, refrigerating and freezing food, for storing refrigerated or frozen foods, monitoring food temperatures, and when necessary, controlling ambient temperatures to ensure the safety and suitability of food.

It would be appropriate to discuss the concerns regarding ice and steam used to cool and heat the food, or other medium respectively. The ice for use in food plants should be made from potable water, and should be stored and handled such as to prevent contamination. Steam that contacts with food or food contact surfaces should also be generated from potable water. Only approved chemicals should be used in boilers which generate steam for such purposes.

10.6.6 Lighting

Adequate natural or artificial lighting should be provided to enable the undertaking to operate in a hygienic manner. Where necessary, lighting should not be such that the resulting colour is misleading. The intensity should be adequate to the nature of the operation. Lighting fixtures should, where appropriate, be protected to ensure that food is not contaminated by breakages.

10.6.7 Storage

Where necessary, adequate facilities for the storage of food, ingredients and non-food chemicals (e.g. cleaning materials, lubricants, fuels) should be provided such as warehouses, storage rooms, silos, tanks, vats, bins.

Where appropriate, food storage facilities should be designed and constructed to:

- permit adequate maintenance and cleaning;
- avoid pest access and harbourage;
- enable food to be effectively protected from contamination, cross contamination, during storage; and
- where necessary, provide an environment which minimizes the deterioration of food (e.g. by temperature and humidity control).

The type of storage facilities required will depend on the nature of the food.

Where necessary, separate, secure storage facilities for cleaning materials and hazardous substances should be provided.

Also, appropriate facilities for storing idle food processing equipment, tools, materials and spare parts for repair and maintenance of equipment should be provided.

10.7 CONTROL OF OPERATIONS

The primary consideration is to prevent contamination, cross-contamination and deterioration of products from the time they arrive in the plant/ establishment to storage, processing, subsequent move to designated storage areas and shipment, delivery to the point of use.

10.7.1 Transportation and Receiving

- A) Receiving Location:** The location for receiving raw materials should be separate from the food processing areas to prevent any likelihood of cross-contamination of products. At this location, only inspection and sorting should be done. Thereafter it should be moved to designated storage area, storage at the receiving location is not recommended.
- B) Transport Vehicles:** All transport vehicles for receipt and delivery of raw material or finished product should be inspected for: cleanliness and sanitation; tamper-proofness and temperature/ other requirement if any.

Before or during unloading of material, the vehicle's floor, walls, ceiling, integrity of packages, the presence of any off-odour, pests, etc. should be done.

In case of unsatisfactory condition or tampering, the problem should be addressed before transferring the material to the storage. A record of inspection of transportation vehicles should be maintained.

C) Incoming Material Requirements

The objective for this requirement is that no raw material or ingredient (including packaging materials, processing aids) should be accepted by an establishment if it is known to contain parasites, undesirable micro-organisms, pesticides, veterinary drugs or toxic, decomposed or extraneous substances if the sorting/ processing is unable to reduce these contaminants/ hazards to an acceptable level.

- Where appropriate, specifications for raw materials should be identified and applied.
- Raw materials or ingredients should, where appropriate, be inspected and sorted before processing.
- Where necessary, laboratory tests should be made to establish fitness for use. Only sound, suitable raw materials or ingredients should be used.
- Stocks of raw materials and ingredients should be subjected to First In First Out (FIFO) concept.

10.7.2 Handling and Storage

- A) Raw materials, Ingredients and Packaging materials:** During handling of raw materials we should ensure that there is no damage or contamination. Raw material should be stored separately from the finished products to prevent cross-contamination.
- B) Non-food Chemicals:** All non-food chemicals such as cleaning and sanitizing agents and pesticides, should be stored in a secure, segregated area to prevent contamination of material, other products or equipment.
- C) Semi-processed or Processed Products:** Semi-processed or Processed products should be properly tagged, identifiable and be stored in designated areas immediately after processing. We need to prevent any contamination during handling or storage of these products.
- D) Packaging:** Packaging design and materials should:

- Provide adequate protection for products to minimize contamination,
- Prevent damage, and
- Accommodate proper labelling.

Packaging materials or gases where used, must be non-toxic and should not pose a threat to the safety of food under the specified conditions of storage and use. If reusable packaging is used, it should be suitably durable, easy to clean and, if necessary, easy to disinfect.

- E) Storage Conditions:** The storage conditions need to be appropriate to prevent contamination of products. The temperature, humidity maintenance if needed should be established. All storage requirements, including pest infestation, should be monitored and recorded routinely.
- F) Stock Rotation:** The use of stored material and ingredients and shipment of processed products should be such as to use the older material or first received (First In) earlier and shipped first (First Out).

