



MVP-003
Principles of Food
Safety and Quality
Management

Block

4

OTHER FOOD SAFETY PRACTICES

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BLOCK 4 OTHER FOOD SAFETY PRACTICES

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 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.

Unit 13 Good Agriculture Practices, Good Animal Husbandry Practices and Good Manufacturing Practices defines Principles and practices of GAP, GAHP, GMP and enumerates application of good hygiene practices in different food sectors. It also states evolution of the international code of practice for general principles of food hygiene as per codex alimentarius commission.

Unit 14 Good Retail Practices, Good Transport Practices and Nutrition Labelling describes good practices to be followed in a retail food unit, good transport practices to be followed w.r.t. food transport. It also outlines nutrition labelling requirements in a typical country, traceability and associated records to be maintained.

Unit 15 Traceability Studies provides an insight into definition, rationale and objectives of traceability along with traceability tools. It also outlines the recommended steps to implement traceability and India’s experience in implementing the tools and traceability.

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

Structure

13.0 Objectives

13.1 Introduction

13.2 Good Agricultural Practices

13.3 Good Animal Husbandry Practices

13.4 Good Manufacturing Practices

13.5 Good Hygiene Practices

13.5.1 Objectives of GHP

13.5.2 Primary Production

13.5.3 Establishment, Design and Facilities

13.5.4 Control of Operation

13.5.5 Establishment, Maintenance and Sanitation

13.5.6 Establishment, Personal Hygiene

13.5.7 Transportation

13.5.8 Product Information and Consumer Awareness

13.5.9 Training

13.6 Let Us Sum Up

13.7 Key Words

13.8 Answers to Check Your Progress Exercise

13.9 Suggested Reading

13.0 OBJECTIVES

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.

13.1 INTRODUCTION

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.

13.2 GOOD AGRICULTURAL PRACTICES

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.

**Good Agriculture Practices,
Good Animal Husbandry
Practices and Good
Manufacturing Practices**

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.

- 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.

**Good Agriculture Practices,
Good Animal Husbandry
Practices and Good
Manufacturing Practices**

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.

13.3 GOOD ANIMAL HUSBANDRY PRACTICES

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

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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;

- 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;

- 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

13.4 GOOD MANUFACTURING PRACTICES

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.

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

13.5 GOOD HYGIENE PRACTICES

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.

Good Agriculture Practices,
Good Animal Husbandry
Practices and Good
Manufacturing Practices

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.

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

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.

13.7 KEY WORDS

Cleaning	:	The removal of soil, food residue, dirt, grease or other objectionable matter.
Contaminant	:	Any biological or chemical agent, foreign matter, or other substances not intentionally added to food which may compromise food safety or suitability.
Contamination	:	The introduction or occurrence of a contaminant in food or food environment.
Disinfection	:	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.
Establishment	:	Any building or area in which food is handled and the surroundings under the control of the same management.
Food Hygiene	:	All conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain.
Hazard	:	A biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect.
HACCP	:	A system which identifies, evaluates, and controls hazards which are significant for food safety.
Food Handler	:	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.
Food Safety	:	Assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use.
Food Suitability	:	Assurance that food is acceptable for human consumption according to its intended use.
Primary Production	:	Those steps in the food chain up to and including, for example, harvesting, slaughter, milking, fishing.



13.8 ANSWERS TO CHECK YOUR PROGRESS EXERCISE

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

13.9 SUGGESTED READING

www.iso.org

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.

UNIT 14 GOOD RETAIL PRACTICES, GOOD TRANSPORT PRACTICES, AND NUTRITION LABELLING

Structure

- 14.0 Objectives
- 14.1 Introduction
- 14.2 Good Retail Practices (GRP)
- 14.3 Good Transport Practices (GTP)
- 14.4 Nutrition Labelling
- 14.5 Traceability Records
- 14.6 Let Us Sum Up
- 14.7 Key Words
- 14.8 Answers to Check Your Progress Exercise
- 14.9 Suggested Reading

14.0 OBJECTIVES

After studying this unit, we should be able to:

- state good practices to be followed in a retail food unit e.g. meat retail unit;
- enumerate good transport practices to be followed w.r.t. food transport;
- describe nutrition labelling requirements in a typical country (say USA); and
- outline traceability and associated records to be maintained.

14.1 INTRODUCTION

The topics of this unit are interlinked and at the outset they share a common area of concern which, interfaces between processing and consuming. Once a food item is processed the journey towards the consumption objective starts. In this journey all interested parties have to consider the associated hazards, the associated risk profile w.r.t. transport to wholesaler and / or retailer, ensuring that good retail practices are followed at retailer end, the consumer is adequately guided about the nutrient contents as per the regulations and in the event of necessity for withdrawal or recall a robust traceability system is in place.

14.2 GOOD RETAIL PRACTICES (GRP)

Risk Categorisation of Retail Food Establishments

Risk type 1

Pre-packaged, non-hazardous foods only. Limited preparation of non-potentially hazardous foods only.

Risk type 2

Limited menu (1 or 2 main items). Pre-packaged, raw ingredients are cooked or prepared to order. Raw ingredients require minimal assembly. Most products are

cooked / prepared and served immediately. Hot and cold holding of potentially hazardous foods is restricted to single meal service. Preparation processes requiring cooking, cooling, and reheating are limited to 1 or 2 potentially hazardous foods.

Risk type 3

Extensive handling of raw ingredients. Preparation process includes the cooking, cooling, and reheating of potentially hazardous foods. A variety of processes require hot and cold holding of potentially hazardous food. Advance preparation for next-day service is limited to 2 or 3 items. Establishments doing food processing at retail.

Risk type 4

Extensive handling of raw ingredients. Preparation processes include the cooking, cooling, and reheating of potentially hazardous foods. A variety of processes require hot and cold holding of potentially hazardous foods. Food processes include advanced preparation for next-day service.

Risk type 5

Extensive handling of raw ingredients. Food processing at the retail level, e.g., smoking and curing, reduced oxygen packaging for extended shelf-life.

Operational Aspects to be Controlled

Within all types and risk categories of retail establishments, research and experience has identified five specific aspects of operations that produce the greatest incidence and severity of exposure to food borne pathogens. Control of these aspects of retail operations is essential to ensure food safety. They are:

- 1) Related to sourcing : • Food from unsafe sources.
- 2) Related to processing : • Inadequate cooking • Improper holding time or temperature.
- 3) Related to cross contamination : • Contaminated equipment • Poor personal hygiene.

What are the Crucial Practices ?

Retail industry experts agree that following categories of good practices are crucial in maintaining food safety of required level in retail sector :

- 1) Time and temperature controls (including cooking temperature, cooling time, cold holding, hot holding);
- 2) Food storage conditions (potential for cross contamination);
- 3) Training and certification of managers; and
- 4) Cleaning and sanitation practices.

The practical reasoning behind choosing these categories is as follows :

Employee Hygiene

It is difficult to change human habits. First, it is difficult to prevent people from working when they are ill – especially if they are penalized financially for informing managers of their illness. Additionally, language and cultural barriers may hinder acceptance of improved personal hygiene practices.

Workers often do not realize that they have touched an unsanitary surface - picking up trash off the floor, pushing hair back, touching their face, etc. So it is difficult to get hands washed or gloves changed as frequently as needed.

- **Time and Temperature Control**

Retail grocery chains and hypermarkets traditionally do not have elaborate food service operations. Consequently, some types of time/temperature controls, over cooking temperatures, hot holding temperatures, and during cook-chill cycles, for example, are not part of traditional operating practices.

- **Cleaning and Sanitizing**

Insuring adequate cleaning is a critical challenge to management. The challenge is to provide adequate resources, adequate time, adequate supervision, and adequate training to get this critical task done thoroughly.

Following are the key areas (and associated aspects) w.r.t. GRP (in a typical meat related retail organisation) :

Area 1 : Receiving

Aspect 1 : Approved Sources

It is recommended that the retailer confirm the supplier has an effective program to prevent biological, physical or chemical hazards, such as a HACCP system.

Aspect 2 : Packaging and Labelling

Shipping containers should have labels which provide the common name, net quantity, name and address of the responsible party, and a list of ingredients. Invoices, receipts, and lot coding information should be kept to permit tracking of products should a recall be necessary.

Aspect 3 : Trailer Inspection

Trailers delivering meat products should be examined to ensure they are suitable for food delivery. Inspection should make certain that the trailer walls, ceiling and floors are clean and in satisfactory condition and that the refrigeration unit is functioning adequately. Incompatible cargo such as chemicals or other items which may contaminate food products must not be present. If conditions are found to be unsatisfactory the trailer should not be unloaded and the shipment returned to its origin.

Aspect 4 : Product Inspection

Product should be inspected for signs of contamination, damage to packaging or indications of temperature abuse. Whenever possible monitoring devices such as temperature recorders should be used to provide information on transit conditions. If product is found to be temperature abused it should be returned to origin or destroyed.

Aspect 5 : Unloading Procedures

As packaging supplies are a food contact item they should be inspected upon arrival to ensure they have not become contaminated during transport. Meat products should not be unloaded in the presence of, or at the same time as, cleaning chemicals or other sources of contamination. Perishable meat products should be moved promptly off the loading dock into refrigerated or frozen storage. Dock seals or other methods should be employed to ensure adequate temperature control is maintained during unloading.

Aspect 6 : Sanitation and Pest Control

Loading dock areas should be periodically cleaned and garbage should be removed daily to ensure adequate sanitation. Birds, mice and other pests must be kept out of loading dock areas and where pests are present effective control measures should be implemented. Whenever possible, points of access for pests such as loading dock doors should be kept closed. Excess water should not be allowed to pool in front of loading dock areas and exterior garbage storage containers should be kept away from loading dock entrances. If grass is present it should be kept short to avoid creating areas which may harbour pests.

Area 2 : Storage

Aspect 1 : Storage Conditions and Cooler Sanitation

At all times stored meat must be covered and protected from pests, dust, condensation, or any other unsanitary condition. Meat storage should never be located in an area used for locker rooms, washrooms, garbage storage, mechanical rooms, under dripping pipes or in chemical storage areas. Fresh meat must be appropriately wrapped to prevent leakage onto other products and if leakers are found any residues should be removed as soon as possible. If pallets are used for storage they should be inspected for loose nails or broken boards which may present a physical hazard. If shelves are used they must not be constructed from unsealed wood or other materials which are not smooth.

