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# UNIT 13 GOOD AGRICULTURE PRACTICES, GOOD ANIMAL HUSBANDRY PRACTICES AND GOOD MANUFACTURING PRACTICES

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## 13.0 OBJECTIVES

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After reading this unit, we shall be able to:

- define principles and practices of GAP;
- understand practice of GAHP;
- enumerate elements of GMP;
- state evolution of the international code of practice for general principles of food hygiene as per codex alimentarius commission;
- outline the main elements of the general principles of food hygiene;
- describe the terminology used in good hygiene practices in the food sector;  
and
- enumerate application of good hygiene practices in different food sectors.

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## 13.1 INTRODUCTION

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Due to an increased awareness of consumers and implementation of WTO we cannot depend on quality evaluation of the final product prior to its marketing as, it is based

on quality checks at the end of a production chain for maintenance of prescribed standards and assigning the final product to quality categories such as “high quality” “regular quality” “low quality” and “non-marketable”. Since at the end of the production chain, there is no way to correct production failures or upgrade the quality of the final product. The lower quality product can only be sold at lower price. Thus, quality control has only a limited potential to increase the quality and efficiency of a multi step production procedure and to ensure the safety of the final product. In contrast to quality control the quality assurance includes the planning and surveillance of every thing to do with the quality throughout company from procurement of raw material to delivery of the finished product to the consumers. Consequently, the Good Agriculture Practices, Good Animal Husbandry Practices and Good Manufacturing Practices play an important role in ensuring the food safety and quality of the final product.

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## **13.2 GOOD AGRICULTURAL PRACTICES**

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Practices that address environmental, economic and social sustainability for on-farm processes, and result in safe and quality food and non-food agricultural products.

### **What is GAP ?**

Good Agricultural Practices are a collection of principles to apply for on-farm production and post-production processes, resulting in safe and healthy food and non-food agricultural products, while taking into account economical, social and environmental sustainability. GAPs may be applied to a wide range of farming systems and at different scales. They are applied through sustainable agricultural methods, such as integrated pest management, integrated fertilizer management and conservation agriculture. The implementation of GAP should contribute to Sustainable Agriculture and Rural Development (SARD).

### **Principles of GAP**

- Economically and efficiently produce sufficient (food security), safe (food safety) and nutritious food (food quality).
- Sustain and enhance natural resources (environmental sustainability).
- Maintain viable farming enterprises and contribute to sustainable livelihoods (economic viability).
- Meet cultural and social demands of society (social acceptability).

### **The Objectives of GAP**

- 1) Ensuring safety and quality of produce in the food chain;
- 2) Capturing new market advantages by modifying supply chain governance;
- 3) Improving natural resources use, workers health and working conditions; and
- 4) Creating new market opportunities for farmers / exporters in developing countries.

### **Potential Benefits of GAP**

- Improvement of the safety / quality of food / other agricultural products.
- Reduction in the risk of non-compliance with national and international regulations, standards and guidelines regarding pesticides, contaminants and hazards in food and non-food agricultural products.

- Promotion of sustainable agriculture and contribution to meet national and international environment and social development objectives.

### **Challenges Related to GAP**

- Increase in production cost due to record keeping and certification.
- Lack of harmonisation between different GAP schemes.
- Non-availability of affordable certification systems.
- Serving of competing interests of specific stakeholders by modifying supplier-buyer relations.
- Inadequate facilitation of small scale farmers by government agencies, resulting in farmers being not adequately informed, technically prepared and organised to meet GAP challenge.
- Compliance may not foster all claimed environmental/social benefits.

### **Elements of GAP**

- 1) Soil
- 2) Water
- 3) Crop and fodder production
- 4) Crop protection
- 5) Animal production
- 6) Animal health and welfare
- 7) Harvest and On-Farm Processing and Storage
- 8) Energy and Waste Management
- 9) Human Welfare, Health, and Safety
- 10) Wildlife and Landscape

#### **1) Soil**

##### **Philosophy**

The physical and chemical structure, and biological activity of the soil, are fundamental to sustaining agricultural productivity and determine, in their complexity, soil fertility. Soil management shall maintain and improve soil fertility by minimizing losses of soil nutrients, and organic matter through erosion, runoff and leaching into surface or groundwater. Such losses represent inefficient and unsustainable management of these resources, in addition to the deleterious off-target effects. Soil management also seeks to enhance the biological activity of the soil and protect surrounding natural vegetation and wildlife.

##### **Practices**

- Establish a detailed knowledge of the nature, properties, distribution, and potential uses of soils of the farm.
- Avoid heavy mechanical soil tillage to the extent possible to reduce soil compaction issue and to maintain soil structure.
- Maintain or improve soil organic matter through the use of soil building crop rotations, use of grazing and by manure application.
- Maintain soil cover to minimize erosion loss by wind and/or water.

## Other Food Safety Practices

- Avoid contamination with agrochemicals, organic and inorganic fertilizers and other contaminants by adapting quantities, application methods and timing to the agronomic and environmental requirements.
- Maintain a history of annual use of each individual land management unit.

## 2) Water

### Philosophy

Agricultural land use carries a high responsibility for the management of water reserves. Management of water resources and efficient use of water within agriculture - for rainfed crop and pasture production, for irrigation where applicable, and for livestock - are criteria for good agricultural practice. They include maximizing the infiltration of rainwater on agricultural land and covering the soil to avoid surface runoff while minimizing leaching to water tables. Maintenance of an adequate soil structure including the adequate special arrangement of continuous macropores and the management of soil organic matter are important factors to achieve this. Efficient irrigation methods and technologies minimize losses in supply and distribution of irrigation water by adapting quantity and timing to agronomic necessities and avoiding leaching and salinisation. Water tables should be managed to prevent excessive rise or fall.

### Practices

- Maximize water infiltration and minimise unproductive efflux of surface waters from watersheds.
- Manage ground and soil water by proper use or avoidance of drainage where required and by build-up of soil structure and soil organic matter.
- Avoid contamination of water resources with production inputs, waste or recycling products caused directly by inadequate handling practices and technologies and indirectly by erosion and leaching.
- Monitor crop, soil-water status and prevent soil salinisation.
- Avoid unproductive irrigation water losses and adopt water-saving measures and recycling where possible.
- Enhance the functioning of the water cycle to increase soil moisture storage and minimize runoff of water and associated contaminants. This may include monitoring of water status, monitoring and proper use of irrigation water, establishing permanent cover, or maintaining or restoring wetlands as needed.
- Manage water tables to prevent excessive extraction or accumulation.
- Provide adequate, safe, clean watering points for livestock.
- Increase soil organic matter levels to maximize moisture retention and root penetration.

