UNIT 1 INTRODUCTION TO FOOD SAFETY AND QUALITY

Structure

1.0 OBJECTIVES

After reading this unit, you will be able to:

- justify the need of inspection and quality control;
- analyze the history of inspection and quality control;
- identify the factors which decide the assurance of TQM; and
- discuss the various issues related to quality of food items.

1.1 INTRODUCTION

Aqua-food or fish and fishery products occupy a unique position as food material for man. A variety of nutrients both major and minor are available in almost all

fish and fishery products. The high nutritional quality and easy digestibility of fish makes it a favourable food of almost all living organisms including bacteria and animals. As a result, all organisms compete to consume fish and fishery products and if handled carelessly, aqua-food can become a source of toxic residues, poisons and different kinds of public health spoilage organisms like *V. cholerae, S. typhi, L. monocytogenes, V. parahaemolyticus, S. aureus* etc. and cause various kinds of infectious diseases and food poisoning in man.

In spite of all these health hazards, fish and shellfish continue to be in great demand as a food material. To avoid public health problems in using fish and shellfish as a food of mass consumption, several quality assurance programmes were evolved. Various kinds of quality standards like Codex standards, US FDA (United States Food and Drug Administration) standards, BSI (British Standards Institution) standards etc., HACCP (Hazard Analysis Critical Control Points) system of USA, European Commission Norms, QMP of Canada and TQM (Total Quality Management) of Japan are aimed to ensure safety and quality of fish and fishery products. Even though TQM of Japan aimed total quality management, it failed to ensure both safety and quality, probably due to certain lacuna like calibration, good laboratory practice, good personnel policy etc. There were several attempts to improve the TQM concept of Japan to make it suitable to tackle all problems of safety and quality of a given product. This unit gives you an overall picture of the various steps initiated to achieve quality and safety of food products including fishery products.

1.2 WHAT IS QUALITY?

Do you know what quality means? Quality is defined as “a combination of certain characteristics such as wholesomeness, integrity and freshness”. Even though fish is a rich and renewable source of cheap and high quality protein for humans, it is also prone to quick spoilage due to two major reasons - autolysis and bacterial contamination. You have studied about these in the earlier topics. In modern times, quality and safety are two major aspects given maximum attention when a fishery product is about to be exported from a country or imported to a country. Quality in recent times has undergone a lot of change towards what is called ‘total quality management’ from fish to dish.

1.3 BACKGROUND INFORMATION

Quality control began in India in the form of a pre-shipment inspection before the products were exported out of the country. But, this inspection on quality was only based on random sampling of products which were from finished products. When the samples did not satisfy the quality standards, the entire lot of consignments were rejected resulting in great losses. The modern quality monitoring has the major difference, in that quality is monitored all through the steps of processing so that quality could be traced or in other words the system had an element of traceability.

In the initial stages of export of fishery products from India, heavy losses resulted since entire consignments were rejected by some countries due to bacterial contamination and spoilage. These prompted the Government of India to set up a fully equipped fish processing technology laboratory at Cochin (Kerala) in 1958 to initiate research on quality control and thus provide the needed support for the processing industry.

Very soon, the Indian Standards Institution (ISI) also joined the scenario and finalized standards for the fishery products exported from the country. However, the ISI or other similar agencies did not take the fishery products meant for exports or for internal consumption. Hence, the Govt. of India brought out a scheme of voluntary pre-shipment inspection in 1963. Around the same time, the Export Act (1963) was enacted by the Parliament of India under which Export Inspection Council was constituted under the Ministry of Commerce, Govt. of India. With the passing of this act, all export goods including the fishery products came under the purview of the Act resulting in compulsory pre-shipment inspection of frozen as well as canned prawns from March, 1963; for dried shark skins and fish bladders from January, 1970; for frozen lobster tails from December, 1971; for cooked frozen prawns and sterile canned fishery products from 1968; for bacterial quality except total count in frozen prawns from August, 1973; for Total Bacterial Count for the above from January, 1974; and for canned crab meat from January, 1977.