Aspect 2 : Box Placement

Ensure that boxes in coolers are not placed against a wall or directly on the floor. The use of pallets and an approximate 10cm (4 inches) space between product and the cooler walls permits air flow which facilitates rapid cooling. An air space between boxes and use of dividers between layers on a pallet is also useful. As a general rule warmer temperatures will be encountered by product placed higher up or closer to the door of the cooler.

Aspect 3 : Storage Temperature and Shelf Life

Fresh meat should be stored at no more than 4°C and lower temperatures between -1.0° and 2°C if possible. This will promote extended shelf life by slowing growth of spoilage bacteria (packaged fresh meat will begin to freeze at -1.5°C). For frozen meat, temperature should be maintained at -18°C and product properly wrapped to prevent freezer burn.

Aspect 4 : First in – First out Rotation System

A FIFO system is important to enable the customer to receive the freshest and safest product. Remember to organize boxes in the cooler to facilitate FIFO.

Aspect 5 : Storage Temperature and Food Safety

Given the crucial nature of temperature for food safety, whenever possible alarm systems should be used to monitor cooler temperatures. If boxes show signs of significant warming they should be inspected by management to determine suitability for use. It is especially important that ground, chopped or rolled meat products which have spent significant time over 4°C be destroyed.

Aspect 6 : Cooler and Freezer Facilities

Ensure that the volume and temperature of the product in the cooler or freezer is not more than the refrigeration capacity the unit can handle.

Area 3 : Fabrication**Aspect 1 : Meat Contact Surfaces**

Cutting boards should be inspected for excessive scoring and scratching and replaced if necessary. Bins used for storage or transport of meat products must be food grade. All surfaces must not pass on colours, odours, tastes or unsafe chemicals into meat products and be free of corrosion, flaking paint or other condition which would prevent cleaning. Equipment, such as bins, which may have potential for use in both inedible and edible products should be colour coded or labeled.

Aspect 2: Product Inspection

During cut fabrication, muscles should be inspected for any defect that would seriously affect product use. If conditions such as abscesses are present, where contamination may have spread to other products in a box or on the cutting board, these products should be destroyed or trimmed when possible. If surfaces such as cutting boards, knives or other equipment have been exposed to contaminated product they must be cleaned and sanitized immediately.

Aspect 3 : Dropped Product

In the event that product is dropped on the floor or contacts any other unclean surface it should be destroyed unless it is possible to trim the contamination. If possible, meat should be suspended on a hook and then trimmed.

Aspect 4 : Operational Sanitation

Cutting boards and other meat contact surfaces will support the growth of spoilage and potentially harmful bacteria which will increase in numbers during the day. It is important that where room temperatures are significantly higher than 4°C, cutting boards should be cleaned on a periodic basis throughout the day.

Aspect 5 : Sanitation and Pest Control

Be sure that all wet garbage is contained and covered. Always ensure that screens on windows opening to the outside are not torn or absent and keep doors closed when possible. All cleaning activities should be performed using only approved chemicals. Store chemicals in well ventilated areas away from food contact items and in the original labeled container. Be sure to clean surfaces thoroughly with cleaning chemicals such as detergents before applying sanitizing solutions as they will otherwise be inactivated by organic materials and bacteria will not be killed. When cleaning be sure to have all packaging materials, ingredients and meat products covered as chemicals and/or spray will contaminate products.

Aspect 6 : Employee Hygiene

Any sores or cuts must be covered with dry, tight fitting bandages and gloves worn when hands are affected. Employees must wash their hands immediately following sneezing, using the washroom, following coffee/lunch breaks or after touching eyes, hair, mouth, nose or any unclean surface. Hair nets and, when applicable, beard nets are recommended.

Area 4 : Grinding**Aspect 1 : Meat Ingredient Storage**

Ground meat and trim should be stored at 4°C or lower in bins. If shop generated trim is used it must be carefully handled to prevent contamination and to ensure adequate

temperature control while in production and storage areas. Shop trimmings should be labeled with production date and species.

Aspect 2 : Ingredient Selection and Preparation

Select meat ingredients in accordance with FIFO (first in first out) system. Inspect meat for off odour, excess purge, bone-chips, cartilage, torn or ripped packaging, or any other condition which would make the ground meat or trim unsatisfactory for use.

Aspect 3 : Grinder Preoperational Inspection

The operator should ensure that all bolts, pins or other small parts removed during disassembly are present and securely placed so that they may not enter ground products. Make certain that the grinder is free of excessive rust, water, flaking paint or other condition which could contaminate product. Ensure that the grinder has been cleaned adequately and is free of visible meat residue.

Aspect 4 : Grinding Production

Whenever possible, grind only what is required in the next few hours. Grind meat in areas where room temperature is not more than 10°C or whenever possible 4°C or colder. Particular attention should be devoted to keeping ground meat at 4°C or less as the temperature of the meat will rise during grinding due to heat generated from friction.

Aspect 5 : Rework

If whole muscle products are taken from the counter for grinding always ensure that they are free from any seasoning and are not past their “best before” date. If you find that you have ground more than you can sell it is acceptable to immediately freeze the remaining unexpired product as patties or frozen ground beef for sale in the frozen counter.

Aspect 6 : Grinder Sanitation

Completely disassemble, clean and sanitize grinder after each day of production or more often if needed. If possible use a separate grinder for each species otherwise a complete cleanup must be undertaken when switching on to another species.

Area 5 : Sausage

Aspect 1 : Casings and Meat Ingredients

To prevent growth of bacteria during storage, natural casings should be salted or kept in brine at 4°C or lower (but not frozen) in covered containers. To avoid mold growth after opening, collagen and fibrous casings should not be kept in warm humid areas but rather in sealed bags or containers in a dry cooler.

Aspect 2 : Spices and Seasonings

Spices and seasonings should be stored covered and be protected from humidity, pests and cleaning chemicals.

Aspect 3 : Ingredient Selection and Preparation

Inspect natural casings to ensure they are relatively free of patches of spongy tissue on their lining which can result in shortened shelf life. If ice is used in sausage production ensure that the ice box is cleaned regularly and that only clean scoops and never

hands are used to remove it. Inspect meat for off odour, bone chips, cartilage, glands, foreign materials or any other condition which would make it unsatisfactory for use.

Aspect 4 : Preoperational Inspection and Sanitation

Before the start of production all equipment should be inspected to ensure that it is free of visible meat residues or pooled water and that all parts and fasteners are accounted for and properly secured. A written procedure for disassembly and sanitation of the grinder, mixer, stuffer and all other equipment should be followed each production day or more often if needed.

Aspect 5 : Sausage Production

Sausage production areas should be kept at no more than 10°C and whenever possible 4°C or colder. During production, the meat block should be sufficiently cold to ensure that the finished product leaving the stuffer is 4°C or less. When moisture addition is required use ice or cold potable liquids dispensed using cleaned and sanitized containers.

Aspect 6 : Allergen Control

If potential allergens are used in the production of sausage, ensure that they are declared in applicable labelling or ingredient lists and that equipment is cleaned before other products are made.

Area 6 : Processing

Aspect 1 : Ingredients

Select meat ingredients on the basis of FIFO system and avoid the use of rework which will shorten shelf life. All meat materials should be kept covered, free of any potential contamination and at 4°C or less. If water is used as an ingredient, make certain that it is cold and is dispensed only from cleaned and sanitized containers.

Aspect 2: Tumbling

Whenever possible, tumble meat at 4°C or colder to enhance food safety, shelf life, slice ability and yield. Clean and sanitize the tumbler between batches which have a different ingredient or species composition, after each production day or more often if required. Inspect the tumbler daily before production for corrosion, damaged or loose components.

Aspect 3 : Coating

Apply all coatings in a single use method. Do not roll or dip meat in storage containers holding spices or other coatings as this will lead to cross-contamination. Place only the required amount of coating material on a clean working surface and following completion throw away all unused ingredients.

Aspect 4 : Marinating

Do not reuse marinades and ensure that a clean, sanitized, acid resistant and covered container is used to hold marinades and meat ingredients and to display the finished product. Conduct marinating activities at 4°C or colder.

Aspect 5 : Stuffing

Do not reuse any stuffing materials and prepare stuffing immediately before use with only cleaned and sanitized containers and tools.

Aspect 6 : Mechanical Tendering or Injecting

Disassemble, clean and sanitize injecting or tenderizing equipment between batches which have a different ingredient or species composition, at the end of the day or more often if required. Inspect needles or blades before production and after each batch to ensure proper function.

Aspect 7 : Allergen Control

If potential allergens are used in the production of processed products ensure that they are declared in applicable labelling or ingredient lists and that equipment is cleaned before other products are made.

Area 7 : Packaging

Aspect 1 : Packaging Storage

As food packaging contacts product directly it must always be kept clean, covered and free of any potential contamination. It is especially important to ensure packaging is protected during cleaning activities to prevent chemicals or spray from contaminating soaker pads, trays and wrap. Packaging must never be stored in the same areas where chemicals are kept.

Aspect 2 : Employee Hygiene

Any sores or cuts must be covered with dry, tight fitting bandages and gloves worn when hands are affected. Packaging employees must wash their hands immediately following sneezing, using the washroom, following coffee/lunch breaks or after touching eyes, hair, mouth, nose or any unclean surface. Hair nets and, when applicable, beard nets are recommended.

Aspect 3 : Packaging Procedures

When packaging ensure that wrap or bag is tight and maintains an effective seal which will not permit leakage. If clips or other fasteners are used then special care is needed to ensure they do not enter the product. Upon opening a new container of packaging supplies a visual inspection should be conducted to make certain no evidence of contamination is present. If packaging falls on the floor it must be thrown away. If cooked product is packaged it is very important to ensure that contamination does not occur from individuals, garments, bins, cutting surfaces or equipment from raw product areas.

Aspect 4 : Placing Meat on Trays

When placing cuts on trays, be aware of the potential for contamination which can result from stacking the tray on the top of the meat surface of the tray beneath. Also when placing meat trays on larger metal or fiberglass trays which are placed in a rack, ensure that the underside of the large tray is clean and dry to avoid contamination from falling on the meat on the tray below.

Aspect 5 : Tray and Rack Placement

When trays and racks are placed in a location to await unloading and over-wrapping, when possible ensure that they are kept in refrigerated areas and away from sources of warm air such as doors opening to unrefrigerated areas.