## 3) Crop and fodder production

### Philosophy

Individual annual and perennial crops, cultivars and varieties are chosen for their suitability to the site and their role within the crop rotation for the management of soil fertility, pests and diseases, available inputs, and local consumer and market needs. Perennial crops are used to provide long-term production options and opportunities for intercropping. Annual crops are grown in sequence, including those with pasture, to maximize the biological benefits of interactions between species and to maintain

productivity. Rangelands are managed to maintain plant cover, productivity and species diversity. Harvesting of all crop and animal products removes their nutrient content from the site and must ultimately be replaced to maintain long term productivity.

### **Practices**

- Select varieties depending on an understanding of their characteristics, including response to planting time, productivity, quality, market acceptability, disease and stress resistance, climatic adaptability, and response to fertilizers and agrochemicals;
- Devise crop sequences to optimize use of labour and equipment and maximize biological benefits of weed control by competition, mechanical, biological and herbicide options, provision of non-host crops to minimize disease and, where appropriate, inclusion of legumes to provide a biological source of nitrogen;
- Apply fertilizers, in a balanced fashion, with appropriate methods and equipment and at adequate intervals to replace nutrients extracted by harvest;
- Maximize the benefits to soil and nutrient stability by re-cycling crop and other organic residues;
- Integrate livestock into crop rotations and utilize the nutrient cycling provided by grazing or housed livestock to benefit the fertility of the entire farm;
- Rotate livestock on pastures to allow for healthy re-growth of pasture plants; and
- Adhere to safety regulations and observe established safety standards for the operation of installations, equipment/machinery for crop and fodder production.

## **4) Crop protection**

### **Philosophy**

Maintenance of crop health is essential for successful farming for both yield and quality of produce. This requires long-term strategies to manage risks by the use of disease and pest resistant crops, crop and pasture rotations, disease breaks for susceptible crops, and the minimal use of agrochemicals to control weeds, pests and diseases following the principles of Integrated Pest Management. Any measure for crop protection, but particularly those involving substances that are harmful for humans or the environment, has to be carried out with state of the art knowledge and equipment.

### **Practices**

- Decide on interventions following consideration of all possible methods and their effects on farm productivity and environmental implications in order to minimize use of agrochemicals (promote integrated pest management);
- Use resistant varieties, crop sequences, associations, and cultural practices;
- Maximize biological prevention of pests and diseases;
- Maintain regular and quantitative assessment of the balance status between pests and diseases and beneficial organisms of all crops;
- Apply pest and disease forecasting techniques where available;
- Store and use agrochemicals according to legal requirements, e.g. registration for individual crops, rates, timings, and pre-harvest intervals;

#### Other Food Safety Practices

- Assure that agrochemicals are applied by trained persons;
- Assure that equipment used for the handling and application of agrochemicals complies with established safety and maintenance standards;
- Maintain accurate records of agrochemical use; and
- Adopt successful organic management practices where and when applicable.

### 5) Animal Production

#### Philosophy

Livestock require adequate space, feed and water to ensure animal welfare and productivity. Record keeping of livestock and of breeding programmes will ensure traceability of type and origin. Stocking rates are adjusted and supplements provided as needed to livestock grazing pasture or rangeland. Chemical and biological contaminants in livestock feeds are avoided to prevent their entry into the food chain. Manure management avoids nutrient losses, minimizes negative and stimulates positive effects on the environment. Land requirements of livestock production are evaluated to ensure sufficient land for feed production and waste disposal.

#### Practices

- Site livestock units appropriately to avoid negative effects on the landscape, environment and animal welfare;
- Avoid contamination of pasture, feed, water and the atmosphere;
- Monitor condition of stock and adjust stocking rates and feeding accordingly;
- Provide adequate, clean water;
- Ensure that staff are properly trained in the handling and treatment of animals;
- Design, construct, choose, use and maintain equipments, structures and handling facilities to avoid injury and loss;
- Make optimal use of by-products and wastes and ensure that they do not contaminate crops, products, land, or water resources;
- Take precautions to prevent residues from veterinary medications and other chemicals given in feeds from entering the food chain;
- Avoid the non-therapeutic use of antibiotics wherever possible;
- Carefully record stock acquisitions, breeding losses and sales;
- Carefully record feeding plans, feed acquisitions and sales;
- Provide for clean and safe handling and on-farm processing of products;
- Integrate livestock and agriculture to avoid problems of waste removal and ensure recycling of nutrients in an efficient way;
- Treat animal waste to reduce nutrient loss and green house gas emissions;
- Adhere to safety regulations and observe established safety standards for the operation of installations, equipment and machinery for animal production.

## 6) Animal Health and Welfare

### 6a) Philosophy

Successful animal production requires attention to health. The health of livestock is maintained by proper management and housing, by preventive treatments such as vaccination and by regular inspection, identification, and treatment of ailments, using veterinary advice as required.

#### Practices

- Minimize risk of infection and disease by good pasture management, safe feeding, appropriate stocking rates and good housing conditions;
- Keep livestock, buildings and feed facilities clean and provide adequate, clean bedding under housed conditions;
- Seek appropriate veterinary advice to avoid disease and health problems;
- Ensure good hygiene standards in housing by proper cleansing and disinfection;
- Monitor disease incidence and treat sick or injured animals promptly in consultation with a veterinarian;
- Purchase, store and use only approved veterinary products in accordance with directions and regulations;
- Comply with withdrawal periods for veterinary medicinal products; and
- Keep detailed records of all sickness, medical treatments and mortality.

### 6b) Animal welfare

#### Philosophy

Farm animals are sentient beings and as such their welfare must be considered. Good animal welfare is recognised as freedom from hunger and thirst; freedom from discomfort; freedom from pain, injury or disease; freedom to express normal behavior; and freedom from fear and distress.

#### Practices

- Provide adequate and appropriate feed and clean water at all times;
- Avoid non-therapeutic mutilations, surgical or invasive procedures, such as tail docking and debeaking;
- Minimise transport of live animals (by foot, rail or road) and the use of livestock markets;
- Avoid rough handling and the use of instruments such as electric goods;
- Maintain animals in appropriate social groupings where possible; isolation of animals (such as veal crates and sow stalls) should be prohibited, except for injury and sickness;
- Avoid overcrowding and conform to minimum space allowances and maximum stocking densities; and
- Maintain slaughter methods that are humane and appropriate for each species, with attention to supervision, training of staff and proper maintenance of equipment.

## 7) Harvest and on-farm processing and storage

### Philosophy

Product quality depends upon implementation of acceptable protocols for harvesting, storage, and where appropriate, processing of farm products. Harvesting must conform to regulations relating to pre-harvest intervals for agrochemicals and with-holding periods for veterinary medicines. Food produce should be stored under appropriate conditions of temperature and humidity in space designed and reserved for that purpose. Operations involving animals, such as shearing and slaughter, must adhere to animal health and welfare standards.

### Practices

- Harvest food products following relevant pre-harvest and withholding periods;
- Process produce hygienically, e.g. use recommended detergents and clean water;
- Store food products under hygienic and appropriate environmental conditions;
- Pack food produce for transport from farm in clean containers; and
- Maintain accurate records regarding harvest, storage and processing.