The Export Inspection Council created the Export Inspection Agency to deal with the pre-shipment inspection of all fishery products as well as other agricultural products. The agency created branches in all-important ports throughout the country to carry out inspection and certification of the products before shipment. Supervisory officers were posted in the processing centres who supervised the entire chain of operation. Moving further ahead, the Government introduced another system by entrusting the entire responsibility of product quality control to the processors themselves. The Government also made available required technical assistance to the processors to set up their own quality testing laboratories to employ their own quality control personnel and also to self certify their products as fit for export based on the prevailing quality standards. This was the background in our country to initiate quality control of the fishery products.

Check Your Progress 1

Note: a) Write your answers within the space provided.

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

1) Define quality?

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2) Govt. of India set up a fully equipped fish processing technology laboratory at Cochin in ……..to initiate research on quality control.

3) The Export Act (1963) was enacted by …….

1.4 QUALITY CONTROL THROUGH THE CONCEPT OF TQM

Today, Total Quality Management (TQM) is a widely used technique for quality assurance in a wide range of production industries. The use of TQM is gaining more and more importance in seafood industry perhaps due to the higher incidence of health risks/hazards in fish and fishery products.

Even though widely used, depending on various factors, the approach and concepts for implementation of TQM vary from industry-to-industry and from person-to-person. Obviously, there is a need for consolidation of all relevant aspects to attain uniformly assured quality for products of mass consumption. What follows is an attempt to consolidate systematically all necessary steps to prevent/eliminate health risks/hazards from all possible sources in a food processing industry.

1.5 FACTORS DECIDING PROCEDURE FOR TQM

The first step in deciding a procedure for TQM is to list out all possible sources of health risks/hazards. In any system of food production, the risks/hazards arise from one or a combination of the following sources:

1) Raw materials;
2) Production Process;
3) Production facility- Plant and Machinery;
4) Personnel involved in Production;
5) Cleanliness of direct/indirect food contact surfaces;
6) Pest control;
7) Risk/hazard monitoring facilities-Laboratory; and
8) Good Personnel Policy.

Items 1 to 8 above, lists all the possible areas that can contribute to physical, chemical or biological hazards into the food handled in a food processing plant. Therefore, the best method to achieve TQM shall be stream lining and critically evaluating each one of the above sources to ensure that health hazards are not introduced at any of the above sources. This exercise needs the support and skill of a team of experts with a thorough knowledge of the raw materials, production processes, hygiene, sanitation and quality assurance. Careful selection of persons responsible for purchase, production, quality, etc. can help in fulfilling this responsibility. The team shall have the skill and expertise to identify possible significant hazards like physical, chemical and biological that can be associated with the raw materials, processing steps, plant and workers. The team shall also be in a position to provide suitable remedial measures to exclude possible hazards from each and every source. A brief description of possible hazards at the eight locations above and preventive measures for their control are discussed below:

1.5.1 Raw Materials

In a food processing plant, raw materials can be the raw food material as well as materials like food additives, food preservatives, packaging etc. Each one of these can contain hazards arising out of contamination, genetic origin, stage of harvest etc. Sea fresh fish and shellfish are generally free from indicator organisms and other pathogens. But, if the fish is landed on unclean surfaces and handled by personnel with poor hygiene, these organisms will find their way into the fish and cause health risk. Similarly, PSP (Paralytic Shellfish Poison), DSP (Diarrhetic Shellfish Poison) in bivalves, lead and cadmium in cephalopods and histamine in scombroid fishes are commonly encountered health hazards in raw fish and shellfish. In case of fish from inland water bodies and culture systems, there is

not only the possibility of occurrence of pathogens but also pollutants and drug residues like pesticide and antibiotic residues. By careful selection of raw materials, hazards arising from contamination, location and stage of harvest, species etc. can be eliminated. During harvesting, control measures like landing and sorting the catch on clean raised platform, quick chilling of the catch followed by chilled/ iced storage till it is delivered to the land based factories can minimize many of the biological hazards.

1.5.2 Production Process

All seafood production processes will have a combination of different processing steps like washing, dressing, treatment with chemicals, cooking, freezing etc. of the raw materials to give finished products. At all these steps, the food material will come into contact with different contact surfaces like tables, utensils, processing equipments, worker's hand etc. and in the absence of sanitation and hygiene, all type of hazards can enter the food under processing. Certain processing steps are also known to reduce or eliminate certain hazards. Thus, chilling or freezing is effective in preventing bacterial multiplication as well as histamine formation. Evisceration of cephalopods will reduce lead and cadmium toxicity. Similarly, cooking and pasteurization is known for killing of pathogens. To ensure safety and quality, all these steps shall be evaluated properly to identify significant hazards introduced or controlled in each step and device procedure for their control and monitoring. This process is popularly known as "Hazard Analysis Critical Control Point" (HACCP), which can be practiced by following the seven principles of HACCP. This will be dealt in detail later.