Aspect 6 : Metal Trays

Metal trays used for storage of meat should be cleaned and sanitized after each use. Racks should also be cleaned on a periodic basis to avoid contamination and be kept free of flaking paint or other unsanitary condition.

Area 8 : Display

Aspect 1 : Meat Display Case Sanitation

A written procedure for cleaning display cases should be constructed which contains a schedule for cleaning. Cases should be cleaned at least once per week and inspections conducted to determine if more frequent cleaning is required.

Aspect 2 : Display Case Maintenance

When maintenance or repair of refrigeration systems is required, it is essential that food products contained in the case be removed or adequately protected against contamination or a rise in temperature. Temperature measurement devices within the display case should be periodically checked.

Aspect 3 : Meat Display Temperature

The surface of all raw meat products contain spoilage bacteria and in some cases potentially harmful bacteria which grow quickly if exposed to air temperatures over 4°C. To ensure shelf life and safety, temperature of cases should be monitored at least three times per day. For optimal display, fresh meat should be maintained between 0 and 2°C (meat freezes at -1.5°C). Frozen meat should be kept at -18°C in the frozen case.

Aspect 4 : Refrigeration Failure

In the event of refrigeration system failure or power outage, product should be inspected by management and where the product temperature has exceeded 4°C for a significant period of time, meat products must be disposed of.

Aspect 5 : Inventory Rotation

Product must be removed from storage and put on display in accordance with a first in–first out program. “Best before” dates of products should be monitored daily to ensure any outdated product is not still on display.

Aspect 6 : Package Dates

When possible a sign explaining the meaning and importance of “packaged on” and “best before” dates should be posted along with the significance of these dates if meat is frozen or used fresh.

Aspect 7 : Package Conditions

Periodic inspection of the display case should be performed to ensure there are no leaking /damaged packaging or other condition which might permit contamination. Consumer handling of leaking products may result in raw meat juices containing potentially harmful bacteria contacting other products in the store or at home. Further, it is also important to make certain that all labels are still present on packages and are readable.

14.3 GOOD TRANSPORT PRACTICES (GTP)

Considerations During Design of GTP

- 1) Is the food “ready for direct consumption”?
- 2) Are the conditions of the food transportation unit likely to introduce or support the increase of a hazard?
- 3) Is it likely, that a hazard is introduced or increased during loading?
- 4) Is it likely, that a hazard may increase during transport or storage in the food transportation unit?
- 5) Is it likely, that a hazard is introduced or increased during unloading?

Categories of GTP Hazards

- 1) Hazards related to the food transportation unit
 - a) Unsuitability of the construction material and coating, lack of sealing/locking device.
 - b) Residues of previous cargoes, residues from cleaning and sanitizing materials.
- 2) Hazards related to loading and unloading
 - a) Increase/decrease of temperature of the food.
 - b) Undesirable introduction of microbes, dust, moisture, or other physical contamination.
- 3) Hazards related to transport
 - a) Leakage of heating / cooling fluid.
 - b) Break down of temperature control.

Design of Food Transportation Units

The design of the food transportation unit should be such as to avoid cross-contamination due to simultaneous or consecutive transport. Important aspects are clean ability and appropriate coatings. Construction and design of the food transportation unit should facilitate inspection, cleaning, disinfection and when appropriate enable temperature control.

Use of means for cooling or heating should be designed and constructed such as to avoid contamination. Although hot water and steam are preferred means of heating, other substances may be used on the basis of safety and risk evaluation and inspection procedures. Upon request by the competent authority, evidence may be required to demonstrate that the heating media employed have been properly evaluated and safely used.

Inner surface materials suitable for direct food contact should be used. These should be non-toxic, inert, or at least compatible with the transported food, and which do not transfer substances to the food or adversely affect the food. Stainless steel or surface coated with food-grade epoxy resins are most suitable. The interior design should eliminate areas that are difficult to access and clean.

The appropriate design of the food transportation unit should assist in preventing access of insects, vermin, etc., contamination from the environment, and when necessary,

providing insulation against loss or gain of heat, adequate cooling or heating capacity, and facilitation of locking or sealing. There should be appropriate facilities conveniently available for cleaning and, where appropriate disinfecting of the food transportation unit. Auxiliary equipment should be (where appropriate) subjected to the above stated requirements. To maintain sanitary conditions, facilities should be provided for the storage of pipes, hoses and other equipment used in the transfer of foods.

Food transportation unit's, accessories, and connections should be cleaned, disinfected (where appropriate) and maintained to avoid or at least reduce the risk of contamination. It should be noted that depending on the commodity relevant, different cleaning procedures are applicable, which should be recorded. Where necessary, there should be disinfection with subsequent rinsing unless manufacturers instruction indicates on a scientific basis that rinsing is not required.

Dedicated Transport

Where appropriate, particularly bulk transport containers and conveyances should be designated and marked for food use only and be used only for that purpose. Bulk food in liquid, granulated or powder form must be transported in receptacles and/or containers /tankers reserved for the transport of food unless the application of principles such as HACCP demonstrates that dedicated transport for these products is not necessary to achieve the same level of food safety.

Documentation and Records

Suitable controls can be formulated by shippers or receivers to ensure food safety during transport in particular cases depending on the likelihood and nature of hazards. Such controls should be communicated in writing. Documentation is an important tool for validation and for verification that the principles have been adhered to. This documentation may include food transportation unit number, registration of previous loads, temperature/time recordings and cleaning certificates. It should be noted that some food transportation units are intended for single use only.

Transportation Spills and Salvage

Should a transportation spill occur involving a food shipment, the onus is on the transporter to ensure that:

- 1) All potentially hazardous foods that have been subjected to temperature abuse (i.e. have remained within the danger zone of 4° C to 60° C for more than 2 hours) are itemized and discarded in such a fashion that precludes the food from being utilized for human consumption.
- 2) Canned or packaged goods that have been subjected to unintentional freezing, which has compromised the integrity of the package (e.g. burst can seams) should be itemized and discarded in such a fashion that precludes the food from being utilized for human consumption.
- 3) All foods that have been subjected to contamination by exposure to the elements, chemicals or other contaminants are itemized and discarded in such a fashion that prevent the food from being utilized for human consumption.
- 4) Any foods that are salvageable and intended for human consumption shall be itemized and kept in secure storage until approved for salvage and resale by the regulatory authority.

Temperature Controls

Food requiring temperature controls shall be transported in a manner that prevents temperature abuse, which could jeopardize the safety of the food.

Food requiring refrigeration (potentially hazardous foods) shall be transported at 4° C or less. This is best achieved with mechanical refrigeration, which is mandatory for long distance transport (more than four hours), but can also be achieved through other effective means for short term transport, such as icing of chicken or fish with ice from approved sources. Therefore, all vehicles used to transport chilled foods shall be so constructed and properly insulated that, when equipped with appropriate refrigeration units, they will be capable of maintaining product temperature between –1° and +4° C throughout the load.

Whenever chilled foods are received with a product temperature of +7° C or higher, or frozen in error, the manufacturer shall be notified immediately and special handling instructions will be requested.

Frozen food should be transported at a temperature of –18° C or less to preserve the quality of the food. Therefore, all vehicles used to transport frozen foods should be constructed and properly insulated so that, when equipped with appropriate refrigeration units, they are capable of maintaining product temperature of –18° C or lower, and in the case of fish and fishery products at –21° C or lower, throughout the load in all movement.

Food (that is not potentially hazardous food) that may be damaged by freezing should be transported at a temperature of 0° C or higher.

Air temperatures within temperature-controlled transportation units should be regularly monitored. For frozen loads the temperature should be recorded at the return air intake of the chiller unit. For refrigerated loads the temperature should be recorded at the cold air outlet. Ideally, for long distance transportation (longer than four hours) of potentially hazardous foods, a written or electronic record of the temperature within the transportation unit should be produced and available for inspection.

For a refrigerated transport trailer, container, railcar or ship, it is essential that the shipment is properly loaded, ensuring adequate air circulation around the load. Failure to properly load may result in certain sections of the load being at much higher temperatures than the air supplied by or returned to the refrigeration unit.

Food requiring refrigeration (potentially hazardous foods) should be at 4° C or lower (pre-tempered) prior to loading in the transportation unit and must be at 4° C or lower once delivered to the receiver.

14.4 NUTRITION LABELLING

Consumers are exposed to a whole range of processed foods everyday. Those who do not want the inconvenience of preparing their own meals are willing to pay a premium for foods perceived to be of high quality and standard. One of their main bases of comparison is the information on the labels of these items.

Codex Alimentarius commission has published guidelines on nutrition labelling viz. CAC-GL 2-1885 (Rev. 1 1993). The purpose of these guidelines is :

- 1) To ensure that nutrition labelling is effective:
 - in providing the consumer with information about a food so that a wise choice of food can be made;
 - in providing a means for conveying information of the nutrient content of a food on the label;
 - in encouraging the use of sound nutrition principles in the formulation of foods which would benefit public health; and
 - in providing the opportunity to include supplementary nutrition information on the label.
- 2) To ensure that nutrition labelling does not describe a product or present information about it which is in any way false, misleading, deceptive or insignificant in any manner.
- 3) To ensure that no nutritional claims are made without nutrition labelling . It is based on the following principles of nutrition labelling.

A) Nutrient Declaration

Information supplied should be for the purpose of providing consumers with a suitable profile of nutrients contained in the food and considered to be of nutritional importance. The information should not lead consumers to believe that there is exact quantitative knowledge of what individuals should eat in order to maintain health, but rather to convey an understanding of the quantity of nutrients contained in the product. A more exact quantitative delineation for individuals is not valid because there is no meaningful way in which knowledge about individual requirements can be used in labelling .

B) Supplementary Nutrition Information

The content of supplementary nutrition information will vary from one country to another and within any country from one target population group to another according to the educational policy of the country and the needs of the target groups.

C) Nutrition Labelling

Nutrition labelling should not deliberately imply that a food which carries such labelling has necessarily any nutritional advantage over a food which is not so labeled.

Food Labels Information

In United States a regulation related to nutrition labelling was passed in 1973 but compliance was entirely voluntary unless nutritional claims were made or nutrients are added in the food products intended for sale. Although it was a voluntary declaration, manufacturers in United States and in other developed countries were complying with the requirement because of competitive pressure. In 1990, Nutrition labelling and Education Act (NLEA) was passed and as a consequence it is now mandatory that all foods marketed in the US market must carry nutrition information in a standardized format. Also to encourage judicious purchase decision by the consumer, the information must indicate how the food contributes to a healthy diet. The regulations are result of the growing health and nutrition consciousness of the typical American consumer.