## 8) Energy and waste management

### Philosophy

Farms require fuel to drive machinery for cultural operations, for processing, and for transport. The objective is to perform operations in a timely fashion, reduce the drudgery of human labour, improve efficiency, diversify energy sources, and reduce energy use. Farming produces by-products, some of which are potential pollutants of soil, water, or air. The production of these by-products should be minimized while others are resources that can be reused or recycled.

### Practices

- Establish input-output plans for farm energy, nutrients, and agrochemicals so as to ensure efficient use and safe disposal;
- Adopt energy saving practices in building design, machinery size, maintenance, and use (e.g. zero or minimum tillage);
- Investigate alternative energy sources to fossil fuels (wind, solar, biofuels), and adopt them where feasible;
- Identify and recycle most organic wastes and inorganic materials, where possible;
- Minimize non-usable wastes and dispose of them responsibly;
- Store fertilizers and agrochemicals securely and in accordance with legislation;
- Maintain accurate records of energy use, and of storage and disposal; and
- Establish emergency action procedures to minimize the risk of pollution from accidents.

## 9) Human welfare, health, and safety

### Philosophy

Farming must be economically viable to be sustainable. The social and economic welfare of farmers, farm workers, and their local communities depends upon it. Health

and safety are also important concerns for those involved in farming operations. Due care and diligence is required at all times.

### **Practices**

- Direct practices to achieve an optimum balance between economic, environmental, and social goals;
- Provide adequate household income and food security;
- Adhere to safe work procedures with acceptable working hours and allowance for rest periods;
- Instruct workers in the safe and efficient use of tools and machinery;
- Pay reasonable wages and not exploit workers, especially women and children; and
- Buy inputs and other services from local merchants if possible.

## **10) Wildlife and landscape**

### **Philosophy**

Agricultural land accommodates a diverse range of animals, birds, insects, and plants. Much public concern about modern farming is directed at the loss of some of these species from the countryside because their habitats have been destroyed. The challenge is to manage and enhance these wildlife habitats while keeping the farm business economically viable.

### **Practices**

- Conserve wildlife habitats/landscape features (e.g. isolated trees) on farm.
- Create, as far as possible, a diverse cropping pattern on the farm.
- Minimize impact of operations such as tillage and agrochemical use on wildlife.
- Manage field margins to reduce noxious weeds and to encourage a diverse flora and fauna with beneficial species.
- Manage water courses / wetlands to encourage wildlife and prevent pollution.
- Monitor those species of plants/animals whose presence on farm is evidence of Good Environmental Practice.

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## **13.3 GOOD ANIMAL HUSBANDRY PRACTICES**

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### **What is GAHP ?**

- A set of procedures to ensure animals are farmed to meet a certain quality and safety requirement and the methods, equipments, facilities and controls for all farmed animals are in place.

### **GAHP**

- Prerequisite program for food quality and safety plans.
- Develop, implement, review and verify for effectiveness.
- Ensure HACCP plans focus on CCP to produce safe food.

### **GAHP Benefits**

- To improve management practices.
- To avoid violative drug residues.

## Other Food Safety Practices

- To decrease production costs.
- To expand market for animal products.

### **Producer Attitude**

- Understand what is done on farm can affect product to consumers.
- Food supply chain.
- Cannot rely solely on drugs to maintain herd health or production. Not substitute for good sanitation practices, sound preventive medication program, good nutrition and proper environmental conditions.
- Reasons for drug use on farm:
  - a) Prevent or control disease / Treat disease.
  - b) Improve rate gain / Improve feed efficiency.
- Important to have veterinarian involvement in medication decisions.
- Feed Act : regulate quality animal feeds.
- Vet Surgeon Act: animal health.
- Animal Ordinance : animal disease.
- Food Act : safe animal products.
- Industry's goal to have no violative residues in products.

### **Management Responsibilities**

- Understand the benefits of GAHP, its implementation and coordination.
- Know the difference between GAHP and HACCP.
- Know the consequences of not having a good quality assurance program.
- Ensure workers and personnel are knowledgeable and trained.
- Facility improvement.
- Total commitment and involvement.

### **GAHP Programs Include :**

#### **1) Food Safety Elements**

##### **Identify and Track all Treated Animals**

- 1) Either individual or pen.
- 2) Keep medication records for at least 12 months.
- 3) Observe withdrawal period.

##### **Maintain Medication and Treatment Records**

- 1) Record vaccination practices and farm medication plan.
- 2) Animals treated dates, who administered, withdrawal time.
- 3) Record : complete, accurate, useful.

##### **Properly Store, Label and Account for all Drug Products and Medicated Feeds**

- 1) Follow label for storage and use e.g. temp exposure in sunlight and other factors affect vaccine or drug become ineffective, use entire bottle after reconstitution.
- 2) Proper usage : clean needles, dosage, disposal of syringes and needles.
- 3) Keep medications out of reach of children.

## **Personnel**

### **Disease control and monitor**

- Written policy
- Medical examination / Communicable diseases
- Protective attire: clothing, boots, gloves
- Discourage visitors
- Personal Hygiene
- Personal cleanliness / Education and training
- Supervision : assign competent supervisors
- Workers movement within pen education and training
- Personnel in charge: education and experience
- Supervisors and workers : knowledge on GAHP
- Compliance by all personnel
- Educate all employees and family members on proper administration techniques and withdrawal times.

## **2) Product Quality Elements**

### **Premise and environment**

- Suitable location
- Adequate drainage
- General maintenance: shed, yard, store
- Building design
- Construction and maintenance
- Sufficient space
- Facilities of cleaning / Adequate lightning
- Adequate ventilation / protection against pests

### **Bio Security**

- 1) Keeping herd safe from diseases/environment/other animals, quarantine new stock, fencing, farm distance, foot bath, vehicle dip, visitor bath.
- 2) Prevent entry of pests
- 3) Regulate visitors

### **Equipment and Utensils**

Proper equipment, utilisation and storage.

### **Sanitation Facilities and Operation**

- Water supply (Sufficient / derived from clean source / Chlorination /Conduct microbiology tests);
- Planned cleaning schedule;
- Completely clean and disinfect each pen or building;
- Have details eg frequency, method, type of sanitizer;

## Other Food Safety Practices

- Person who check, record and verify; and
- Microbiological test.

### **Rubbish Disposal and Waste Treatment**

- 1) Good disposal system for litter and waste treatment.
- 2) Rubbish, dead animals, waste disposal.

### **Pest Control Program**

- Pests can be carriers of disease;
- Control of insects, rodents, birds or other vermins;
- Regular inspection;
- Layout bait or trap station;
- Rodenticides, fumigants, insecticides approved by authority, instruction on usage, dosage, collection of dead pests; and
- Rodent control: eg cleaning up feed spills, replacing lids and covers of feeders, plugging holes in building walls and doors, use baits, control weeds around building.

