Meat and Meat Products Processing- Level II

Based on May 2019, Version 2 Occupational standards

Module Title: - Complying with Quality Assurance and HACCP Requirements

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Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Identifying hazards to food safety and quality
- Identifying hazard control points

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify hazards to food safety and quality
- Identify hazard control points

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If your performance is satisfactory proceed to the next learning guide

Information Sheet 1- Identifying hazards to food safety and quality

1.1. Introduction HACCP

What is HACCP?

HACCP is an abbreviation for the Hazard Analysis Critical Control Point system, which is synonymous with food safety management. It is “a system which identifies, evaluates, and controls hazards which are significant for food safety.”

The HACCP system, which is science based and systematic, identifies specific hazards and measures for their control to ensure the safety of food. HACCP is a tool to assess hazards and establish control systems that focus on prevention rather than relying mainly on end-product testing. Any HACCP system is capable of accommodating change, such as advances in equipment design, processing procedures or technological developments.

HACCP can be applied throughout the food chain from primary production to final consumption and its implementation should be guided by scientific evidence of risks to human health. As well as enhancing food safety, implementation of HACCP can provide other significant benefits. In addition, the application of HACCP systems can aid inspection by regulatory authorities and promote international trade by increasing confidence in food safety.

The successful application of HACCP requires the full commitment and involvement of management and the work force. It also requires a multidisciplinary approach; this multidisciplinary approach should include, when appropriate, expertise in agronomy, veterinary health, production, microbiology, medicine, public health, food technology, environmental health, chemistry and engineering, according to the particular study. The application of HACCP is compatible with the implementation of quality management

systems, such as the ISO 9000 series, and is the system of choice in the management of food safety within such systems.

Definitions of terms

Control: To take all necessary actions to ensure and maintain compliance with criteria established in the HACCP plan. Or The state wherein correct procedures are being followed and criteria are being met.

Control measure: Any action and activity that can be used to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

Corrective action: Any action to be taken when the results of monitoring at the CCP indicate a loss of control.

Critical Control Point (CCP): A step at which control can be applied and is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

Critical limit: A criterion which separates acceptability from unacceptability.

Deviation: Failure to meet a critical limit.

Flow diagram: A systematic representation of the sequence of steps or operations used in the production or manufacture of a particular food item.

HACCP: A system which identifies, evaluates, and controls hazards which are significant for food safety.

HACCP plan: A document prepared in accordance with the principles of HACCP to ensure control of hazards which are significant for food safety in the segment of the food chain under consideration.

Hazard: A biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect.

Hazard analysis: The process of collecting and evaluating information on hazards and conditions leading to their presence to decide which are significant for food safety and therefore should be addressed in the HACCP plan.

Monitor: The act of conducting a planned sequence of observations or measurements of control parameters to assess whether a CCP is under control.

Step: A point, procedure, operation or stage in the food chain including raw materials, from primary production to final consumption.

Validation: Obtaining evidence that the elements of the HACCP plan are effective.

Verification: The application of methods, procedures, tests and other evaluations, in addition to monitoring to determine compliance with the HACCP plan.

2.3. Implementation of HACCP

HACCP is a system that assists organizations to identify potential food safety hazards in the entire food supply chain and to take preventive measures for their control. HACCP focuses on the prevention of hazards rather than relying on end product testing. The following sequence of 12 steps, included in the guidelines developed by the Codex Committee on Food Hygiene, is the recommended approach to develop a HACCP programme.

Step 1: Assemble HACCP team

Set up a multi-disciplinary team that includes representatives from production, sanitation, quality control, food microbiology, etc. Top management must give its full support to the team. If the required expertise is not available within the company, bring in help from a consultant.

Step 2: Describe product

Draw up a full description of the product for which the HACCP plan is to be prepared, including product composition, structure, processing conditions, packaging, storage and distribution conditions, required shelf life, instructions for use, etc.

Step 3: Identify intended use

Identify the intended use of the product by the end-user or consumer. You need to determine where the product will be sold as well as the target group (e.g. institutional catering, homes for senior citizens, hospitals, etc.).

Step 4: Construct flow diagram

Carefully examine the product/process and produce a flow diagram around which to base the HACCP study. Whatever the format you choose, study all the steps involved in

the process including delays during or between the steps from receiving the raw material to placing the end-product on the market in sequence, and present them in a detailed flow diagram with sufficient technical data.

Step 5: On-site confirmation of flow diagram

The HACCP team should confirm the processing operation against the flow diagram during all stages and hours of operation and amend the flow diagram if necessary.