The Food and Drug Administration (FDA) and the U.S. Department of Agriculture (USDA) require labels on almost all packaged foods that include nutrition information in readable type. The information usually appears on the back or side of packaging

under the title “Nutrition Facts.” It’s also displayed in grocery stores near fresh foods, like fruits, vegetables, and fish.

Manufacturers are required to provide information on certain nutrients. The mandatory (underlined> and voluntary components and the order in which they must appear are:

- total calories
- calories from fat
- calories from saturated fat
- total fat
- saturated fat
- polyunsaturated fat
- monounsaturated fat
- cholesterol
- sodium
- potassium
- total carbohydrate
- dietary fiber
- soluble fiber
- insoluble fiber
- sugars
- sugar alcohol (for example, the sugar substitutes xylitol, mannitol and sorbitol)
- other carbohydrate (the difference between total carbohydrate and the sum of dietary fiber, sugars, and sugar alcohol if declared)
- protein
- vitamin A
- percent of vitamin A present as beta-carotene
- vitamin C
- calcium
- iron
- other essential vitamins and minerals

If a claim is made about any of the optional components, or if a food is fortified or enriched with any of them, nutrition information for these components becomes mandatory.

Nutrition Panel Format

The standard format called ‘Nutrition Facts’ must indicate per serving size, total calories, calories from fat, saturated fat, cholesterol, sodium, total carbohydrates, dietary fiber, sugars, protein, vitamin A, vitamin C, calcium and iron. For easy understanding, the values are generally given in grams for each nutrient and as a percentage of recommended daily allowance to help the consumer not only compare food quality for various alternatives available but also to decide the daily food intake to meet the daily dietary nutrition requirement. This helps to maintain consumers health and promote nutrition education.

All nutrients must be declared as percentages of the Daily Values which are label reference values. The amount, in grams or milligrams, of macronutrients (such as fat, cholesterol, sodium, carbohydrates, and protein) are still listed to the immediate right of these nutrients. But, for the first time, a column headed “% Daily Value” appears on the far right side.

Declaring nutrients as a percentage of the Daily Values is intended to prevent misinterpretations that arise with quantitative values. For example, a food with 140 milligrams (mg) of sodium could be mistaken for a high-sodium food because 140 is a relatively large number. In actuality, however, that amount represents less than 6 per cent of the Daily Value for sodium, which is 2,400 mg. On the other hand, a food with 5 g of saturated fat could be construed as being low in that nutrient. In fact, that food would provide one-fourth of the total Daily Value because 20 g is the Daily Value for saturated fat.

Nutrition Panel Footnote

The % Daily Value listing carries a footnote saying that the percentages are based on a 2,000-calorie diet. Some nutrition labels—at least those on larger packages—have these additional footnotes:

- a sentence noting that a person’s individual nutrient goals are based on his or her calorie needs; and
- lists of the daily values for selected nutrients for a 2,000- and a 2,500-calorie diet.

Nutrient Content Claims

The regulations also spell out what terms may be used to describe the level of a nutrient in a food and how they can be used. These are the core terms:

- **Free:** This term means that a product contains no amount of, or only trivial or “physiologically inconsequential” amounts of, one or more of these components: fat, saturated fat, cholesterol, sodium, sugars and calories. For example, “calorie-free” means fewer than 5 calories per serving, and “sugar-free” and “fat-free” both mean less than 0.5 g per serving. Synonyms for “free” include “without,” “no” and “zero.” A synonym for fat-free milk is “skim”.
- **Low:** This term can be used on foods that can be eaten frequently without exceeding dietary guidelines for one or more of these components: fat, saturated fat, cholesterol, sodium and calories. Thus, descriptors are defined as follows:
 - low-fat: 3 g or less per serving;
 - low-saturated fat: 1 g or less per serving;
 - low-sodium: 140 mg or less per serving;
 - very low sodium: 35 mg or less per serving;
 - low-cholesterol: 20 mg or less and 2 g or less of saturated fat per serving; and
 - low-calorie: 40 calories or less per serving.

Synonyms for low include “little,” “few,” “low source of,” and “contains a small amount of.”

- **Lean and extra lean:** These terms can be used to describe the fat content of meat, poultry, seafood and game meats.

- **Lean:** less than 10 g fat, 4.5 g or less saturated fat, and less than 95 mg cholesterol per serving and per 100 g.
- **Extra lean:** less than 5 g fat, less than 2 g saturated fat, and less than 95 mg.
- Cholesterol per serving and per 100 g.
- **High:** This term can be used if the food contains 20 per cent or more of the Daily Value for a particular nutrient in a serving.
- **Good Source:** This term means that one serving of a food contains 10 to 19 per cent of the Daily Value for a particular nutrient.
- **Reduced:** This term means that a nutritionally altered product contains at least 25 per cent less of a nutrient or of calories than the regular, or reference, product. However, a reduced claim can't be made on a product if its reference food already meets the requirement for a "low" claim.
- **Less:** This term means that a food, whether altered or not, contains 25 per cent less of a nutrient or of calories than the reference food. For example, pretzels that have 25 per cent less fat than potato chips could carry a "less" claim. "Fewer" is an acceptable synonym.
- **Light:** This descriptor can mean two things:
 - First, that a nutritionally altered product contains one-third fewer calories or half the fat of the reference food. If the food derives 50 per cent or more of its calories from fat, the reduction must be 50 per cent of the fat.
 - Second, that the sodium content of a low-calorie, low-fat food has been reduced by 50 per cent. In addition, "light in sodium" may be used on food in which the sodium content has been reduced by at least 50 per cent.

The term "light" still can be used to describe such properties as texture and color, as long as the label explains the intent—for example, "light brown sugar" and "light and fluffy."

- **More:** This term means that a serving of food, whether altered or not, contains a nutrient that is at least 10 per cent of the Daily Value more than the reference food. The 10 per cent of Daily Value also applies to "fortified," "enriched" and "added" "extra and plus" claims, but in those cases, the food must be altered.

14.5 TRACEABILITY RECORDS

Traceability

The ISO 9000:2000 guidelines define traceability as the "ability to trace the history, application or location of that which is under consideration". The ISO guidelines further specify that traceability may refer to the origin of the materials and parts, the processing history, and the distribution and location of the product after delivery. This definition of traceability is quite broad. It does not specify a standard measurement for "that which is under consideration" (a grain of wheat or a truckload), a standard location size (field, farm, or county), a list of processes that must be identified (pesticide applications or animal welfare), where the information is recorded (paper or electronic record, box, container or product itself), or a bookkeeping technology (pen and paper or computer).

Traceability is closely linked with product identification. It may relate to:

- the origin of materials and parts (food products and ingredients),

- the product processing history, and
- the distribution and location of the product after delivery.

Complete Traceability is Impossible

The definition of traceability is necessarily broad because traceability is a tool for achieving a number of different objectives. **The three dimensions of traceability systems viz. the breadth, depth and precision are influenced by the objectives to be achieved by the traceability system.**

Breadth describes the amount of information the traceability system records.

There is a lot to know about the food we eat, and a record keeping system cataloging all of a food's attributes would be enormous, unnecessary and expensive. Take for example, a cup of coffee. The beans could come from any number of countries; be grown with numerous pesticides or just a few; grown on huge corporate organic farms or small family-run conventional farms; harvested by children or by machines; stored in hygienic or pest-infested facilities; decaffeinated using a chemical solvent or hot water.

The depth of a traceability system is how far back or forward the system tracks. In many cases, the depth of a system is largely determined by its breadth: once the firm or regulator has decided which attributes are worth tracking, the depth of the system is essentially determined. For example, a traceability system for decaffeinated coffee would only need to extend back to the processing stage. In other cases, the depth of the system is determined by quality or safety control points along with the supply chain e.g. a firm's traceability system for pathogen control may only need to extend to the last "kill" step—where product was treated, cooked, or irradiated.

Precision reflects the degree of assurance with which the tracing system can pinpoint a particular food product's movement or characteristics. Precision is determined by the unit of analysis used in the system and the acceptable error rate. The unit of analysis, whether container, truck, crate, day of production, shift, or any other unit, is the tracking unit for the traceability system. Systems that have large tracking units, such as an entire feedlot or grain silo, will have poor precision in isolating safety or quality problems. Systems with smaller units, such as individual cows, will have greater precision.

What is a Lot ?

Product differentiation for tracking is achieved by breaking product flow into lots. Lots are the smallest quantity for which firms keep records. Firms may choose among an infinite array of unit sizes, shapes, or time, defining their own lot size by the quantity of product that fits in a container, that a forklift can move on a pallet, or that fills a truck. A lot may be an individual animal or group of animals, or production from an entire day or shift. In choosing lot size, firms typically consider a number of factors, including accounting procedures, production technologies, and transportation. As these factors vary within and among industries, lot size varies from plant to plant. There is no standard traceability unit. The size and shape of a lot is likely to change at each processing juncture. Consider an example : An apple packer-shipper may use accounting procedures to choose the incoming lot size. The shipper may receive apples from a number of growers and must pay each grower based on the type, size, and grade of the product. Since these attributes are known only after the apples have been sorted, each grower's apples need to be kept separate in the packing line. These accounting procedures thus influence the lot size of product entering the packing house.

Factors Influencing Costs / Benefits of Traceability

Factors Influencing Benefits

- 1) Value of coordination along the supply chain;
- 2) Market size;
- 3) Value of the food product;
- 4) Likelihood of safety or quality failures; and
- 5) Magnitude of penalty (loss of market, legal expenses, government fines).

Factors Influencing Costs

- 1) Breadth of traceability, the information to record;
- 2) Depth and the number of transactions;
- 3) Precision, size and exacting nature of the tracking units;
- 4) Degree of product transformation, complexity of the system;
- 5) New segregation or identity preservation activities;
- 6) New accounting systems and procedures; and
- 7) Technological difficulties of tracking.

Why have a Traceability System in your Business?

Each business has a role to play in collecting, collating and storing information about ingredients, products and processes under their control, thereby facilitating traceability through the whole food chain - from 'farm to fork'. In addition to meeting regulatory demands, traceability systems have three main roles within business:

- 1) To provide information within your business to assist in process control and management e.g. stock control, efficiency of material usage and quality control;
- 2) To assist you when problems arise. Traceability systems are important to support effective withdrawal or recall of products. They can also allow detection of the cause of a problem so that you can take targeted action to prevent recurrence; and
- 3) To help you support claims about your product and provide information to consumers. Traceability systems are important to authenticate marketing claims that cannot be supported by analysis e.g. relating to origin or assurance status.