### **Supplies**

- Raw materials and other ingredients from approved source;
- Supplier Quality Assurance (SQA): quality and safety;
- Inspect, test (level of micro-organism, chemicals, physical parameters) and Store;
- Receiving area away from sheds; and
- Labelling and storage.

### **Storage**

- Raw materials and supplies inspected upon receipt;
- Storage area / Appropriate stock rotation;
- Proper conditions (temperature, humidity);
- Pest control programs / Labelling; and
- Toxic chemicals approved by authority / Identified and stored properly / Separate locked room.

### **Establish an efficient and effective herd health management plan**

- Prevention is cheaper than treating it;
- Practice all-in and all-out;
- Proper vaccination program and prophylactic treatment;
- Health problems can be controlled by management;
- Examine herd for present of diseases;
- Serologically testing for diseases;
- Routine post-mortem examinations and diagnostic procedures; and
- Review production performance and financial records.

### **Provide proper animal care**

- Good animal husbandry practice;

- Facilities to protect and shelter animals from weather extremes while;
- protecting air and water quality in the natural environment;
- Well-kept facilities to allow safe, humane, efficient animal movement;
- Personnel with training to care for and handle each stage of production with no tolerance for mistreatment;
- Access to good quality water and nutritionally balanced diets for each class of animals;
- Make sure basic needs for food and water are being met and to detect illness or injury;
- Developing herd health program with veterinary advice;
- Prompt veterinary medical care when required;
- Use humane methods to euthanize sick or injured animals not responding to care and treatment and disposing them properly; and
- Transportation that avoids undue stress caused by overcrowding, excess time in transit or improper handling during loading/unloading.

### **Follow Appropriate on-farm Feed Processing or Purchase from Approved Commercial Feed Millers**

- 1) Importance of quality feed, meet nutritional composition, free from Contaminants; and
- 2) Guidelines on GMP on buildings and grounds, workspace and storage, lab assays and equipment cleanout procedures.

### **Process Control**

- Operations conducted in accordance with adequate sanitation principles;
- Use of feed, materials and animals from approved source;
- Farming procedures: do not contribute contamination from any source; and
- Testing methods :chemical, microbiology.

### **Defect Action Level**

- Animals and Product traceability : product coding, distribution records;
- Means of notifying customers, retailers, wholesalers;
- Evaluate complaint / Investigate / Notify regulatory agency; and
- Regular analysis / Preventive measures / Avoid recurrence.

### **Documentation**

- Define materials, operations.
- Record and communicate information.
- Defect product traceability.
- Permit investigation
- Quality manual / Operating procedures / Support documentation.

### **GAHP Operations**

- Good bio-security;
- Farm management : control physical factors and farming operations;

#### Other Food Safety Practices

- Measures to destroy or prevent disease; and
- Disposal of dead carcasses and waste?

#### Sale of animals

- Healthy animals;
- Observe withdrawal period; and
- Labeled and identified.

#### Inspection

- Cleanliness of farm / Sanitation procedures;
- Health of animals / Disease control and situation;
- Proper usage of drug / Storage of feed, drug, equipment;
- Testing program / Labelling;
- Personnel / Farm management and productivity; and
- Feeds and feeding.

#### Contaminants

- Biological / Physical / Chemical

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## 13.4 GOOD MANUFACTURING PRACTICES

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### What is GMP ?

GMP refers to the Good Manufacturing Practice Regulations promulgated by the US Food and Drug Administration. These regulations, which have the force of law, require that manufacturers, processors, and packagers of drugs, medical devices, food, and blood take pro-active steps to ensure that their products are safe, pure, and effective. GMP regulations require a quality approach to manufacturing, enabling companies to minimize or eliminate instances of contamination, mixups, and errors. This in turn, protects the consumer from purchasing a product which is not effective or even dangerous. Failure of firms to comply with GMP regulations can result in very serious consequences including recall, seizure, fines, and jail time. GMP regulations address issues including record keeping, personnel qualifications, sanitation, cleanliness, equipment verification, process validation, and complaint handling. Most GMP requirements are very general and open-ended, allowing each manufacturer to decide individually how to best implement the necessary controls. This provides much flexibility, but also requires that the manufacturer interpret the requirements in a manner which makes sense for each individual business.

### Good Manufacturing Practice in Food Industry

#### Personnel

- a) **Disease control:** Any person who, appears to have, an illness, open lesion, including boils, sores, or infected wounds shall be excluded from any operations which may be expected to result in food contamination.
- b) **Cleanliness:** All persons working in direct contact with food shall conform to following hygienic practices while on duty :
  - 1) Wearing garments suitable to the operation to avoid contamination of food.
  - 2) Maintaining adequate personal cleanliness.

- 3) Washing hands thoroughly in an adequate hand-washing facility.
  - 4) Removing all unsecured jewellery and other objects that might fall into food, equipment, or containers.
  - 5) Maintaining gloves, if they are used in food handling, in an intact, clean, and sanitary condition. The gloves should be of an impermeable material.
  - 6) Wearing, where appropriate, in an effective manner, hair nets, headbands, caps, beard covers, or other effective hair restraints.
  - 7) Storing clothing or other personal belongings in areas other than where food is exposed or where equipment or utensils are washed.
  - 8) Confining the following to areas other than where food may be exposed : eating food, chewing gum, drinking beverages, or using tobacco.
  - 9) Taking any other necessary precautions to protect against contamination of food by perspiration, cosmetics, tobacco, chemicals, medicines applied to skin.
- c) **Education and training:** Personnel responsible for identifying sanitation failures should have a background of education or experience to provide a level of competency necessary for production of clean and safe food.
- d) **Supervision:** Responsibility for assuring compliance by all personnel with all requirements of this part shall be clearly assigned to competent supervisory personnel.

#### **Plant and Grounds**

- a) **Grounds:** shall be kept in a condition that will protect against the contamination of food. The methods for maintenance of grounds are as follows :
- 1) Properly storing equipment, removing litter and waste, and cutting weeds or grass within the immediate vicinity of the plant buildings or structures that may constitute an attractant, breeding place, or harborage for pests.
  - 2) Maintaining roads, yards, and parking lots so that they do not constitute a source of contamination in areas where food is exposed.
  - 3) Adequately draining areas that may contribute to contamination to food by seepage, food-borne filth, or providing a breeding place for pests.
  - 4) Operating systems for waste treatment and disposal so that they do not constitute a source of contamination in areas where food is exposed.
- b) **Plant construction and design:** The plant and facilities shall:
- 1) Provide sufficient space for such placement of equipment and storage of materials as is necessary for the maintenance of sanitary operations.
  - 2) Permit the taking of proper precautions to reduce the potential for contamination of food, food-contact surfaces, or food-packaging materials.
  - 3) Permit the taking of proper precautions to protect food in outdoor bulk fermentation vessels.
  - 4) Be constructed in such a manner that floors, walls, and ceilings may be adequately cleaned and kept clean and kept in good repair.
  - 5) Provide adequate lighting in hand-washing areas, dressing and locker rooms, and toilet rooms and in all areas where food is examined, processed, or stored.