1.5.3 The Production Facility

Plant, machinery and other facilities are important factors, which if not properly selected and laid out can lead to safety risks.

Good Manufacturing Practice (GMP)

This is largely the procedure laid down for achieving safety from plant, machinery and other infrastructure used in the production. The important elements of Good Manufacturing Practice are listed below:

a) Plant design, construction and layout

In any production plant, there will be raw materials and finished products as well as one or many intermediate products. The plant design shall be such that the movement of edible materials from raw materials stage to the finished products stage is unidirectional and opposite to the movement of waste materials like solid wastes and liquid effluents. Another aspect of the plant design and construction is the nature of the materials used for the construction and the type of construction. All materials used shall be water resistant, washable and with a smooth surface. Further, the construction shall be such that there is no sharp corners and that all wall to wall, wall to floor and wall to roof joints are round and smoothened. The design shall take care to provide fly proofing of all external openings like doors, windows, ventilators, chute doors and drain outlets. In fact, the safety at drain outlets shall be such that there is no chance for any solid particles to go out as well as no fly can enter into the food handling areas. The plant will also need several electrical and mechanical fittings. All such items shall be washable and laid out in such a way that there is no scope for pest/ microbial harbourage.

b) Machinery design, construction and layout

Like plant, machinery too shall be designed, constructed and installed to facilitate unidirectional movement of food materials and that the machinery is water resistant, washable and sanitizable. All the machinery shall also be in a position to achieve criteria for good manufacturing practice. For example, the machinery for quick freezing shall be in a position to freeze the food in such a way that the core of the food attains –18+2°C in 90 minutes. Similarly, equipments for cooking shall be able to attain the validated cooking temperature and time without causing under or over cooking. Selection and installation of processing machinery in this way will exclude all possible health risks from machinery.

c) Provision for pest control

The provision for pest control is often a neglected item. Pest can be the cause for both dirt and contamination with microbes of public health significance. Exclusion of pests is best done by providing fly proof netting for all windows and ventilators as well as providing automatic air curtain and self closing shutters for all doors and chutes directly opening to outside. There shall also be fly proof netting for drain outlets. Further, to take care of any pest by-passing these facilities, there can be electrical fly catchers and rodent traps at strategic locations. Effective operation of these facilities will make food-handling areas free from pests.

For pest control, there shall not be any chemical based pest control procedures. In rodent traps, the baits shall be only food items like dried and baked coconut or fish. Poison baits shall never be used for rodent control in food processing plants. In case, there is any unusual fly population, fumigation with formaldehyde followed by defumigation with ammonia can be followed. However, there shall not be a regular schedule for fumigation as it may introduce unwanted chemical residues into the food material handled in the plant.

1.5.4 Personnel Involved in Production

Workers or plant personnel are the most dynamic source of various type of microbial contamination in any food-processing establishment. In case of food materials from land and inland water bodies, there is every chance of occurrence of organisms of public health significance. But in case of seafood, the occurrence of Public Health Indicator organisms is a sure indication of poor hygiene and sanitation. To exclude such contamination from workers, all personnel in the production unit shall follow good hygiene practice. Important elements of Good Hygiene Practice are:

a) Medical Fitness of workers

Medical examination to certify the workers is an exercise to be done without failure once in a year. To certify a worker to be fit to handle food actually involves three important steps.

i) Examination of the worker by a qualified medical practitioner to rule out that the worker is not suffering from any disease. A doctor can do this by physical examination and certain investigations on blood, urine and stool.

ii) Exclusion of the possibility of the worker as a carrier of certain pathogens especially *Salmonella.* This can be ensured only by conducting a stool culture test for *Salmonella*.

These two tests will ensure that the worker is fit to handle food materials. These tests are normally done once in a year. During this period, there is no guarantee that the worker will not contract any disease or become a carrier.

iii) To guarantee that the worker will remain fit until next examination. This is ensured by immunization of workers against typhoid and other contagious and communicable diseases.