Step 6: List all potential hazards on each step, conduct a hazard analysis, and consider any measures to control hazards

Using the flow diagram, the team should list all the hazards biological, chemical or physical that may reasonably be expected to occur at each process step, and describe the preventive measures that can be used to control such hazards (for example, the use of air curtains, hand and feet washing at entrance to processing areas, wearing of head gear, use of Good Manufacturing Practices [GMP]/standard operating procedures [SOP]/ Sanitation Standard Operating Procedures [SSOP].

Step 7: Determine Critical Control Points (CCPs)

When applying the decision tree, you need to remain flexible and use common sense to avoid, wherever possible, unnecessary control points throughout the whole manufacturing process. If you identify hazards at a step where control is necessary for safety and no preventive measures exist at that step, you need to modify the process at that step, or at an earlier or a later stage, to include a preventive measure.

For example, in a slaughterhouse, covering carcasses with a sanitized cloth to prevent infection by flies is a preventive measure at the carcass stage, which substitutes for a preventive measure such as washing the prepared meat at the next stage, as it will not be possible to disinfect the meat at this stage, i.e., during cutting or mincing operations.

Step 8: Establish critical limits for each CCP

Establish critical limits for each CCP. They are normally derived from specifications included in the food legislation of a country or in national or international standards. When limits are not taken from regulatory standards (e.g. frozen storage temperature) or from existing and validated guides of good manufacturing practices, the HACCP team should ascertain the validity of such limits relative to the control of identified hazards and critical points.

Step 9: Establish a system of monitoring each CCP

Monitoring is the scheduled measurement or observation of a CCP to determine conformance to its critical limits. The monitoring procedures must be able to determine loss of control, if any, at the CCP.

Step 10: Establish corrective actions

The HACCP team should develop specific corrective actions and document them in the HACCP plan for each CCP in the HACCP system so that they can deal with deviations when they occur. Such corrective action should include:

- Proper identification of the person(s) responsible for implementation of a corrective action
- Actions required to correct the observed deviation
- Action to be taken with regard to products manufactured during the period when the process was out of control; and
- Written records of measures taken.

Step 11: Establish verification procedure

Develop a verification procedure to ensure that the HACCP system is working correctly. The procedure should include the frequency of verification, which should be conducted by a responsible and independent person.

Step 12: Establish documentation and record keeping

The HACCP system requires efficient documentation and accurate record keeping. For example, hazard analysis, identified CCPs and their limits (including revisions, if any)

should be documented. Examples of records are CCP monitoring records, records of deviation found and corrective action taken on them, etc.

2. Identifying hazards to food safety and quality

2.1. Food Safety

Food safety means assurance that food will not cause any harm to the consumers. An understanding of food safety is improved by defining two other concepts toxicity and hazard.

Toxicity: - Is the capacity of a substance to produce harm or injury of any kind under any conditions.

Hazard: - Is the relative probability that harm or injury will result when substance is not used in a prescribed manner and quantity. Hazards can be :-

- Physical
- Chemical and
- Biological causing harmful / adverse effects on the health of consumers

1. **Physical hazard** is any physical material not normally found in food, which causes illness or injury and includes wood, stones, parts of pests, hair etc.

Figure 1.1. Physical Hazards in foods

2. Chemical hazards: - Chemical hazards chemicals or deleterious substances which may be intentionally or un-intentionally added to foods. This category of hazards

includes pesticides, chemical residues, toxic metals, polychlorinated biphenyls, preservatives, food colours and other additives.

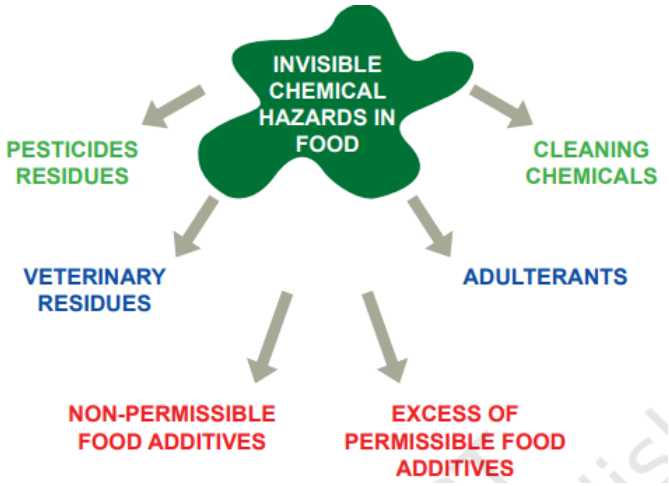

Figure 1.2. Chemical Hazards in foods

3. **Biological hazards:**-Biological hazards living organisms and include microbiological organisms. Those micro-organisms which are associated with food and cause diseases are termed food-borne pathogens. There are two types of food-borne diseases from microbial pathogens infections and poisoning.