- 6) Provide adequate ventilation or control equipment to minimize odors and vapors in areas where they may contaminate food.
- 7) Provide, where necessary, adequate screening or other protection against pests.

### Sanitary Operations

- a) **General Maintenance:** Buildings, fixtures, and other physical facilities of the plant shall be maintained in a sanitary condition.
- b) **Substances used in cleaning and sanitizing; storage of toxic materials :**
  - 1) Cleaning compounds and sanitizing agents used in cleaning and sanitizing procedures shall be free from undesirable microorganisms.
  - 2) Toxic cleaning compounds, sanitizing agents shall be identified, held, and stored in a manner that protects against contamination of food.
- c) **Pest control:** No pests shall be allowed in any area of a food plant. The use of insecticides or rodenticides is permitted only under precautions and restrictions that will protect against the contamination of food, food-contact surfaces, and food-packaging materials.
- d) **Sanitation of food-contact surfaces:** All food-contact surfaces, including utensils and food-contact surfaces of equipment, shall be cleaned frequently to protect against contamination of food.
  - 1) Food-contact surfaces used for manufacturing or holding low-moisture food shall be in a dry, sanitary condition at the time of use.
  - 2) In wet processing, when cleaning is necessary to protect against the introduction of micro-organisms into food, all food-contact surfaces shall be cleaned and sanitized before use and after any interruption during which the food-contact surfaces may have become contaminated.
  - 3) Non-food-contact surfaces of equipment used in the operation of food plants should be cleaned frequently to protect against contamination of food.
  - 4) Single-service articles should be stored in appropriate containers.
  - 5) Sanitizing agents shall be adequate and safe under conditions of use.
- e) **Storage and handling of cleaned portable equipment and utensils:** Cleaned and sanitized portable equipment with food-contact surfaces and utensils should be stored so as to protect food-contact surfaces from contamination.

### Sanitary facilities and controls

Each plant shall be equipped with adequate sanitary facilities and accommodations including, but not limited to:

- a) **Water supply:** The water supply shall be sufficient for the operations intended and shall be derived from an adequate source. Any water that contacts food or food-contact surfaces shall be safe and of adequate sanitary quality.
- b) **Plumbing:** Plumbing shall be of adequate size and design and adequately installed and maintained to:
  - 1) Carry sufficient quantities of water to required locations throughout the plant.
  - 2) Properly convey sewage and liquid disposable waste from the plant.
  - 3) Avoid constituting a source of contamination to food, water supplies, equipment, or utensils or creating an unsanitary condition.

- 4) Provide adequate floor drainage in all areas where floors are subject to flooding-type cleaning or where normal operations release or discharge water or other liquid waste on the floor.
  - 5) Provide that there is no backflow from, or cross-connection between, piping systems that discharge waste water or sewage and piping systems that carry water for food or food manufacturing.
- c) **Sewage disposal:** Sewage disposal shall be made into an adequate sewerage system or disposed of through other adequate means.
  - d) **Toilet facilities:** Each plant shall provide its employees with adequate, readily accessible toilet facilities.
  - e) **Hand washing facilities:** Hand washing facilities shall be adequate and convenient and be furnished with running water at a suitable temperature.

**Compliance with this requirement may be accomplished by providing:**

- 1) Hand washing facilities and, where appropriate hand-sanitizing facilities at each location in the plant where good sanitary practices require employees to wash and/or sanitize their hands.
- 2) Effective hand-cleaning and sanitizing preparations.
- 3) Sanitary towel service or suitable drying devices.
- 4) Devices or fixtures, such as water control valves, so designed and constructed to protect against recontamination of clean, sanitized hands.
- 5) Readily understandable signs directing employees to wash and, where appropriate, sanitize their hands.
- 6) Refuse receptacles that are constructed and maintained in a manner that protects against contamination of food.
- f) **Rubbish and offal disposal:** Rubbish and any offal shall be so conveyed, stored, and disposed of as to minimize the development of odor, minimize the potential for the waste becoming so an attractant and harborage place for pests.

**Equipment and Utensils**

- a) All plant equipment and utensils shall be so designed and of such material and workmanship as to be adequately cleanable.
- b) Seams on food-contact surfaces shall be smoothly bonded or maintained so as to minimize accumulation of food particles, dirt and organic matter.
- c) Equipment that is in manufacturing area and that does not come into contact with food shall be so constructed that it can be kept in a clean condition.
- d) Holding, conveying, and manufacturing systems shall be of design and construction that enables them to be maintained in sanitary condition.
- e) Each freezer used to store and hold food capable of supporting growth of micro-organisms shall be fitted with an indicating temperature recording device.
- f) Instruments and controls shall be accurate and adequately maintained, and adequate in number for their designated uses.
- g) Compressed air or other gases introduced into food shall be treated in such a way that food is not contaminated.

**Processes and Controls**a) **Raw materials/ ingredients**

- 1) Raw materials shall be inspected and segregated to ascertain that they are clean and suitable for processing into food;
- 2) Raw materials shall either not contain levels of micro-organisms that may produce food poisoning or other disease in humans;
- 3) Raw materials susceptible to contamination with aflatoxin, undesirable micro-organisms, or extraneous material shall comply with regulations;
- 4) Raw materials shall be held so as to protect against contamination and shall be held at such temperature and humidity as to prevent food adulteration;
- 5) Frozen raw materials shall be kept frozen. If thawing is required it shall be done in a manner that prevents the raw materials from becoming adulterated; and
- 6) Liquid or dry raw materials and other ingredients received and stored in bulk form shall be held in a manner that protects against contamination.

b) **Manufacturing operations**

- 1) Equipment and utensils and finished food containers shall be maintained in an acceptable condition through appropriate cleaning and sanitizing.
- 2) Manufacturing shall be conducted under such conditions and controls as are necessary to minimize the potential for the growth of micro-organisms,
- 3) Food that can support the rapid growth of undesirable micro-organisms, shall be held in a manner that prevents the food from becoming adulterated.
  - i) Maintaining refrigerated foods at 7.2°C or below, frozen foods in a frozen state and hot foods at 60°C or above.
  - ii) Heat treating acid or acidified foods to destroy mesophilic micro-organisms.
- 4) Work-in-process shall be handled so as to protect against contamination.
- 5) Effective measures shall be taken to protect finished food from contamination by raw materials, other ingredients, or refuse.
- 6) Equipment, containers, and utensils shall be maintained during manufacturing or storage in a manner that protects against contamination.
- 7) Effective measures shall be taken to protect against the inclusion of metal or other extraneous material in food.
- 8) Mechanical manufacturing steps shall be performed so as to protect food against contamination.
- 9) Filling, assembling, packaging and other operations shall be performed in such a way that food is protected against contamination.
- 10) Ice shall be made from water that is safe and of adequate sanitary quality.
- 11) Manufacturing areas/equipment used for manufacturing human food should not be used to manufacture non-human use food.