Key Traceability Steps in the Manufacturing Process

1) When Goods are Received

At this point your records form a critical traceability link in the food chain and your recording system links up with that of your supplier.

Key Records

- 1) **From whom** : Name and address of supplier and/or transporter.
- 2) **When** : Date and time on which goods were received.
- 3) **What exactly you have received** : Identity of food / feed and the quantity.
- 4) **What you did with the goods as received** : Added to Store A, mixed with Delivery B etc.

Factors which may Need to be Addressed:

- 1) New deliveries used to top up a single store e.g. a tank of oil or silo of flour;
- 2) Deliveries or collections when no-one is on site;
- 3) Difficulties in getting the right information or poor information from suppliers; and
- 4) Limitations on the information that can be obtained where basic raw materials are used.

2) Inside a Food or Feed Business

Can you make the links between the products you have received and the goods or finished products you have sent out? The size of the unit chosen for traceability will affect the size of any withdrawal required. The unit may for example cover a single production unit or a period of time in a continuous process.

Key Records

Made where goods are separated, changed or combined together. The number of points you will need to take records to create the link depends on your processes.

- 1) **From what :** The ingredients used.
- 2) **When :** Keeping a note of the date/time at which the transformation happened.
- 3) **What is created :** The new identity of the 'in process' unit.
- 4) **Product identification :** New products must be described and linked to your records by batch or lot number in an appropriate way.

Factors which may Need to be Addressed :

- 1) Continuous processing with no obvious breaks.
- 2) Transfers between continuous and batch processing operations.
- 3) Rework.
- 4) Lag times for liquids and solids carried in pipes .

3) When Goods are Dispatched

The products may leave your control, but not necessarily your liability.

Key Records

- 1) **To whom :** To whom you have dispatched and the destination of products.
- 2) **What you have supplied :** Identity and quantity of goods you have supplied.
- 3) **When :** The date and time when goods were dispatched and received.

Where possible make it easy for your customers to link your identity number, as well as any information about the goods into their recording system. Discussions between suppliers and purchasers are important to identify critical information to ensure the traceability chain remains in place.

When the System is in Place**Who has Access to my Records?**

The data you collect is your information. However, in the event of a problem, assess whether the issue is specific to your products or of wider interest to the food chain. Notify enforcement authorities if products do not meet safety requirements, and it is necessary to withdraw and / or recall such products.

How Long to Keep the Records?

For some sectors, there are specific legal requirements to keep some records for a minimum period. You also need to consider the shelf life of the products you or your customers sell and the likelihood that they will be stored by consumers.

Check it Out

- 1) Check regularly that the traceability system is working effectively, by checking the accuracy of the information and time taken to retrieve traceability data.
- 2) Check the system both backwards and forwards i.e. tracing a batch of ingredients forwards as well as products backwards.
- 3) Carry out a mock traceability exercise regularly in conjunction with product recall / withdrawal test exercises.

Enforcement officers, trading partners, or customers might be happy to help you out and create 'practice' problems to check that information can be put together quickly and reliably. Consider using a third party to do an independent check; it is in your interest that the systems work well.

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) What are the broad-level crucial practices to be followed in a retail organisation?

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- 2) State three areas to be addressed in a meat retail organisation from GRP point of view?

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- 3) State three categories of GTP hazards and their brief contents?

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- 4) State four elements of documents and records to be maintained w.r.t. GTP by a transporter?

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- 5) State briefly the purpose of nutrition labelling as per Codex guidelines?

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- 6) What are nutrition facts required to be declared on food package in USA?

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- 7) State five factors influencing cost of traceability?

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- 8) State the three main roles played by the traceability system in an organisation?

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14.6 LET US SUM UP

Once a food item is processed the journey towards the consumption starts. In this journey all interested parties have to consider the associated hazards, the associated risk profile w.r.t. transport to wholesaler and / or retailer, ensuring that good retail practices are followed at retailer end, the consumer is adequately guided about the nutrient contents as per the regulations and in the event of necessity for withdrawal or recall, a robust traceability system is in place. The purpose of the guidelines published by Codex Alimentarius commission on nutrition labelling is:

- i) To ensure that nutrition labelling is effective in :
- providing the consumer with information about a food so that a wise choice of food can be made;

- providing a means for conveying information of the nutrient content of a food on the label;
 - encouraging the use of sound nutrition principles in the formulation of foods which would benefit public health; and
 - providing the opportunity to include supplementary nutrition information on the label.
- ii) To ensure that nutrition labelling does not describe a product or present information about it which is in any way false, misleading, deceptive or insignificant in any manner.
- iii) To ensure that no nutritional claims are made without nutrition labelling .

Traceability system has three main roles within business: 1) To provide information within your business to assist in process control and management e.g. stock control, efficiency of material usage and quality control. 2) To assist you when problems arise. Traceability systems are important to support effective withdrawal or recall of products. They can also allow detection of the cause of a problem so that you can take targeted action to prevent recurrence. 3) To help you support claims about your product and provide information to consumers. Traceability systems are important to authenticate marketing claims that cannot be supported by analysis e.g. relating to origin or assurance status

14.7 KEY WORDS

- Nutrition Labelling** : A description intended to inform the consumer of nutritional properties of a food.
Nutrition labelling consists of two components:
- a) nutrient declaration; and
 - b) supplementary nutrition information.
- Nutrition Declaration** : means a standardized statement or listing of the nutrient content of a food.
- Nutrition Claim** : means any representation which states, suggests or implies that a food has particular nutritional properties including but not limited to the energy value and to the content of protein, fat and carbohydrates, as well as the content of vitamins and minerals. The following do not constitute nutrition claims:
- a) the mention of substances in the list of ingredients;
 - b) the mention of nutrients as a mandatory part of nutrition labelling; and
 - c) quantitative or qualitative declaration of certain nutrients or ingredients on the label if required by national legislation.
- Nutrient Content Claim** : A nutrition claim that describes the level of a nutrient contained in a food.
(Examples: “source of calcium”; “high in fibre and low in fat”);).

Health Claim	:	means any representation that states, suggests, or implies that a relationship exists between a food or a constituent of that food and health.
Food Transportation Unit:		Includes food transport vehicles or contact receptacles (such as containers, boxes, bins, bulk tanks) in vehicles, aircraft, railcars, trailers and ships and any other transport receptacles in which food is transported.
Bulk	:	Means unpacked food in direct contact with the contact surface of the food transportation unit and the atmosphere (for example, powdered, granulated or liquid form).
Semi-packed Food	:	Semi-packed food is a food which might come in direct contact with the food transportation unit or the atmosphere (e.g. vegetables and food in crates and bags).
Traceability	:	The ability to follow the movement of a food through specified stage(s) of production, processing and distribution.



14.8 ANSWERS TO CHECK YOUR PROGRESS EXERCISE

Your answer should include following points:

Check Your Progress Exercise 1

- 1) 1) Time and Temperature Controls (including cooking temperature, cooling time, cold holding, hot holding).
- 2) Food Storage Conditions (potential for cross-contamination).
- 3) Training and Certification of Managers.
- 4) Cleaning and Sanitation Practices.
- 2) 1) Receiving (approved sources, labelling, trailer inspection, product inspection, pest control).
- 2) Storage (storage condition, box placement, storage temperature, FIFO, freezer condition).
- 3) Fabrication (meat contact surfaces, product inspection, employee hygiene, operational sanitation, pest control).
- 3) 1) Hazards related to the food transportation unit :
 - a) Unsuitability of the construction material and coating, lack of sealing/locking device.
 - b) Residues of previous cargoes, residues from cleaning and sanitizing materials.
- 2) Hazards related to loading and unloading:
 - a) Increase/decrease of temperature of the food.
 - b) Undesirable introduction of microbes, dust, moisture, or other physical contamination.

- 3) Hazards related to transport
 - a) Leakage of heating/ cooling fluid.
 - b) Break down of temperature control.
- 4) 1) Food transportation unit number
 - 2) Registration of previous loads
 - 3) Temperature / time recordings
 - 4) Cleaning certificates
- 5) 1) To ensure that nutrition labelling is effective:
 - in providing the consumer with information about a food so that a wise choice of food can be made; and
 - in providing a means for conveying information of the nutrient content of a food on the label.
 - 2) To ensure that nutrition labelling does not describe a product or present information about it which is in any way false, misleading, deceptive or insignificant in any manner.
 - 3) To ensure that no nutritional claims are made without nutrition labelling . It is based on the following principles of nutrition labelling.
- 6) 1) Total calories
 - 2) Calories from fat
 - 3) Total fat
 - 4) Saturated fat
 - 5) Cholesterol
 - 6) Sodium
 - 7) Total carbohydrate
 - 8) Dietary fiber
 - 9) Sugars
 - 10) Protein
 - 11) Vitamin A
 - 12) Vitamin C
 - 13) Calcium
 - 14) Iron
- 7) 1) Breadth of traceability, the information to record
 - 2) Depth and the number of transactions
 - 3) Precision, size and exact nature of the tracking units
 - 4) Degree of product transformation, complexity of the system
 - 5) New segregation or identity preservation activities
- 8) 1) To provide information within your business to assist in process control and management e.g. stock control, efficiency of material usage and quality control.

- 2) To assist you when problems arise. Traceability systems are important to support effective withdrawal or recall of products. They can also allow detection of the cause of a problem so that you can take targeted action to prevent recurrence.
- 3) To help you support claims about your product and provide information to consumers. Traceability systems are important to authenticate marketing claims that cannot be supported by analysis e.g. relating to origin or assurance status.