Medical fitness of workers following the above steps will ensure exclusion of pathogens from workers.

b) Use of clean uniform including gum boots, head cover, face mask and gloves

Medical fitness is only a guarantee against contamination with pathogens. The body of the workers is still prone to various types of contamination and a sure source of different kinds of bacteria of public health significance. To avoid such contamination from workers, there shall be proper isolation of workers body in such a way that directly or indirectly body of workers does not come in contact with the food or food contact surfaces. This is effectively done by providing clean uniforms including gum boots, head cover, face mask and gloves. While head cover prevents falling hair and subsequent contamination to the food, face mask will prevent spillage of saliva/ nasal secretion and introduction of *S. aureus*, which is a hygiene indicator as well as a food poisoning organism.

c) Removal of ornaments and other beauty aids

Ornaments and certain beauty aids offer lot of gaps and crevices which are very difficult to clean and so form easy home for various kinds of bacteria, which will be extremely difficult to eradicate. So, removal of all type of ornaments by all employees is essential before they enter the food handling areas for achieving safety of the food processed.

d) Scrubbing of hands

Use of single use sterile gloves by all fish handling personnel is ideal to prevent contamination from workers. Whether the workers use gloves or not, it is very essential that they scrub their hands with soap and clean water. The hands shall then be dried with a clean towel or better by hot air before the workers enter the food handling area with or without gloves. This practice will make the hands of the workers safe.

e) Sanitizing footwear

The bottom of the gum boot, the workers wear in change room, may cause contamination sometimes. This is prevented by allowing the workers with gum boot or other factory provided footwear to pass through a foot dip containing 100 ppm. available chlorine, which will sanitize the bottom portion of the footwear and prevent contamination of floor of the food handling area.

f) Hand sanitizing

Once the workers enter the food handling area, they shall sanitize their hands by dipping the full palm of both hands in 20 ppm. chlorine water. This procedure will enable the removal of significant bacterial load from the palms of workers and they will be safe for food handling.

The above steps will help to prevent all sorts of contamination from workers to the food/fish.

1.5.5 Cleanliness of Direct/Indirect Food Contact Surfaces

Another factor responsible for contamination is the cleanliness of direct and indirect food contact surfaces. There shall be identification and listing of all food contact and non-contact surfaces followed by a cleaning procedure and cleaning schedule.

All these operations are popularly known as "**Standard Sanitation Operation Procedure"** (SSOP).

The following are the main elements of SSOP:

a) Cleaning and maintenance of water source, storage and supply lines including prevention of cross contamination.

Quality of water can be ensured by providing certain minimum treatments for raw water such as filtering through sand bed, chlorine dozing followed by filtration through activated carbon column. Water treated in this fashion shall be tested for conformity to appropriate standards for achieving safety of water. The supply lines and storage tanks of treated process water shall be cleaned as per the cleaning procedure for food contact surfaces once in a month.

b) Surface finish, water resistance and cleanability of all direct and indirect food contact surfaces

All food contact surfaces shall be made of water resistant, smooth and washable material. This will ensure proper cleaning and prevention of dirt accumulation.

c) Regular cleaning procedure and cleaning schedule

The direct and indirect contact surfaces shall be cleaned as per the cleaning procedure before and after each shift of production. The best cleaning procedure will be wetting with water, removing all solid wastes, application of a non-ionic detergent by scrubbing with the help of a clean brush, washing with potable water, sanitizing with chlorine water containing 50 ppm. chlorine for 30 minutes and finally washing with potable water. Cleaning of all contact and indirect contact surfaces will prevent bacterial build up and contamination of the food handled.

d) Personal hygiene practices

The use of factory provided uniforms, scrubbing of hands, sanitizing of footwear, hand sanitizing etc. as outlined under the provision for personal hygiene shall be followed to avoid contamination from workers.

e) Regular cleaning and sanitizing of uniforms

Uniforms of all the workers such as dress, head cover; face mask etc. shall be washed and ironed on a single use basis. On no account, dress used in one shift shall be used for another shift, even if it is items like apron. All such used dress shall be washed and ironed before second use. There shall be adequate facility in tune with the number of workers for hand scrubbing, sanitizing, uniform washing and ironing, utensil washing etc. in the plant.

f) Protection of all contact surfaces from lubricants, detergents, chemicals, sanitizers etc.