**Warehousing and Distribution**

Storage and transportation of finished food shall be under conditions that will protect food against physical, chemical and microbial contamination as well as against deterioration of the food and the container.

## Maximum Defect Action Levels

Defect action levels are established for foods whenever it is necessary and feasible to do so.

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## 13.5 GOOD HYGIENE PRACTICES

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### General principles of Food Hygiene (CAC/RCP 1-1969, Rev. 4-2003)

The current version of the Recommended International Code of Practice-General Principles of Food Hygiene was adopted by the Codex Alimentarius Commission in 1997. Amendments/revisions were done in 2003. International food trade and foreign travel, are increasing, bringing important social and economic benefits. But this also makes the spread of illness around the world easier. Effective hygiene control, therefore, is vital to avoid the adverse human health and economic consequences of food borne illness, food borne injury, and food spoilage. The General Principles are commended to Governments, industry (including individual primary producers, manufacturers, processors, food service operators and retailers) and consumers alike.

#### 13.5.1 Objectives of GHP

- identify the essential principles of food hygiene applicable throughout the food chain (including primary production through to the final consumer), to achieve the goal of ensuring that food is safe and suitable for human consumption;
- recommend a HACCP-based approach as a means to enhance food safety; and
- indicate how to implement those principles.

#### Scope and Use

Governments can consider the contents of this document and decide how best they should encourage the implementation of these general principles to:

- protect consumers adequately from illness or injury caused by food;
- policies need to consider the vulnerability of different groups within the population;
- provide assurance that food is suitable for human consumption;
- maintain confidence in internationally traded food; and
- provide health education programs which effectively communicate the principles of food hygiene to industry and consumers.

#### 13.5.2 Primary Production

**Objective:** Primary production should be managed in a way that ensures that food is safe and suitable for its intended use. Where necessary, this will include:

- avoiding use of areas where the environment poses a threat to food safety;
- controlling contaminants/diseases of animals/plants to safeguard food safety; and
- adopting practices to ensure food is produced under hygienic conditions.

**Rationale:** To reduce likelihood of introducing a hazard which may adversely affect food safety, or its suitability for consumption, at later stages of food chain.

#### Environmental Hygiene

Consider potential sources of contamination from the environment. Primary food production should not be carried on in areas where presence of potentially harmful substances may lead to unacceptable level of such substances in food.

### Hygienic production of food sources

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 points where a high probability of contamination may exist and taking specific measures to minimize that probability. Producers should implement measures to:

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

### Handling, storage and transport

Procedures should be in place to:

- sort food and food ingredients to segregate material which is evidently unfit for human consumption;
- dispose of any rejected material in a hygienic manner; and
- protect food and food ingredients from contamination by pests, or by chemical, physical or microbiological contaminants or other objectionable substances during handling, storage and transport.

Care should be taken to prevent deterioration and spoilage through measures which may include controlling temperature, humidity, and/or other controls.

### Cleaning, maintenance and personnel hygiene

Appropriate facilities and procedures should be in place to ensure that:

- any necessary cleaning and maintenance is carried out effectively; and
- an appropriate degree of personal hygiene is maintained.

### 13.5.3 Establishment, Design and Facilities

**Objectives:** Depending on nature of operations, and associated risks, premises, equipment and facilities should be located, designed and constructed to ensure :

- 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, 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 harborage.

**Rationale:** Attention to good hygienic design and construction, appropriate location, and provision of adequate facilities, is necessary to control hazards.

## **Location**

### **Establishment**

Potential sources of contamination need to be considered when deciding where to locate food establishments and effectiveness of any reasonable measures that might be taken to protect food. Establishments should be located away from:

- environmentally polluted areas and industrial activities which pose a serious threat of contaminating food;
- 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.

### **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.

## **Premises and Rooms**

### **Design and layout**

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

### **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.

- The surfaces of walls, partitions and floors should be made of impervious materials with no toxic effect in intended use.
- Walls and partitions should have a smooth surface up to a height appropriate to operation.
- Floors should be constructed to allow adequate drainage and cleaning.
- Ceilings and overhead fixtures should minimize build up of dirt and condensation, and the shedding of particles.
- Windows should be easy to clean, be constructed to minimize the build up of dirt.
- Doors should have smooth, non-absorbent surfaces, and be easy to clean and, where necessary, disinfect.
- Working surfaces that come into direct contact with food should be in sound condition, durable and easy to clean, maintain and disinfect.

### **Temporary/mobile premises and vending machines**

Premises and structures include market stalls, mobile sales and street vending vehicles, temporary premises in which food is handled such as tents. Such premises and structures should be sited, designed and constructed to avoid, contaminating food and harboring pests.

## **Equipment**

Equipment and containers coming into contact with food, should be designed and constructed to ensure that, they can be adequately cleaned, disinfected and maintained to avoid the contamination of food.

### **Food control and monitoring equipment**

Equipment used to cook, heat treat, cool, store or freeze food 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. 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.

### **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.

## **Facilities**

### **Water supply**

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. Non-potable water shall have a separate system.

### **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.

### **Cleaning**

Provide adequate facilities for cleaning food, utensils and equipment. Facilities should have an adequate supply of hot and cold potable water where appropriate.

### **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, suitably located and designated facilities should include:

- adequate means of hygienically washing and drying hands;
- lavatories of appropriate hygienic design; and
- adequate changing facilities for personnel.

### Temperature control

Depending on nature of 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 food safety and suitability.

### Air quality and ventilation

Provide adequate means of natural or mechanical ventilation to :

- minimize contamination of food e.g. from aerosols/condensation droplets;
- control ambient temperatures;
- control odours which might affect the suitability of food; and
- 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.

### Lighting

Provide adequate lighting to carry out operation in a hygienic manner. Lighting should not result in misleading colour. Intensity should be adequate. Protect lighting fixtures to ensure that food is not contaminated by breakages.

### Storage

Provide adequate facilities for storage of food, ingredients and non-food chemicals.

Design and construct facilities to :

- permit adequate maintenance and cleaning;
- avoid pest access and harborage;
- enable food to be effectively protected from contamination during storage;
- provide environment (temperature and humidity) to avoid food deterioration; and
- provide secure storage facilities for cleaning materials/hazardous substances.

## 13.5.4 Control of Operation

**Objective:** To produce food which is safe and suitable for human consumption by:

- formulating design requirements with respect to raw materials;
- composition, processing, distribution, and consumer use to be met in the manufacture;
- handling of specific food items; and
- designing, implementing, monitoring and reviewing effective control systems.