14.9 SUGGESTED READING

American Meat Institute (AMI) (<http://www.meatami.org>)

Code of Hygienic Practice for the Transport of Food (CAC/RCP 47-2001)

Food Drug Administration (FDA) (<http://www.fda.gov/>)

Food Marketing Association (FMI) (<http://www.fmi.org>)

Grocery Manufacturers of America (GMA) (<http://www.gmabrands.com>)

International Association for Food Protection (IAFP) (<http://www.foodprotection.org>)

National Food Processors Organisation (NFPA) (<http://www.nfpa-food.org>)

National Food Safety Information Network (<http://vm.cfsan.fda.gov>)

National Restaurant Association (NRA) (<http://restaurant.org>)

U.S. Department of Agriculture (USDA) (<http://www.fsis.usda.gov/>)

UNIT 15 TRACEABILITY STUDIES

Structure

- 15.0 Objectives
- 15.1 Introduction
- 15.2 What is Traceability?
- 15.3 Rationale and Objective of Traceability
- 15.4 Traceability and Codex
 - 15.4.1 Evolution of Discussion in the Codex Framework
- 15.5 Components of the Traceability/ Product Tracing Tool
- 15.6 Limitations of Implementing the Traceability/ Product Tracing Tool
- 15.7 Alternatives to the Traceability/ Product Tracing Tool
- 15.8 Recommended Steps for the Application of Traceability/ Product Tracing Tool
- 15.9 India's Experience with Traceability-The Grape Story
- 15.10 The Vision
- 15.11 Let Us Sum Up
- 15.12 Key Words
- 15.13 Answers to Check Your Progress Exercises
- 15.14 Suggested Reading

15.0 OBJECTIVES

After reading this unit we will be able to :

- define traceability;
- understand the rationale and objectives of traceability;
- understand the traceability tracing tools;
- understanding the limitations of traceability tracing tools;
- know the recommended steps to implement traceability; and
- know the India's experience in implementing the tools and traceability.

15.1 INTRODUCTION

The Uruguay Round of WTO saw trade in agriculture coming within the fold of multilateralism for the first time. All were enthusiastic, especially the developing countries. They saw a tremendous opportunity for their agricultural products and producers. They saw – we now know a little naively – the developed countries opening their doors to produce from developing countries. They saw in this an opportunity to finally, at long last work their way out of the vicious cycle of poverty their rural populations were struggling with for as long as they could remember. Their optimism had a definite basis. The WTO promised a rules-based regime for trade in agricultural produce and products. It signaled the possibility of an end to the bilateral exchanges, which were perceived to be unequal. Better market access through agreed reductions in tariffs

raised hopes. Coupled with promises on reduction in domestic support and export subsidies, the world indeed looked a rosier place for developing countries with a competitive agricultural base. In addition, there were two other agreements, *viz.*, the Agreement on Sanitary and Phyto-Sanitary Measures (SPS) and the Agreement on Technical Barriers to Trade (TBT). It seemed very reasonable to agree that since food trade did involve issues of food safety and public health, and since each country had a definite responsibility for these for their own citizens, there should be standards and guidelines to protect the global consumer from unsafe food and from being misled by inaccurate or fraudulent labelling.

Specific mention of Codex in the WTO texts was reassuring for the developing world. It took care of any apprehension that standards, whether for foodstuffs or for labelling or for any other regulatory activity, might be arbitrary. The fact that the SPS Agreement did permit countries to set higher standards than Codex was certainly worrying. But this was addressed by requiring any such deviation from Codex to be based on verifiable, scientific evidence. The fact that many developing countries simply did not have in place or even the means to put in place elaborate regulatory institutions and mechanisms was also addressed by appropriate documentation of the intent to provide capacity building assistance and so forth. For the developing world, however, the experience post – Uruguay can hardly be called satisfactory. The gains of the WTO rules-based regime, in the area of trade in agriculture, have proved to be rather illusory. Standards for ensuring food safety and fair trade practices seem to have negated any gains that may have accrued from market access promises. And while the developing world continues to struggle to meet existing standards, it is forced to look at and consider yet other requirements. And one such area that everyone is now being asked to address is TRACEABILITY.

15.2 WHAT IS TRACEABILITY ?

Traceability is the ability to trace the history, use or location of an entity by means of recorded information. For a product, it refers to the origin of the ingredients, the history of process applied, the distribution and location of the product after delivery.

Traceability is a tool to control quality, to find the cause of a quality problem, help in logistics and in rationalizing the process linked to logistics flow. It plays an important role in consumer safety, in allowing speedy and targeted recalls and withdrawal. It answers the requirement of regulations, and is a part of marketing in contributing to the protection of brand image.

The four main factors to allow traceability is identification of what has to be traced, recording of the related data, the links between all data recorded, and the communication of data. But to ensure traceability along the whole supply chain, there is inter-dependency of all partners involved, so there is a need for a common language, hence, the role of standardisation.

The whole supply chain is very complex and involves several companies, where various ingredients, components and packaging plays an important role. Thus, the scope of traceability system must be defined, what are the items that will be traced, which organisation will do it, an information system and the performance objectives.

Under the ISO Standard No. 8402, traceability is defined as the ‘ability to trace the history, application or location of an entity by means of recorded identifications’. The ISO definition of traceability also states that ‘all aspects of traceability requirements

should be clearly specified, for example, in terms of period of time, point of origin or identification’.

It implies that traceability may or may not be required or may begin at a certain point within the production chain or may end at a point before the end of the chain. Traceability may relate to -

- the origin of materials including raw materials and parts;
- the product processing history;
- the distribution and location of the product after delivery.

The issues which have a bearing on the subject of traceability are:

- a) The place of traceability in risk management;
- b) The use of traceability for product integrity, authenticity and identification;
- c) The use of equivalent measures;
- d) The practicability of traceability, and in particular the feasibility of its application in developing countries;
- e) Consumer confidence and information concerning the nature and origin of products; and
- f) The possibility of using traceability for liability and redress.

Several Codex Committees and Task Forces have initiated work on one or the other aspect of Traceability. It has been discussed by the:

- i) Codex Committee on General Principles (CCGP);
- ii) Codex Committee on Food Import & Export Inspection and Certification Systems (CCFICS);
- iii) Codex Committee on Food Hygiene (CCFH);
- iv) Codex Committee on Food Labelling (CCFL);
- v) Ad-hoc Codex Inter-governmental Task Force on Foods derived from Biotechnology; and
- vi) Ad-hoc Codex Inter-governmental Task Force on Animal Feeding.

Since the nature of discussions is significantly different in each of these bodies, and there are chances of having different interpretations of the meaning of ‘traceability’ and different approaches of handling, the issues that may arise within the Codex System, the matter was taken up in the Codex Alimentarius Commission so that means of dealing it within the framework of Codex remains uniform.

15.3 RATIONALE AND OBJECTIVE OF TRACEABILITY

The application of traceability could be on account of:

- 1) Human health and safety;
- 2) Other non-health consumer interest like, quality or to ascertain the genuineness of a particular declaration, like ‘organic’ nature of food product; and
- 3) Fair practices in food trade.

There could also be a combination of these objectives.

15.4 TRACEABILITY AND CODEX

The matter of traceability has been raised in several Codex Committees and Task Forces. Whereas, the European Union, perhaps, with the exception of UK, has been advocating a comprehensive application of traceability to all the food products, there have been countries, like United States, who have argued for a limited application of traceability. The US insisted that traceability (termed as ‘trace-back’ by them) should be made applicable only on the basis of food safety or public health protection. In fact, the US view has been that traceability *per se* is not specifically designed to assure safety nor should it necessarily be a prerequisite for assuring food safety. The US uses the system of ‘trace-back’ to directly address the recall of products for food safety reasons. The purpose of trace-back is to locate and, as necessary, removing a food or food ingredient(s) from the market place when a specific public health problem has been identified. It has been further emphasized by the US that a plan for monitoring should be determined based on specific concern associated with a particular product. It is inappropriate to require costly and onerous traceability programme for all products when a need for traceability is limited to exceptional situation. This view has also been endorsed by countries like Argentina and Brazil.

15.4.1 Evolution of Discussion in the Codex Framework

- 1) During the 24th Session of Codex Alimentarius Commission (July 2001), the Codex Secretariat submitted a draft discussion paper on traceability. The paper stated that the extent to which it may be applied to protect the health of consumers may be considered as part of a food safety risk management decision that would assume the ability to demonstrate the presence of a food safety risk and that it needed to be managed through traceability to achieve the Appropriate Level of Protection (ALOP) in a cost effective manner. The paper raised a question whether traceability needed to be applied throughout the production and distribution chains or only to some part of the chain. The paper also mentioned that the use of traceability “to ensure fair practices in the food trade” correlates to the “prevention of deceptive practices” as a legitimate objective described by the WTO Agreement on Technical Barriers to Trade.
- 2) During the 49th (Extraordinary) Session of the Executive Committee (September 2001), it was recommended that CCGP should consider traceability as a food safety objective (SPS measure) and as a legitimate objective (TBT measure). The Committee was of the opinion that consideration should be given to the use of traceability/ product tracing as a risk management option within the Working Principles of Risk Analysis and also noted that CCGP, CCFICS, CCFH and CCFL needed to undertake work as deemed appropriate within their respective mandates.
- 3) During the 50th session of the Executive Committee (June/July 2002), it was agreed to retain both aspects (SPS and TBT) without mentioning the priorities, but indicated that first consideration should be given to the use of traceability/ product tracing as a food safety risk management option (SPS measures).
- 4) During the 20th Session of CCGP (May 2004), the following definition of traceability/product tracing was agreed upon. The definition was adopted at the 27th Session of Codex Alimentarius Commission (June/July 2004).

“ Traceability/product tracing is the ability to follow the movement of a food through specified stage(s) of production, processing and distribution. ”

- 5) During the 13th Session of CCFICS (December, 2004), divergent views were expressed by the members. A number of delegations expressed the opinion that there should be no reference to fair trade practices in developing the document on application of traceability/product tracing and that it should be used only as a risk management tool for the purposes of ensuring food safety. The Committee agreed on the need to develop principles for the application of traceability/ product tracing in the context of food import and export inspection and certification systems and it was decided that a proposal for new work should be discussed at the 28th Session of the Codex Alimentarius Commission (July 2005). In this context, it was also agreed that a revised set of principles would be circulated for discussion by a working group and that if the proposal for new work was approved by the Codex Alimentarius Commission, then the proposed draft principles as prepared by the Working Group would be considered at the 14th Session of CCFICS during Nov./Dec. 2005.
- 6) Based on the results of the meeting of a physical Working Group held in Brussels during 12 – 14 September 2005 and the comments submitted by countries the Chairperson introduced the “Draft Principles for the Application of Traceability/ Product Tracing in the context of Food Import & Export Inspection and Certification System” during the 14th Session of CCFICS. It was also informed that the Working Group had developed consensus on a number of key themes as follows :
 - Traceability/product tracing is a tool that does not in itself improve food safety and/or fair trade practice outcomes unless it is combined with a relevant measure or requirement;
 - It is not compulsory for an exporting country to replicate the traceability/ product tracing tool of the importing country. They need to meet the objectives of the importing country’s food inspection and certification system;
 - The concept of traceability/product tracing as a tool is that it should follow food one step forward and one step back; and
 - Importing countries should be prepared to explain to an exporting country what are the objectives and outcomes of its food inspection and certification system when they incorporate a traceability/product tracing tool.
- 7) Some delegations felt that the proposed draft principles should be closely linked to food safety. The Chairperson expressed the view that the text had been carefully drafted to take into account the dual mandate of the Codex. The representative of OIE, supporting the proposed set of principles, suggested that countries should be provided with guidance in setting up a traceability system that covered the entire food chain without gaps and duplications. This was not accepted by the Committee, which, however felt that a food inspection and certification system without traceability/product tracing tool might meet the same objectives and produce the same outcomes as a food safety inspection and certification system with a traceability/product tracing tool.