The production personnel shall see that all the food contact surfaces are not contaminated with inedible materials like lubricants, detergents and other chemicals and sanitizers (other than chlorine). This is very essential to ensure safety of the food handled in the plant.

g) Exclusion of poisonous and toxic chemicals in processing areas

In any food processing plant, there shall not be storage or use of any type of toxic or poisonous chemicals in food handling areas even for pest control. For pest control in food handling areas, the permitted procedure is fumigation with formaldehyde followed by de-fumigation with ammonia only when there is an unusual fly population and there shall not be fumigation schedule.

h) Exclusion of infected workers

Daily the entire workers shall be monitored for any kind of disease or open wounds. The workers shall also be taught to report to the management any such disease condition. Infected workers or workers with open wound shall be isolated from handling the material till they are cured of the problem.

i) Adequate toilet facilities

There shall be sufficient number of toilets and bath rooms in the factory proportionate with the number of workers. Standards say that there shall be one toilet for each fifteen workers. All such toilets must be made fly proof.

j) Direction and procedure for movement of waste and edible materials

In all food processing plants, the direction of movement of edible materials and waste generated shall be opposite to prevent cross contamination. Solid and liquid wastes are often neglected and are a cause for various kinds of pest and microbial build up and consequent contamination. Wherever possible, the solid and liquid wastes must be collected separately for treatment and disposal. All waste water generated should be collected through proper pipe lines into the drain, without any chance to spill on the floor as waste water on the floor is a cause for microbial build up. All drain inlets and outlets shall be fitted with fly proof netting to prevent outflow of solid waste into the effluent treatment plant as well as prevent entry of pests into the processing facility. There shall be suitable receptacles for collection of solid wastes with a procedure for their periodic removal and disposal.

1.5.6 Pest Control

Common pests like flies, cockroaches, lizards and rodents find their way into the food processing area, even though, birds and pets are rarely seen. Often these pests introduce hazards and dirt into the material handled in the plant. To overcome this, there shall be effective pest control. All doors and chutes in the plant shall be fitted with self closing devices. All externally opening doors / chutes are to be fitted with automatic air curtains. Fly proofing of all windows, ventilators, drain outlets or all holes more than half a square inch with fly proof netting will help. To take care of isolated flies and rodents there shall be electronic fly catchers and rodent traps located at strategic points. However, the fly catchers must be positioned away from food handling points. In case of visible fly population, fumigation with formaldehyde, followed by defumigation with ammonia can be adopted.

1.5.7 Risk/Hazard Monitoring Facilities

The raw material quality and the process monitoring should be as per HACCP, GMP (Good Manufacturing Practice), GLP (Good Laboratory Practice) and SSOP (Standard Sanitation Operation Procedures) norms. Personal hygiene etc. depends heavily on monitoring certain physical, chemical or microbiological parameters. Consequently, the success of all the above processes and procedures will depend on the facilities of the laboratory in the plant. In fact, the laboratory shall have all test methods and testing equipments in tune with the following requirements:

a) Use of approved methods

All the methods used by the lab shall be approved methods by national or international agencies, like BIS standards (Bureau of Indian Standards), EU (European Union) Norms, US FDA (United States Food and Drug Administration) Guides and Codex. Under no circumstances, unapproved procedures shall be used for monitoring any process/quality parameter.

b) Use of calibrated instruments

In case of measurements like volume, weight, time, temperature, pressure etc., the measuring instruments shall be subjected to periodic calibration with reference to national or international standards, before they are used for actual measurements. In case of weights and measures, the Legal Metrology Department and in case of other physical measurements, calibration with reference to the standards whose accuracy can be traced back to the standards maintained at National Physical Laboratory, New Delhi or the international standards kept at Paris.

c) Use of CRM as standards

All labs will be using various chemical standards for estimation of several chemical parameters by different methods like titration, chromatography, spectrophotometry etc. All such standards shall be certified reference materials (CRM) or certified analytical reagents. This will ensure accuracy and reproducibility of test results.