**Rationale:** To reduce the risk of unsafe food by taking preventive measures to assure the safety and suitability of food at an appropriate stage in the operation by controlling food hazards.

### Control of food hazards

Control food hazards through the use of systems such as HACCP. They should:

- identify any steps in their operations which are critical to the safety of food;

- implement effective control procedures at those steps;
- monitor control procedures to ensure their continuing effectiveness; and
- review control procedures periodically, and whenever the operations change.

These systems should be applied throughout the food chain to control food hygiene throughout the shelf-life of the product through proper product and process design.

### **Key aspects of hygiene control systems**

#### **Time and temperature control**

Inadequate food temperature control is one of the most common causes of food borne illness or food spoilage. Such controls include time and temperature of cooking, cooling, processing and storage. Systems should be in place to ensure that temperature is controlled effectively where it is critical to the safety and suitability of food. Temperature control systems should take into account:

- the nature of the food, e.g. its water activity, pH, and likely initial level and types of micro-organisms;
- the intended shelf-life of the product;
- the method of packaging and processing; and
- how the product is intended to be used.

Such systems should also specify tolerable limits for time and temperature variations.

#### **Specific process steps**

Other steps which contribute to food hygiene may include e.g. chilling, thermal processing, irradiation, drying, chemical preservation, vacuum or modified atmospheric packaging.

#### **Microbiological and other specifications**

Where microbiological, chemical or physical specifications are used in any food control system, such specifications should be based on sound scientific principles and state, where appropriate, monitoring procedures, analytical methods and action limits.

#### **Microbiological cross-contamination**

Pathogens can be transferred from one food to another, either by direct contact or by food handlers, contact surfaces or the air. Raw, unprocessed food should be effectively separated, either physically or by time, from ready-to-eat foods, with effective intermediate cleaning and where appropriate disinfection. Access to processing areas may need to be restricted or controlled.

#### **Physical and chemical contamination**

Systems should be in place to prevent contamination of foods by foreign bodies such as glass or metal shread from machinery, dust, harmful fumes and unwanted chemicals. In manufacturing and processing, suitable detection or screening devices should be used where necessary.

#### **Incoming material requirements**

No raw material or ingredient 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 which would not be reduced to an acceptable level by normal sorting and/or processing.

### **Packaging**

Packaging design and materials should provide adequate protection for products to minimize contamination, prevent damage, and accommodate proper labelling.

### **Water**

#### **In contact with food**

Only potable water, should be used in food handling and processing, with the following exceptions:

- for steam production, fire control and other similar purposes not connected with food; and
- in certain food processes, e.g. chilling, and in food handling areas, provided this does not constitute a hazard to the safety and suitability of food (e.g. the use of clean sea water).

Water re-circulated for reuse should be treated and maintained in such a condition that no risk to the safety and suitability of food results from its use.

#### **As an ingredient**

Potable water should be used wherever necessary to avoid food contamination.

#### **Management and supervision**

The type of control and supervision needed will depend on size of business, nature of its activities and types of food involved. Managers and supervisors should have enough knowledge of food hygiene principles and practices.

#### **Documentation and records**

Appropriate records of processing, production and distribution should be 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.

#### **Recall procedures**

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

### **13.5.5 Establishment, Maintenance and Sanitation**

**Objective:** To establish effective systems to:

- ensure adequate and appropriate maintenance and cleaning;
- control pests;
- manage waste; and
- monitor effectiveness of maintenance and sanitation procedures.

**Rationale:** To facilitate the continuing effective control of food hazards, pests, and other agents likely to contaminate food.

## **Maintenance and cleaning**

Establishments and equipment should be kept in an appropriate state of repair and condition to:

- facilitate all sanitation procedures;
- function as intended, particularly at critical steps; and
- prevent contamination of food, e.g. from metal shread, flaking plaster, debris and chemicals.

Cleaning should remove food residues and dirt which may be a source of contamination. The necessary cleaning methods and materials will depend on the nature of the food business.

## **Cleaning procedures and methods**

Cleaning can be carried out by the separate or the combined use of physical methods, such as heat, scrubbing etc. Cleaning procedures will involve, where appropriate:

- removing gross debris from surfaces;
- applying a detergent solution to loosen soil and bacterial film and hold them in solution or suspension;
- rinsing with water to remove loosened soil and residues of detergent;
- dry cleaning or other methods for removing/collecting residues and debris; and
- disinfection with subsequent rinsing unless the manufacturers' instructions indicate on scientific basis that rinsing is not required.

## **Cleaning programmes**

Cleaning/disinfection programmes should ensure that all parts of establishment are appropriately clean, and should include the cleaning of cleaning equipment. Where written cleaning programmes are used, they should specify:

- areas, items of equipment and utensils to be cleaned;
- responsibility for particular tasks;
- method and frequency of cleaning; and
- monitoring arrangements.

## **Pest control systems**

Pests are threat to safety and suitability of food. Pest infestations can occur where there are breeding sites and a supply of food. Avoid creating an environment conducive to pests.

## **Preventing access**

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.

## **Harborage and infestation**

The availability of food and water encourages pest harborage and infestation. Potential food sources should be stored in pest-proof containers and/or stacked above the ground and away from walls.

## Monitoring and detection

Establishments and surrounding areas should be regularly examined for evidence of infestation.

## Eradication

Pest infestations should be dealt with immediately and without adversely affecting food safety or suitability.

## Waste management

Make suitable provision for removal and storage of waste. Waste must not accumulate in working areas. Waste stores must be kept clean.

## Monitoring effectiveness

Sanitation systems should be monitored for effectiveness, periodically verified by means such as audit pre-operational inspections or microbiological sampling.

## 13.5.6 Establishment, Personal Hygiene

**Objectives:** To ensure that those 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.

**Rationale:** People who do not maintain an appropriate degree of personal cleanliness, who have certain illnesses or conditions or who behave appropriately, can contaminate food and transmit illness to consumers.

### Health status

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. Medical examination of a food handler should be carried out if clinically or epidemiologically indicated.

### Illness and injuries

Conditions to be reported to management for medical examination and/or possible exclusion from food handling can be considered, are jaundice, diarrhoea, vomiting, fever, sore throat with fever, visibly infected skin lesions and discharges from ear, eye or nose.

### Personal cleanliness

Food handlers should maintain a high degree of personal cleanliness. Personnel should always wash their hands when personal cleanliness may affect food safety, for example:

- at the start of food handling activities;
- immediately after using the toilet; and
- after handling raw food or any contaminated material, where this could result in contamination of other food items; they should avoid handling ready-to-eat food, where appropriate.

**Personal behavior**

People should avoid behavior which could result in contamination of food.

**Visitors**

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

**13.5.7 Transportation**

**Objectives:** 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.

**Rationale:** Food may become contaminated, or may not reach its destination in a suitable condition for consumption, unless effective control measures are taken during transport. Food must be adequately protected during transport.