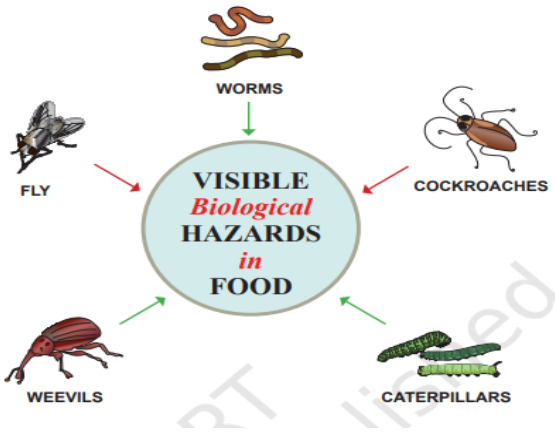

Figure 1.3 Visible biological Hazards in foods

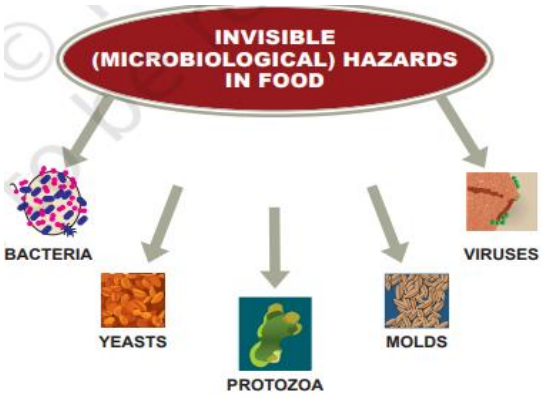

Figure1.4 Invisible biological Hazards in foods

2.2. Meat Quality

There are two major aspects of meat quality, nutritional quality which is objective and "eating" quality as perceived by the consumer:-

- Flavour
- Juiciness
- Tenderness and
- Color which is highly subjective.

There are considerable differences between the preferences of individuals including preferences for different cuts of meat, lean or fatty, muscle or organ meats, methods of cooking, etc.

Self-check 1	Written test

Name_____ ID_____ Date _____

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Choose the best answer (2 points each)

1. Of the following one is not the parameter in meat quality preferences by Customers
   A. Flavour
   B. Agronomy
   C. Tenderness
   D. Color

2. Except one the others are hazards that can harm human if not foods are not kept properly
   A. Chemical hazards
   B. Physical hazards
   C. Veterinary services
   D. All

3. Of the following one is not the focus area of HACCP.
   A. Schedule
   B. Veterinary services
   C. Food technology
   D. Chemistry and health

Test II: Short Answer Questions

1. List at least 6 implementation steps of HACCP (6 point)

You can ask you teacher for the copy of the correct answers.

Note: **Satisfactory rating – 8 points** **Unsatisfactory - below 8 points**

Information Sheet 2- Identifying hazard control points

2.1. Hazard control

A Critical Control Point (CCP) is a step at which control can be applied so that the hazard is prevented, eliminated or reduced to an acceptable level. The system identifies the CCPs and then defines the conditions that have to be met to ensure a safe product. These points need to be monitored. When measurements are taken at a CCP a Critical Limit (CL) is defined that tells you whether the CCP is being controlled and therefore, whether the product produced is acceptable or not.

For an operation to fulfill the definition for a CCP it must achieve one of the following:

1. Prevent the hazard or
2. Eliminate the hazard from the product or
3. Reduce the hazard to an acceptable level

I. Prevent the hazard being consumed

A. Chilling

- If chilling is done *C.* perfringens spores are prevented from germinating and growing to a level of concern.
- The Critical Limits are prescribed in a two-stage process which must take cured meat through the growth zone in seven and a half hours and uncured meat in six hours and then to 5°C within 24 hours after completing cooking.

B. Nitrite addition

- The addition of nitrite to the formulation prevents growth of *C. botulinum* by inhibiting spores from germinating.
- The Critical Limit is that nitrite is present to the legal limit of 125 mg/kg in all products except Uncooked Comminuted Fermented Meats (UCFM) in which is up to 500 mg/kg of a combination of nitrate and nitrite.