10.7.3 Transport and Shipping

Processed products: Only those products which meet all the statutory and food safety requirements, including product specifications, packaging and labelling requirements should be prepared for transportation and delivery.

Transport vehicle: as discussed in previous section.

Delivery: During transportation, it should be ensured that there is no contamination, deterioration or damage, tampering of the product. Locks and seals on delivery vehicles should be maintained during transportation and if opened for customs checking, state border crossings etc., these should be replaced.

10.7.4 Management and Supervision

Managers and supervisors should have enough knowledge of food hygiene principles and practices such that they are able to judge potential risks, take appropriate preventive and corrective action, and ensure that effective monitoring and supervision takes place.

10.7.5 Documentation and Records

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.

10.8 PERSONNEL HEALTH AND HYGIENE

Since people in the plant (personnel and visitors) come into proximity to food and the environment, their health, hygiene and cleanliness affects the food and its environment. People who do not maintain an appropriate degree of personal cleanliness, who have certain illnesses or conditions or who behave inappropriately, can contaminate food and transmit illness to consumers. It is therefore essential that personnel employed in the production of food products understand their duties relative to food safety. If the operations involved in

production and processing are highly technical in nature, they may require constant vigilance, attention to details, and a high degree of competence on the part of employees.

Inadequate training of personnel, or the absence of an appreciation of the importance of proper employee practices, can contribute to the production of food products which may pose a hazard to health.

We need to ensure that personnel who come directly or indirectly into contact with food are not likely to contaminate food by:

- maintaining an appropriate degree of personal cleanliness; and
- behaving and operating in an appropriate manner.

10.8.1 Health Status

Food plant employees with certain illness whether suspected, to be suffering from, or to be a carrier of a disease 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. The illness or conditions which should be reported to management (so that any need for medical examination and/or possible exclusion from food handling can be considered) include:

- jaundice;
- diarrhoea;
- vomiting;
- fever;
- sore throat with fever;
- visibly infected skin lesions (boils, cuts, etc.);
- discharges from the ear, eye or nose, or
- any other disease which can be transmitted through food.

Medical examination of a food handler should be carried out if clinically or epidemiologically indicated. In addition, the supervisors in the food plant should constantly monitor food handling employees for these illnesses or injuries. The employees should be made aware of the importance of this practice.

10.8.2 Personal Hygiene

Plant employees especially food handlers should maintain a high degree of personal grooming, cleanliness and personal hygiene practices. This includes general cleanliness of clothing and body, including hair and fingernails. Where appropriate, they should wear suitable protective clothing, head covering, and footwear. Cuts and wounds, where personnel are permitted to continue working, should be covered by suitable waterproof dressings.

Hand washing: Personnel should always wash their hands when personal cleanliness may affect food safety, for example:

- at the start of food handling activities.

After re-entering the product area,

- immediately after using the toilet;

- coughing or sneezing into their hands, and
- after handling raw food or any contaminated material like raw material, equipment, waste and waste containers where this could result in contamination of other food items; they should avoid handling ready-to-eat food, where appropriate.

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

- smoking;
- spitting;
- chewing or eating;
- sneezing or coughing over unprotected food;
- placing fingers in their mouth, nose or ears; and
- touching hair or other parts of the body.

Eating, drinking and smoking: Employees should eat, drink, if permitted smoke only in designated lunch rooms and break room or other authorized areas. The employees food and drinks should be placed in the designated areas and not carried into the plant. Drinking of water should be at the designated water coolers. Medications of the employees should not be taken inside the plant.

Garments and Uniform: Employees should wear outer garments or uniforms provided for their work. These clothes should be kept clean at the start of the work and changed upon getting dirty or according to the required change frequency. If gloves are used, they should be kept clean and sanitary, replaced when torn. Hair and beard nets should completely cover the hair and beard.

Personal items: Personal items such as jewellery, watches, pins or other items like artificial eyelashes, false nails, nail paints should not be worn or brought into food handling areas as they pose a threat to the safety and suitability of food.

10.8.3 Visitors and Non-company Personnel

Controlled access to the premises: The access of visitors and non-company personnel to mainly the food handling area and food plant should be controlled to avoid any potential source of contamination. This control should apply to even the family members of personnel, suppliers, customers, govt. inspectors, plant tours, non-company people working on the premises.

Personal practices: Visitors or non-company personnel who are permitted entry into the food processing and handling areas should follow same personal practices and hygiene provisions as the plant personnel.