The Committee also noted the need for giving consideration to the capabilities of developing countries and longer time frames and flexibility for application and designing of the traceability/product tracing tool and agreed to include necessary provisions in the document. The Committee, however, felt that these flexibilities should not compromise the safety of exported food and should not be interpreted

as the possibility to derogate from the rules of the importing country. The text included a provision stating that in deciding whether and how to apply the traceability/product tracing tool, the competent authority should take account of the assessed food safety risks and/or the characteristics of the potential deceptive marketing practices being addressed.

The Committee, thus, agreed that a traceability/product tracing tool should be implemented, when and as appropriate on a case-by-case basis, that it should not be more trade restrictive than necessary and that it should be transparent, practical, technically feasible and economically viable within the food inspection and certification system. The text also incorporated a provision stating that if, in the context of a traceability/product tracing tool, an importing country has objectives or outcomes of their food inspection and certification system, which cannot be met by an exporting country, the importing country should consider providing assistance to the exporting country, particularly a developing country.

- 8) A number of countries felt that since the principles were closely related to the *Codex Principles for Food Import and Export Inspection and Certification*, these should be appended to the *Codex Guidelines for the Design, Operation, Assessment and Accreditation of Food Import and Export Inspection and Certification Systems* and not a stand alone Codex text. The Chairperson, noting that since either way it did not impact significantly on the application of the principles, suggested moving it forward as a stand-alone document. While some delegations strongly objected to this position, the Committee proceeded with the decision and agreed to adopt the document. However, no decision was taken with regard to further development of the document into guidelines.
- 9) The 29th Session of the Codex Alimentarius Commission held in July 2006, adopted the draft principles for traceability/product tracing.
- 10) There was, thereafter, a suggestion to develop a guidance document for governments for the implementation of traceability, but the suggestion did not gather enough support for the reason that it was felt that countries, owing to different situations, be left free to develop their own guidelines for its implementation.

15.5 COMPONENTS OF THE TRACEABILITY/ PRODUCT TRACING TOOL

- a) The food supply chain is very complex and involves several companies, wherein various ingredients, components and packaging as well as the process of inspection play an important role. Thus, as stated earlier, the objective and scope of applying a traceability/ product tracing tool will need to be defined, what is to be traced, who will do it, an information system and the performance objectives. In selecting the items sought to be traced, there are a number of other factors that would also need to be ascertained, such as, the origin of food ingredients, processing history, definition of the batch, links between manufacturing batches, methods of production, methods of analysis, storage, personnel involved, the entire supply and distribution chain system, etc. It may also be necessary to establish product integrity, authenticity and identification at all the stages for consumer confidence in the context of food inspection and certification system. It might also need to address liability issues and redress mechanism.

- b) The context of traceability incorporates different features of the process of implementation of HACCP/GMP etc. in food businesses requiring record keeping at relevant stages of the value chain, where practicable. It also provides for preserving product identity. It is acknowledged that traceability/product tracing is not an end in itself but an instrument seeking to achieve the particular objective(s), such as production of safe food and protection from unfair trade practices.

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) What is Traceability according to ISO definition?

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- 2) What are the objectives and rationale of traceability?

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- 3) What are the components of the traceability tool?

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15.6 LIMITATIONS OF IMPLEMENTING THE TRACEABILITY/PRODUCT TRACING TOOL

- In countries where the product, raw material, ingredients and components are produced by SMEs or in a co-operative structure or are procured through the market systems in smaller volumes, the backward identification of the product becomes quite difficult.
- Where the raw material, ingredients or components are of such nature (e.g. liquids or sometimes even solids) that these are inseparable, tracing to its source is impractical.

- In some developing countries, due to small farm holdings, farm production is in very small volumes. Marketable volumes are built up at the collection centers before being taken to a packing house or processing center. In such situations, traceability/product tracing is possible only up to the stage of a packing house or processing center and not up to the primary level, unless an extra effort is put in place to bring in the small holdings into the fold through a grower group or through the system of recording data of the chain-of-custody.

15.7 ALTERNATIVES TO THE TRACEABILITY/ PRODUCT TRACING TOOL

- 1) At the primary level, group farming with an internal control system and record keeping can be a feasible alternative. In such alternative systems, random checks for food safety needs will work out to be cost effective to the farmer or producer.
- 2) Food safety controls through HACCP/GMP etc. applicable according to the size of the operation including checks of contaminants and appropriate labelling of batch/lot numbers with expiry dates, where applicable take into account the concerns of traceability needs.
- 3) Management of non-conformities pointed out by food safety experts from within or outside the production system with respect to the required rules and procedures as well as regular training of manpower involved in the production process.
- 4) Regular documentation of inputs and practices followed in the production system that facilitates identification of the possible reasons of contamination in food.

Application of the alternatives would depend upon the nature and extent of risk involved that should be determined on the basis of necessary risk management needs and the stage at which the alternative(s) should be applied should also be identified.

15.8 RECOMMENDED STEPS FOR THE APPLICATION OF TRACEABILITY/ PRODUCT TRACING TOOL

The following steps can be followed by countries for the application of traceability/product tracing tool in the context of food import and export inspection and certification system:

- i) Identification and communication of the objectives and scope of traceability/product tracing by the importing country to the exporting country as required in respect of the specified product along with Performance Objectives.
- ii) Identification and communication of what is to be traced and, if appropriate, stage of the food chain as a risk management option. The recommendation may also state the suggested method of analysis, need for relevant data (e.g., origin, processing history, storage, personnel), establishment of links between the recorded data, establishment of the integrity/authenticity of the links and liability/redress mechanism, if applicable.
- iii) Provide information to the exporting country about the possible causes of the risk, nature and extent of the risk and the assessment of risk by not applying the traceability/product tracing tool. This assessment would apply to concerns relating to food safety and deceptive marketing practices.

- iv) The importing country should suggest possible cost effective alternative yet equivalent measures (e.g., HACCP, internal control system, record keeping, random checks or other means to facilitate identification of the possible means of contamination, lot/batch numbers, labelling, management of non-compliances) to address the risk concerns without the use of traceability/product tracing tool to ensure protection from the assessed food safety risks and deceptive marketing practices on a case-by-case basis depending upon the nature of the product and production/marketing practices.
- v) The importing country should also take into account that when and as appropriate a traceability/product tracing tool is to be implemented, it should be transparent, practical, technically feasible and economically viable and that it should not be more trade restrictive than necessary.
- vi) The extent of application of traceability in the food chain should also be established taking into account evaluation of the various alternatives referred to above to achieve the same objective.
- vii) Application of the traceability/product tracing tool should adequately address the needs of the developing countries and their traditional practices and may be applied as a food safety objective (SPS measure) and as a legitimate objective (TBT measure).
- viii) The exporting country should be able to establish that the alternative measures selected for application would appropriately address the risk concerns of the importing country without the need for application of a traceability/product tracing tool.

It must not be forgotten that traceability is only a tool for the establishment of product authenticity, reliability, identification of the problem areas for the purposes of tracking and product recall. Food safety will come with the implementation of appropriate practices like Good Agricultural Practices, Good Manufacturing Practices, Good Handling Practices, HACCP, ISO-22000 etc. coupled with Quality Management Systems.

15.9 INDIA'S EXPERIENCE WITH TRACEABILITY– THE GRAPE STORY

Computer-based traceability systems have virtually been absent in India for quite sometime, particularly, in the agri. business sector. Some organisation did make an attempt to introduce it processed foods through bar codes, mainly with the angle of inventory management and prices. Some grape exporters also initiated work on traceability solutions to meet the product integrity needs of their super-market buyers.

During 2003, on account of a trade issue between an Indian exporter and a Dutch importer (who sought to apply undue pressure on an Indian supplier), Indian grapes suffered a major set back in UK, the Netherlands, Belgium and Germany. The European Commission had issued at least 17 rapid alert notifications about the presence of pesticide residues in excess of the Maximum Residue Level (MRL) values prescribed by these countries. APEDA launched an investigation to ascertain the reasons for the alerts. It was found that there were certain flaws in the vineyard registration system, pesticides were being sprayed after sampling for laboratory analysis, the sampling system itself was improper, there was lack of awareness and training, appropriate

equipment for residue analysis was not available with the laboratories, the methods of laboratory analysis were not appropriate and above all there were rapid changes in the MRL values by the European Union (EU) countries, which none of the stakeholders were able to keep track of. In addition, the French manufacturer of a pesticide called Lanet (methomyl) that is banned in the EU market started pushing sales of their stocks in India by the use of inappropriate and misleading promotional literature, in which the simple and lesser informed farmers of Maharashtra, A.P. and Karnataka eventually found themselves trapped.

Thereafter, a series of steps were taken in India to control the presence of residues. The steps included up-gradation and recognition of residue testing laboratories, revision in the export standards, recognition of horticulture pack-houses, awareness and training programmes at all levels, regular monitoring by agricultural officers in Maharashtra, Andhra Pradesh and Karnataka (which are the main grape exporting states), streamlining of sampling and testing procedures and setting up of a National Referral Laboratory (NRL) for grapes at the National Research Centre for Grapes (NRC), Pune. NRC is an ICAR (Indian Council of Agricultural Research, Ministry of Agriculture) institution involved in research activities in grapes.