d) Accreditation of laboratories by National / International agencies

Wherever possible, laboratories attached to food processing plants shall be accredited by qualified assessors appointed by agencies like National Accreditation Board for Laboratories or International Laboratory Accreditation Conference to ensure that these laboratories have necessary facilities in terms of equipments, chemicals including certified reference materials, qualified personnel etc. and necessary methodology to perform stipulated tests so that the results generated by the laboratories are dependable as well as acceptable to the consumers.

e) Record keeping

The laboratories shall keep all the records relating to production and quality assurance as per HACCP, SSOP, GMP etc. and these records shall be available for review and audit for at least three years. Generally, the records insisted are those outlined in HACCP plan form (CCP monitoring records, corrective action records, verification records and calibration records.), hygiene and sanitation monitoring records, GMP records, ETP records (Effluent Treatment Records),

raw material and finished product testing records. All these records shall be supported with appropriate procedures and schedule for ensuring their adequacy.

1.5.8 Good Personnel Policy

All major events in a food manufacture like sanitation, hygiene, processing and quality checks heavily rely on modern methods in science and technology. However, all the production and quality checks are performed by specific personnel, whose knowledge and skill will ultimately decide the safety of the product. So, the personnel required for all these activities shall be suitably qualified and certified for the job assigned to them. Products of a plant with such a qualified, certified and alert personnel shall be free from health hazards.

This can be ensured by a good personnel policy consisting of recruitment of suitably qualified personnel in sufficient number, providing them periodic training necessary to upgrade and update their skill to meet growing demands in production, quality and marketing. The employees shall also be given a good service condition to keep them alert, active and responsible.

Thus, if there is HACCP, GMP, GHP, SSOP, GLP and good personnel policy, any food processing plant can achieve Total Quality Management and thereby safety and quality of the product.

? Check Your Progress 2

Note: a) Write your answers within the space provided.

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

1) What are the commonly encountered health hazards in raw fish and shellfish?

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2) Why removal of all type of ornaments by all employees is essential before they enter the food handling areas for achieving safety of the food processed?

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3) Why should you insist the personnel of a processing facility to have a foot dip?

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4) How to have an effective pest control system?

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1.6 SANITARY AND PHYTO-SANITARY MEASURES (SPS)

Countries who wished to have easy and friendly trade links with each other reached upon the agreement on SPS measures. In this section, you will learn more about SPS.

1.6.1 Why do Standards Matter for Trade?

Government regulations or industry standards for goods can impact trade in at least three ways:

- facilitate exchange by clearly defining product characteristics and improving compatibility and usability;
- advance domestic social goals like public health by establishing minimum standards or prescribing safety requirements; and
- can hide protectionist policies.

During the Uruguay Round of multilateral trade negotiations, member nations established the Agreement on the Application of Sanitary and Phyto-sanitary (SPS) Measures and the Agreement on Technical Barriers to Trade (TBT) to address the emerging debate over the use of standards in international trade. The SPS and TBT Agreements can be interpreted as an attempt to balance the first two uses of standards and to minimize the third. In other words, these agreements balance the competing demands for domestic regulatory autonomy and the global harmonization of product standards. At the same time, the agreements attempt to prevent standards from becoming a protectionist device.

1.6.2 The SPS and TBT Agreements

The Sanitary and Phyto-sanitary Agreement (SPS) allows members to take scientifically based measures to protect public health. The agreement commits members to base these measures on internationally established guidelines and risk assessment procedures. Generally speaking, the SPS agreement is a compromise that permits countries to take measures to protect public health within their borders so long as they do so in a manner that restricts trade as little as possible.

Likewise, the Technical Barriers to Trade Agreement (TBT) strikes a delicate balance between the policy goals of trade facilitation and national autonomy in technical regulations.

1.6.3 Sanitary and Phyto-sanitary Measures

Sanitary and Phyto-Sanitary Measures are maintained by countries to ensure that food is safe for consumers, and to prevent the spread of pests and diseases among animals and plants. Thus, this is another way to maintain quality.

SPS measures can take many forms:

- Requiring products to come from a disease-free area;
- Inspection of products;

- Specific treatment or processing of products;
- Setting of allowable maximum levels of pesticide residues; and
- Permitted use of only certain additives in food.

SPS measures apply to food, feed, animals and plants coming from other countries.