10.9 PEST CONTROL

This programme covers the specific activities that are directed at controlling, preventing, and excluding occurrence of pests, particularly pests, rodents, insects and birds, from a food plant. Cats, dogs should not be allowed into the plant. These pests pose a major threat to the safety and suitability of food. Pest infestations can occur where there are breeding sites and a supply of food. Good hygiene practices should be employed to avoid creating an environment conducive

to pests. Good sanitation, inspection of incoming materials and good monitoring can minimize the likelihood of infestation and thereby limit the need for pesticides.

10.9.1 Preventing Access

Building and Facilities: Buildings should be kept in good repair and condition to prevent pest access and to eliminate potential breeding sites. Holes, drains and other places where pests are likely to gain access should be kept sealed. Wire mesh screens, for example on open windows, doors and ventilators, will reduce the problem of pest entry. Animals should, wherever possible, be excluded from the grounds of factories and food processing plants.

Harbourage and infestation: The availability of food and water encourages pest harbourage and infestation. Potential food sources should be stored in pest-proof containers and/or stacked above the ground and away from walls. Areas both inside and outside food premises should be kept clean. Where appropriate, refuse should be stored in covered, pest-proof containers.

10.9.2 Pest Control Programme

There should be formal, documented pest control programme that is maintained for the establishment. The programme cover all preventive measures taken to exclude and eliminate pests, the various pest control devices and pest control chemicals that are used, monitoring of pest activity, and compliance with Govt. regulations on use of pesticides and pest control devices.

Pest Control Devices: This programme should include outside bait stations for rodent control, netting, bait stations or mechanical traps for birds, inside devices such as mechanical traps, glue boards for rodents, insect light traps for flying insects.

These devices should be located at appropriate locations where they are most effective for removing pests from the building. There should be an updated diagram map to show actual locations of all pest control devices both inside and outside the building.

Monitoring and Maintenance of Devices: The pest control devices should be monitored at an established frequency for any pest activity and for the status of the devices. If this monitoring shows any anomaly, the appropriate follow up action should be undertaken immediately and serviced if required.

A written report of this monitoring and maintenance should be kept.

10.9.3 Pest Control Personnel

The personnel responsible for placement, monitoring and maintenance of the pest control devices, and handling and use of pesticides, should have the required qualification and training including food safety training. If the pest control activity is conducted by an external agency, appropriate licence or certification should be obtained.

10.9.4 Pest Control Chemicals

Treatment with chemical, physical or biological agents should be carried out without posing a threat to the safety or suitability of food. Only chemicals

approved as pesticides by appropriate regulatory agency should be used for pest control in the food plant. 'Restricted Use' pesticides should be used only with the required supervision and General Use pesticides should only be used by personnel with required training.

All efforts should be made to prevent the likelihood of contamination of food and food contact surfaces with pesticides.

All pesticide and pesticide application equipment must be clearly identified with labels and stored in a protected, locked area far removed from food processing areas and storage areas for raw materials, ingredients, packaging materials, cleaning materials and products.

10.9.5 Monitoring Effectiveness

Pest control systems should be monitored for effectiveness, periodically verified by means such as audit pre-operational inspections or, where appropriate, microbiological sampling of environment and food contact surfaces and regularly reviewed. Whenever any pest activity is evident, the source of the pest should be identified and eliminated as soon as possible. The programme should be reviewed to determine whether the preventive aspects of the programme are effective.

Check Your Progress Exercise 2



Note: a) Use the space below for your answers.

b) Compare your answers with those given at the end of the unit.

1) Waste bins located outside the food plant should be:

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2) Food handling personnel should be subjected to routine medical check up. Is this a requirement under pre-requisite programme. True or False

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3) What type of records are present for pest control programme?

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10.10 TRAINING

Employees in a food plant play a critical role in ensuring the safety of foods produced at the plant. In addition, employees should not contaminate or be a source of cross-contamination of foods. The primary consideration for this prerequisite is that those engaged in food operations who come directly or indirectly into contact with food should be adequately trained, supervised and follow their work related tasks, personal hygiene requirements and acceptable personal hygiene practices to a level appropriate to the operations they are to perform.

10.10.1 Food Safety Awareness

Food safety training is fundamentally important for all food plant employees including temporary employees. This training should cover basic principles and practices that are required to prevent contamination and cross-contamination of foods, hygienic handling practices, personal hygiene requirements. The dangers associated with the poor personal hygiene and unsanitary personnel practices should be elaborated. The training of supervisory staff to recognize injuries or infectious illnesses among the plant employees should also be conducted. The food safety training should be reviewed periodically, and if necessary refresher training should be provided.

Factors to take into account in assessing the level of training required include:

- the nature of the food, in particular its ability to sustain growth of pathogenic or spoilage micro-organisms;
- the manner in which the food is handled and packed, including the probability of contamination;
- the extent and nature of processing or further preparation before final consumption;
- the conditions under which the food will be stored; and
- the expected length of time before consumption.