The NRC was sanctioned an amount of about US \$ 1.2 million in December, 2003 by APEDA to set up a state-of-the-art laboratory with the most sophisticated equipments to enable them to function as a NRL and monitor the functioning of the farmers and laboratories with a view to ensuring export of grapes within the prescribed residue levels. Within two months, the NRC procured the necessary equipment and made a make shift arrangement within their premises and started functioning. In the meantime, work relating to construction of the NRL building was initiated. Soon, a full-fledged NRL was in place for the first time in the country. It is estimated that APEDA would have spent more than US \$ 3 million during 2003 to upgrade various facilities in the laboratories, pack-houses and on training at all levels. If one looks at the process of regulation of grape exports to the European Union through control of pesticide residues (APEDA's website – www.apeda.com – can be seen for details), it would be observed that it was one of the most complex residue monitoring documents one may have witnessed. It was, primarily, aimed at bringing about a credible mechanism to ensure export of residue-free grapes with a trace back system.

The initiative helped in containing the presence of pesticide residues within the prescribed levels and it is note worthy that after the 2003 episode, there was not a single case of rejection on account of the presence of pesticide residues in excess of the MRLs. In about a year's time, it was felt necessary to initiate efforts to ensure that the quality of Indian grapes improves. Truly, the 2003 event was a blessing in disguise, thanks to the Dutch importer who woke us up from the slumber and really put the Indian grape business on its toes.

The residue monitoring procedure introduced after the 2003 episode contained a large number of documents (approximately 18 documents) that were required to be maintained by the farmers and the exporters. This document provided a possibility of complete trace back of the grapes from the supermarkets to vineyards located in the three states. The grape seasons of 2005, 2006 as well as 2007 continued to show a positive trend in the quality and safety of table grapes. However, the system was quite complex and the unstinted efforts on the part of all stakeholders encouraged APEDA to make use of IT tools to electronically demonstrate application of traceability and implementation of the residue monitoring procedure. The objective was to eliminate

possible human errors and, at the same time, create a mind set among the stakeholders adopt current technology in agriculture business.

Independent modules of the web-based software applications were introduced in 2006, which were then integrated in 2007 to provide linkages required for traceability. This was the most important development introduced for the first time in the country. This software, titled, 'GrapeNet', was launched by Mr. Jairam Ramesh, Hon'ble Minister of State for Commerce & Industry, Govt. of India.

The GrapeNet was implemented with minimal cost implications for the farmers and exporters. It enables tracing the origin of produce right up to the farm at the click of a mouse. The software helped close to 40,000 farmers, over 150 exporters and about a dozen laboratories in three states come together and adopt uniform farming practices. The success of implementation of the GrapeNet motivated APEDA and stakeholders in the grape business look at simplification and bring about total reliability in the procedures through introduction of a bar code for registration of each farmer through a unique identification number and traceability.

A number of modifications were made by APEDA before the 2008 grape season, which included single window clearance of grape shipments and minimizing paper work through creation of database of all farmers, pack-houses, laboratory analysis, grade classification of grapes and phyto-sanitary certification. This was possible only through a series of interactive meetings with the stakeholders over one year.

15.10 THE VISION

- a) Subsequent steps that can be implemented in the grape traceability system are :
 - (i) linking of the laboratory testing equipment to the software so that the testing results can be directly uploaded to the software. This would eliminate the possibility of errors in data entry and manipulation ;
 - (ii) Further, container details can be linked to the software of shipping lines so that location of the consignment with details of the shipment can be tracked ;
 - (iii) In addition, GrapeNet software can also be provided an interface with the Customs database, where the shipping bill for export shipments is filed with the customs authorities. This would further minimize the possibility of errors while creation of the shipping bill.

Once these additional linkages can be provided to the software, it would provide a complete traceability solution available to any stakeholders in India or abroad.

- b) Looking at the success of the GrapeNet software, APEDA has introduced a similar software-based traceability system for pomegranates and is currently in the process of developing more software modules on similar lines for mangoes, honey, cereals, groundnuts and organic products. Eventually, it should be the aim of the Govt. to provide such traceability solutions for all horticulture products, processed foods and other commodities including tea, coffee, cashew nuts, spices, tobacco, rubber, etc. If this can be done by India in the near future, India's position in global agricultural trade will come to the forefront and India would become one of the most credible suppliers of food products with complete trace and tack mechanism. The process would also enable the Govt. to have real time information on agricultural exports from India.
- c) Ideally speaking, Govt. might consider implementing the farmer registration system for traceability purposes by recording the plot area, input and production details with the help of GPS and linking the details with the Kisan Credit Cards based

on which each farmer is bar-coded and provided a software based interface with the softwares like GrapeNet, AnarNet. APEDA has already started work on GPS based registration of farmers in the organic sector for ensuring the credibility of organic products exported from India.

- d) Traceability systems on similar lines should be introduced for pharmaceutical products, particularly, from the angle of authenticity, which has become an important requirement in major markets. It may be recalled that the US FDA has already introduced e-Pedigree, a software based traceability tool, for marketing of pharma items. The US is a major market for Indian pharmaceutical products.
- e) Eventually, such mechanisms should be introduced for the domestic market as well so that the Indian consumers can equally benefit from this system. The process would also provide a possibility for the farmers to take advantage of the traceability system to realize a fair price for their work on the field.
- f) Looking at the trends in the global market, it would be useful to set up an institutional mechanism in India to implement traceability in all agricultural products and commodities, processed foods and pharmaceutical items to ensure product reliability and authenticity with built-in features for safety of plants, animals and human beings. GS-1 provides internationally recognizable tools, but implementation will have to be the responsibility of the Govt.



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) List the limitations of implementing traceability?

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- 2) What alternative measures can be used in place of traceability?

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- 3) What are the recommended steps for application of traceability tool?

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15.11 LET US SUM UP



As a result of coming into existence the World Trade Organisation (WTO), the access of world market has become possible for food commodities from any part of the globe. However, the product to be traded in the international market should be manufactured in accordance with globally accepted norms and standards. We must be aware about the practices adopted in the production, transportation and retailing. Therefore, food safety and quality management system must be properly adopted throughout the food chain. Traceability is a tool to control quality, find the cause of a quality problem, and to help logistics and rationalizing process linked to logistics flow. Protection of human health and safety, ascertain the genuineness of a particular declaration like organic nature of food product and fair practices in food trade are the objectives of traceability. Codex Alimentarius Commission is also concerned about traceability. The context of traceability incorporates different features of the process of implementation of HACCP/GMP etc. in food business and keeping their record. Where the raw material, ingredients or components are of such nature that they are inseparable, tracing their source is impracticable. In some developing countries, due to small holdings, farm produce is in very small volume and before marketing, the produce from several farmers has to be combined under such circumstances it is very difficult to trace back the products. Group farming with an internal control system and record keeping, management of non-conformities pointed out by food safety experts, regular documentation of inputs and practices followed in the production system may be the alternatives in place of traceability. In import or export inspection, the importing country may provide information about the possible cause of risk, nature and extent of risk and the assessment of risk by not applying the traceability. At the same time, the importing country may suggest possible cost effective alternative yet equivalent measures such as HACCP, etc.

15.12 KEY WORDS

Risk	:	Possibility of suffering health hazards.
NRC	:	National Research Centre for Grapes.
NRL	:	National Referral Laboratory.
MRL	:	Maximum Residues Limit.
GAP	:	Good Agricultural Practices.
GMP	:	Good Manufacturing Practices.
SPS	:	Sanitary and Phyto-Sanitary.

15.13 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

Your answer should include following points:

Check Your Progress Exercise 1

- 1) The ability to trace the history, application or location of an entity by means of recorded information and all the aspects of its requirements like period of time, point of origin or identification must be specified.
- 2) The application of traceability could be on account of :
 - 1) Human health and safety;
 - 2) Other non-health consumer interest like, quality or to ascertain the genuineness of a particular declaration, like 'organic' nature of food product; and
 - 3) Fair practices in food trade.
- 3) Define objectives as what is to be traced, who will do it an information system and the performance objectives.

Check Your Progress Exercise 2

- 1) In countries where the produce is in small volume and has to be pooled before marketing or where the nature of raw material/ ingredients/ components is such that they are inseparable the traceability of its source becomes very difficult.
- 2) Group farming with an internal control system, application of food safety control through HACCP etc. management of non- conformities pointed out by Food Safety Exports as well as regular documentation of inputs and practices followed in the production system may be the other alternatives.
- 3) Following are the steps recommended for the application of traceability :
 - Identification and communication of the objectives and scope of traceability; and
 - Identification and communication of what should be traced and stage of food chain where it should be traced.
 - In case of import, the providing of information of possible cause of risk to the exporting country.
 - Suggesting cost effective alternative yet effective measures, e.g., HACCP to the exporting country.
- 4) Export of table grapes to the European Union (Grape Net).

15.14 SUGGESTED READING

www.codexalimentarius.net

www.iso.org

Europa – *Food Safety: From Farm to Fork* — http://ec.europa.eu/food/index_en.htm

(Feedback Response Sheet)

Dear Student,

Welcome to the PG Diploma in Food Safety and Quality Management.

The School intends to upgrade and strengthen the study material continuously as the subject is dynamic in nature. Please arrange to give you inputs to improve the self learning study material. We wish to know your difficulties and suggestions in order to improve the contents. A response sheet for a block of the course has been enclosed for your kind persual and consideration please. Kindly fill in this response sheet pertaining to a block and send the inputs for various blocks of the programme to the school. If you find the space provided is insufficient, please use a separate sheet.

Enrolment No.

Name of the Course and Block _____

1) How many hours did you need for studying the units of this block?

Unit No.	13	14	15
Number of Hours	<input type="text"/>	<input type="text"/>	<input type="text"/>

2) Please give your observations to the following on quality of contents after going through the block.

Items	Yes	No	Requires Changes/Additions if any
Contents are complete	<input type="text"/>	<input type="text"/>	
Factual mistakes in the contents	<input type="text"/>	<input type="text"/>	
Additional inputs required	<input type="text"/>	<input type="text"/>	

3) Please give your observations to the following items after reading the block.

Items	Excellent	Very Good	Good	Poor	Give Specific Examples, if Poor
Presentation Quality	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
Language and Style	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
Conceptual Clarity	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	

4) Any other comments:

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Please mail either through post or email to:

a) Programme Coordinator (PGDFSQM), School of Agriculture, Academic Complex, Block-G, Room No.2, Indira Gandhi National Open University (IGNOU), Maidan Garhi, New Delhi-110068 02

or

b) pgdfsqm@ignou.ac.in

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