The SPS Agreement recognizes the fundamental right of countries to protect the health and life of their consumers, animals and plants against pests, diseases, and other threats to health. However, the basic right to protect against harmful pests and disease is tempered by several rules aimed at preventing the use of health measures in an unjustified, arbitrary or discriminatory fashion.

The primary obligation is that SPS protection measures must be based on either a relevant international standard established by an international standards body recognized by the SPS Agreement or a scientific risk assessment. For plant quarantine authorities, this means being able to demonstrate the threat of a particular pest or disease of concern that makes a particular phyto-sanitary regulation (i.e. import requirements or border controls) necessary.

1.6.4 The Ten Commandments of the Sanitary and Phyto-sanitary Agreement of the World Trade Organization

These are the ten parameters upon which the SPA works:

1) Participation in relevant international organizations such as *Office International des Epizooties* (OIE), Secretariat of the International Plant Protection Convention (IPPC) and *Codex Alimentarius.*
2) Adaptation of laws, rules and standards to the terms of the SPS agreement
3) Use of risk analysis studies.
4) Transparency of information.
5) Reinforcement of export certification procedures.
6) Reinforcement of import inspection and quarantine procedures.
7) Modernization of laboratory services.
8) Strengthening the information, surveillance and alert service.
9) Modernization of procedures for registering and controlling agricultural chemicals and veterinary products.
10) Control and eradication of diseases and pests that affect trade.

1.6.5 SPS Agreement Principles

There are many SPS Agreement principles included and they are as follows:

1) Harmonization
2) Risk assessment
3) Setting the appropriate level of protection
4) Transparency
5) Dispute settlement

The SPS agreement recognizes three international standard setting bodies as the official entities for developing health- related standards, guidelines and recommendations. These international bodies include:

- *Codex Alimentarius* for food safety standards;
- International Plant Protection Convention (IPPC) for plant health standards; and
- *Office International des Epizooties* (OIE) for animal health standards.

The OIE, IPPC and Codex will increasingly focus their efforts in developing internationally accepted standards in their respective areas of animal, plant health and food safety as a result of their role in the WTO (World Trade Organization). The standards and guidelines of the OIE, IPPC and Codex are likely to prevail when the WTO is called upon to review technically based trade disputes.

1.6.6 Current Scenario

Though technical regulations and industry standards were once considered objective tools for facilitating production and exchange, they have recently become a hotly contested subject in the politics of international trade. In particular, issues of domestic security and public health such as the U.S.'s bio-terrorism laws and the European Union's food and feed regulations present emotionally charged contexts under which WTO agreements are interpreted.

These measures are criticized by some who claim that the agreements are too invasive and deny them control of domestic regulation. Others claim that the agreements do not go far enough, and domestic regulation is often a form of protectionism. Developing countries protest that the standards promoted in the agreements lack their input and are dominated by the interests of developed countries. The inability of developing country governments to adequately fund their delegations to attend SPS meetings is certainly also a concern. Adding their voices to the debate are environmentalists, non-governmental organizations and local regulatory officials who feel excluded from negotiations of a topic that directly affects them.

There is also considerable debate over the extent to which the SPS and TBT agreements allow trade restrictions based on specifications related to process and production methods. Nations disagree, for example, over the extent to which the TBT Agreement allows nations to differentiate between identical products that were produced in different ways. Can a country treat products differently because the production methods used have different environmental impacts? Such questions have raised fears among environmentalists and other civil society groups that the Uruguay Round Agreements may threaten environmental quality. They are afraid that international standards will diminish a country's ability to uphold its own environmental or public health principles.

As we have seen, agreement with the guidelines established in the SPS Agreement of the WTO involves not only a formal commitment on the part of, but also benefits for, the agricultural/ food sectors of the signatory member states, if it is their intention to gain greater access to international agricultural markets. Not only government authorities are responsible for following the Ten Commandments analyzed herein, they must also be assumed jointly by all those involved in

agriculture, especially farmers and operators of agri-businesses, who, in the long run, will be the principal beneficiaries of an agricultural trade regime that is free of sanitary and phyto-sanitary barriers. The most effective way to move forward in complying with these commitments is for the government and private sectors to share this responsibility.

Activity 1

Visit any fish/ shellfish processing factory. Go around the facility and take down notes related to TQM parameters followed in the said facility. Compare your notes with the data provided in this unit. Underline your suggestions.