**Requirements**

Conveyances/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 microbial growth; and
- allow any necessary temperature, humidity and other conditions to be checked.

**Use and maintenance**

Conveyances and containers for transporting food should be kept in a state of cleanliness, repair and condition.

**13.5.8 Product Information and Consumer Awareness**

**Objectives:** Products should bear appropriate information to ensure that:

- adequate and accessible information is available to the next person in the food chain to enable them to handle the product safely and correctly; and
- the lot or batch can be easily identified and recalled if necessary.

**Rationale:** Insufficient product information, and/or inadequate knowledge of general food hygiene, can lead to products being mishandled at later stages in the food chain.

**Lot identification**

Lot identification is essential in product recall and stock rotation. Each container of food should be permanently marked to identify producer and lot.

## Product information

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

## Labelling

Prepackaged foods should be labeled with clear instructions to enable the next person in the food chain to handle, display, store and use the product safely.

## Consumer education

Health education programs should cover general food hygiene. Such programs should enable consumers to understand the importance of any product information and to follow any instructions accompanying products, and make informed choices.

## 13.5.9 Training

**Objective:** Personnel who come into contact with food should be trained in food hygiene to a level appropriate to operations they are to perform.

**Rationale:** Inadequate hygiene training and supervision of people pose a potential threat to food safety and its suitability for consumption.

### Awareness and responsibilities

All personnel should be aware of their role 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 or hazardous chemicals should be instructed in safe handling techniques.

### Training programmes

Level of training depends on the following factors :

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

Periodic assessments of effectiveness of training and instruction programs should be made.

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## 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) List the elements of GAP

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2) List the food safety elements of GAHP.

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3) List the main elements of GMP.

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4) List the eight main areas of good hygiene practices.

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5) State the objectives of good hygiene practices.

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6) List the elements of GHP in primary production.

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7) List any four areas of operational control in food establishment.

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8) State the conditions which should be reported to management in case of personnel injury or illness.

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### 13.6 LET US SUM UP

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This unit basically gives introduction to good practices in agricultural and food industry. It specifically discuss about principles and practices adopted in GAP, GAHP, GMP. GAP enumerates practices that address environmental, economic and social sustainability for on-farm processes, and result in safe and quality food and non-food agricultural products. GHP outlines the evolution of the international code of practice for general principles of food hygiene as per Codex Alimentarius Commission. GAHP

describes a set of procedures to ensure animals are farmed to meet a certain quality and safety requirement and the methods, equipments, facilities and controls for all farmed animals are in place. While GMP refers to the Good Manufacturing Practice Regulations promulgated by the US Food and Drug Administration. These regulations, which have the force of law, require that manufacturers, processors, and packagers of drugs, medical devices, some food, and blood take proactive steps to ensure that their products are safe, pure, and effective. GMP regulations require a quality approach to manufacturing, enabling companies to minimize or eliminate instances of contamination, mixups and errors. This in turn, protects the consumer from purchasing a product which is not effective or even dangerous.

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## 13.7 KEY WORDS

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<b>Cleaning</b>	:	The removal of soil, food residue, dirt, grease or other objectionable matter.
<b>Contaminant</b>	:	Any biological or chemical agent, foreign matter, or other substances not intentionally added to food which may compromise food safety or suitability.
<b>Contamination</b>	:	The introduction or occurrence of a contaminant in food or food environment.
<b>Disinfection</b>	:	The reduction, by means of chemical agents and/or physical methods, of the number of micro-organisms in the environment, to a level that does not compromise food safety or suitability.
<b>Establishment</b>	:	Any building or area in which food is handled and the surroundings under the control of the same management.
<b>Food Hygiene</b>	:	All conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain.
<b>Hazard</b>	:	A biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect.
<b>HACCP</b>	:	A system which identifies, evaluates, and controls hazards which are significant for food safety.
<b>Food Handler</b>	:	Any person who directly handles packaged or unpackaged food, food equipment and utensils, or food contact surfaces and is therefore expected to comply with food hygiene requirements.
<b>Food Safety</b>	:	Assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use.
<b>Food Suitability</b>	:	Assurance that food is acceptable for human consumption according to its intended use.
<b>Primary Production</b>	:	Those steps in the food chain up to and including, for example, harvesting, slaughter, milking, fishing.



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## 13.8 ANSWERS TO CHECK YOUR PROGRESS EXERCISE

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Your answer should include following points:

### Check Your Progress Exercise 1

- 1)
  - Soil
  - Water
  - Crop and fodder production
  - Crop protection
  - Animal production
    - Animal health and welfare
    - Harvest and On-Farm Processing and Storage
    - Energy and Waste Management
    - Human Welfare, Health and Safety
    - Wildlife and Landscape
- 2)
  - Identify and track all treated animals.
  - Maintain medication and treatment records.
  - Properly store, label and account for drug products and medicated feeds.
  - Personnel training, hygiene and disease control.
- 3)
  - Personnel (Disease control, Cleanliness, Education/training, supervision).
  - Plants and grounds (Grounds, Plant design and construction).
  - Sanitary operations (General maintenance, Substances used for cleaning, Pest control, Sanitation of food-contact surfaces, Storage and handling).
  - Sanitary facilities and controls (Water supply, Plumbing, Sewage disposal, Toilet facilities, Hand-washing facilities, Rubbish and offal disposal, Equipment and utensils).
  - Processes and controls (Raw materials, Manufacturing operations).
- 4)
  - Primary Production
  - Establishment, Design and Facilities
  - Control of Operation
  - Establishment, Maintenance and Sanitation
  - Establishment, Personal Hygiene
  - Transportation
  - Product Information and Consumer Awareness
  - Training
- 5)
  - Identification of the essential principles of food hygiene applicable throughout the food chain (including primary production through to the final consumer), to achieve the goal of ensuring that food is safe and suitable for human consumption;

- Recommendation of a HACCP-based approach as a means to enhance food safety; and
  - Providing guidance on how to implement those principles.
- 6) • Control of food hazards
- Incoming material requirement
  - Packaging
  - Water
- 7) • Environmental hygiene
- Hygienic production of food sources
  - Handling, storage and transport
  - Cleaning, maintenance and personnel hygiene
- 8) • Jaundice
- Diarrhoea
  - Vomiting
  - Fever
  - Sore throat with fever
  - Visibly infected skin lesions (boils, cuts, etc.)
  - Discharges from the ear, eye or nose

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## 13.9 SUGGESTED READING

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[www.iso.org](http://www.iso.org)

[www.codexalimentarius.net](http://www.codexalimentarius.net)

*Codex Alimentarius Food Hygiene Basic Texts, Food and Agricultural Organisation of the United Nations, World Health Organisation, Rome, 2001.*

*Codex General Standard for the Labelling of Prepackaged Foods (CODEX STAN 1-1985, Rev. (1991))*

*ISO / TS 22004: Food System Management Systems - Guidance on the Application of ISO 22000: 2005.*