Technical Training: Employees whose tasks involve operation, maintenance, and cleaning of food processing equipment, and sanitation and cleaning activities should be provided with adequate technical training required to carry out their specific tasks so that all food safety requirements are met.

Training Records: Records should be kept as evidence that the relevant food safety training was provided to employees, and that they were evaluated after completion of the training. Records for reviewing of training needs of the employees should be kept.

10.10.2 Roles and Responsibilities

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.

10.11 TRACEABILITY AND RECALL PROCEDURES

Managers should ensure effective procedures are in place to deal with any food safety hazard and to enable the complete, rapid recall of any implicated lot of the finished food from the market. This should include:

Lot Identification

Lot identification is essential in product recall and also helps effective stock rotation. Each container of food should be permanently marked to identify the producer and the lot. The Food Safety and Standards Act 2006 applies in India.

Product Information and Labelling

All food products should be accompanied by or bear adequate and clear information to enable the next person in the food chain to handle, display, store and prepare and use the product safely and correctly.

Where a product has been withdrawn because of an immediate health hazard, other products which are produced under similar conditions, and which may present a similar hazard to public health, should be evaluated for safety and may need to be withdrawn. The need for public warnings should be considered.

Recalled products should be held under supervision until they are destroyed, used for purposes other than human consumption, determined to be safe for human consumption, or reprocessed in a manner to ensure their safety.

10.12 LET US SUM UP



Prerequisite programmes are procedures including good manufacturing practices that address operational conditions providing the foundation for the HACCP system. The prerequisite programmes must be developed and implemented before an effective HACCP system can be implemented. These include: facilities, supplier control, specifications, production equipment, cleaning and sanitation, personal hygiene, training, chemical control, receiving, storage and shipping, traceability and recall, pest control. These topics are covered in the Codex General Principles of Food Hygiene as design and facilities control of operation; maintenance and sanitation; personal hygiene; transportation; product information and consumer awareness and training.

10.13 KEY WORDS

- Primary Production** : “Primary food production” means the growing, raising, cultivation, picking, harvesting, collection or catching of food.
- Sanitation** : is a process capable of reducing the number of microbial contaminants to a relatively safe level. It provides the lowest safety margin because it does not require or necessarily produce the complete destruction of any particular micro-organisms.

Cleaning	:	The removal of soil, food residue, dirt, grease or other objectionable matter.
Traceability	:	Ability to trace the history, application or location of that which is under consideration (ISO 9000:2000). The ability to trace the history, application, or location of an item and like items or activities by means of recorded identification (ASQ, 1998).
Record	:	Document stating results achieved or providing evidence of activities performed.

10.14 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

Your answer should include the following points:

Check Your Progress Exercise 1

- 1) To reduce the likelihood of introducing a hazard which may adversely affect the safety of food, or its suitability for consumption, at later stages of the food chain.
- 2) Stairs in a food plant should
 - be located so as to minimize the risk of product contamination;
 - constructed of impervious materials that are cleanable;
 - catwalks or mezzanines located over processing areas, and where splashing or dripping could pose a contamination risk;
 - must be of solid masonry or metal construction; and
 - where appropriate, narrow raised walkways for overseeing (catwalks) and balconies (mezzanines) must be equipped with raised edges of a height sufficient to prevent the spread of contamination.
- 3)
 - exterior structure shall be designed and maintained to prevent entry of pests.
 - areas surrounding exterior of dairy plant shall be:
 - drained to minimize standing water;
 - free of uncontrolled vegetation, stored items, garbage, or any other condition in close proximity to the plant that could harbour pests; and
 - maintained to minimize creation of dust.

Check Your Progress Exercise 2

- 1) Solid waste containers located **outside** the plant shall be:
 - equipped with covers and closed when not in use;
 - maintained in a manner not to attract pests; and
 - emptied, cleaned and sanitized regularly.
- 2) False. The supervisors in the food plant should constantly monitor food handling employees for these illnesses or injuries.

- 3) There should be an updated diagram map to show actual locations of all pest control devices both inside and outside the building. A written report of monitoring and maintenance of pest control equipment should be kept.

10.15 SUGGESTED READING

Canadian National Dairy Regulation and Code Processing Sector Interpretive Guidelines (2006)

Inteaz Ali (2004). *Food Quality Assurance: Principles and Practice*. CRC Press LLC, Florida, USA.

Recommended International Code of Practice *General Principles of Food Hygiene* CAC/RCP 1-1969, Rev. 4-2003