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Check Your Progress 3

Note: a) Write your answers within the space provided.

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

1) What do the Sanitary and Phyto-sanitary Agreement (SPS) do?

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2) What does the Technical Barriers to Trade Agreement (TBT) do?

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3) What does the Sanitary and Phyto-Sanitary Measures stand for?

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4) What are the three international standards setting bodies recognized by the SPS?

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1.7 LET US SUM UP

Quality is a combination of such characteristics such as wholesomeness, integrity and freshness. Total quality management is now an accepted test for quality assurance in a number of production industries. TQM starts from new material, production process, hygiene and sanitization of employees/ workers to finished product. This process avoids end product inspection and rejection of contaminated/ spoiled or under processed food and saves product recall and loss to industry. To maintain quality, standards are formulated by national and international agencies.

The national governments also sign various agreements between them, importing and exporting countries, to safeguard the trade and manufacturers to avoid loss to each other.

1.8 GLOSSARY

Bait	:	Anything that tempts.
Bivalves	:	Mollusks having two shells.
Consolidation	:	To make something strong.
Contagious	:	Spreading by contact.
Effluents	:	Discharged waste materials.
Epizooties	:	Organisms attached to the surface.
Eradicate	:	Remove completely.
Formaldehyde	:	A chemical used as a preservative.
Fumigation	:	Disinfecting with the help of fumes.
Genetic Origin	:	Trait obtained from the parents genetically.
Harbourage	:	Shelter or refuge, or a place providing shelter.
Harmonization	:	Arranging satisfactorily.
Implementation	:	Carry out an undertaking.
Lacuna	:	Vacant space.
Pasteurization	:	Removal of pathogens through heating.
Pathogens	:	Harmful bacteria/fungi.
Pest Control	:	Removal of pests – controlling their attack.
Quarantine	:	Separation from others until it is known that there is no danger of spreading disease.
Receptacles	:	Container.
Reinforcement	:	Make stronger by further addition.
Residues	:	Leftover content.
Rodent	:	Animals like rats.
Utensils	:	Vessels.

1.9 SUGGESTED FURTHER READING

Mukundan, M.K. and Balasubramaniam, S. 2007. (Ed) *Seafood Quality Assurance*. CIFT Training Manual 1, Central Institute of Fisheries Technology (CIFT), Cochin, Kerala.

1.10 REFERENCES

Gopakumar, K. 2002. *Textbook on Fish Processing Technology,* Indian Council of Agricultural Research, New Delhi.

1.11 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) Quality is defined as "a combination of such characteristics such as wholesomeness, integrity and freshness".

2) 1958.

3) Parliament of India.

Check Your Progress 2

1) PSP (Paralytic Shellfish Poison), DSP (Diarrhetic Shellfish Poison) in bivalves, lead and Cadmium in cephalopods and Histamine in scombroid fishes.

2) Ornaments and certain beauty aids offer lot of gaps and crevices which are very difficult to clean and so form easy home for various kinds of bacteria, which will be extremely difficult to eradicate.

3) A foot dip containing 100 ppm available chlorine will sanitize the bottom portion of the foot wear and prevent contamination of floor of the food handling area.

4) All doors and chutes in the plant shall be fitted with self closing devices. All externally opening doors / chutes are to be fitted with automatic air curtains. Fly proofing of all windows, ventilators, drain outlets or all holes more than half a square inch with fly proof netting will help. To take care of isolated flies and rodents there shall be electronic fly catchers and rodent traps located at strategic points.

Check Your Progress 3

1) The SPS allows members to take scientifically based measures to protect public health. The agreement commits members to base these measures on internationally established guidelines and risk assessment procedures.

2) The TBT strikes a delicate balance between the policy goals of trade facilitation and national autonomy in technical regulations.

3) Sanitary and Phyto-sanitary Measures are maintained by countries to ensure that food is safe for consumers, and to prevent the spread of pests and diseases among animals and plants. Thus this is another avenue to maintain quality.

4) These international bodies include:

   a) *Codex Alimentarius* for food safety standards,

   b) International Plant Protection Convention (IPPC) for plant health standards, and

   c) *Office International des Epizooties* (OIE) for animal health standards.