II. Eliminate the hazard from the product

A. Cooking

- In cured, cooked meats the cook step must eliminate all target bacteria.
- The CL is that the slowest heating point of meat receives 65°C for 10 minutes

III. Reduce the hazard to an acceptable level

Example: Metal. Passage of final product through a metal detector reduces the contaminant to an acceptable level.

- The CL is based on the capability of the detector to detect metal of a specific size and type (stainless, ferrous and non-ferrous).

2.2. How to conduct a hazard analysis

After listing all the hazards (biological, chemical or physical) that may be reasonably expected at each step from primary production, processing, manufacturing and distribution until the point of consumption, the HACCP team should assess the potential significance or risk of each hazard by considering its likelihood of occurrence and severity.

2.3. Hazard analysis in meat industry

There are about five hazard analysis procedures in the meat industry. As the meat and meat products are a perishable products hazards to human health is very high in meat industry. Thus it is highly important to Analysis this hazards under five basic procedures, to eliminate or reduce the risk.

1. Review incoming material

A ready-to-eat product must not contain pathogens in amounts that may harm the consumer. On the other hand, if the end-product is not a ready to eat product, some microorganisms may be acceptable in the end-product if a further operation (e.g. cooking at home) will eliminate or reduce them to an acceptable level.

2. Evaluate processing operations for hazards

The objective of this activity is to identify all realistic potential hazards related to each processing operation, the product flow and the employee traffic pattern.

3. Observe actual operating practices

The HACCP team must be very familiar with every detail of the operation under investigation. Any identified hazard must be recorded on the appropriate forms. The HACCP team shall:

- Observe the operation long enough to be confident that it comprises the usual process or practices.
- Observe the employees (e.g. could raw or contaminated product cross-contaminate workers' hands, gloves or equipment used for finished or post-process product?)
- Observe hygienic practices and note the hazards.
- Analyze if there is a kill step (process which destroys all microorganisms) during the process (if so, attention should be focused on potential cross-contamination after this processing operation)

4. Take measurements

It may be necessary to take measurements of important processing parameters to confirm actual operating conditions. Before measuring, make sure all devices are accurate and correctly calibrated.

The measurements that is done depending on the product or process type

- Measure product temperatures, considering heat processing and cooling or chilling operations.
- Measure time/temperature for cooking, pasteurizing, canning cooling (rates), storing, thawing, reconstituting, etc.
- Measure the dimension of the containers used to hold foods being cooled and the depth of the food mass.

- Measure pressure, headspace, venting procedure, adequacy of container closure, initial temperatures and any other factors critical to the successful delivery of a scheduled process.
- Measure the PH of the product during processing and also of the finished product, measuring PH at room temperature whenever possible.
- Collect Sample, inoculated-pack studies and microbial challenge studies could be necessary when information on hazards is not otherwise available, for new products or for assessing expected shelf-life.

5. Analyze the measurements

A qualified individual (with proper scientific background) must analyze the measurements to interpret correctly the data collected.

For example:

- Plot time/temperature measurements using a computer or on graph paper.
- Interpret controlled data versus optimal growth temperatures of microorganisms and temperature ranges at which they can multiply.
- Estimate and evaluate probable cooling rates; interpret cooling rates and compare the measured temperatures with temperature ranges within which bacteria of concern multiply rapidly versus temperature at which growth begins. Evaluate the shelf stability of the product.

2.4. Control measures of some Selected hazards

After the hazard analysis is completed, the team must then consider what control measures, if any, exist which can be applied for the control of each hazard.

I. Controlling biological hazards

Biological hazards can be controlled by limiting, removing or altering the growth kinetics microorganisms need to survive, grow and reproduce. They can be destroyed, eliminated or controlled by thermal processing (heating or cooking), freezing or drying.

Mechanisms of biological hazards control

a. Bacteria control measures

- Temperature/time control (proper control of refrigeration and storage time, for example, minimizes the proliferation of microorganisms).
- Heating and cooking (thermal processing) for an adequate time and at an adequate temperature to eliminate microorganisms or reduce them to acceptable levels.
- Cooling and freezing.
- Addition of salt or other preservatives, which at acceptable levels may inhibit growth of microorganisms.
- Drying, this may use enough heat to kill microorganisms or may remove enough water from the food to prevent certain microorganisms from growing even when drying is conducted at lower temperatures.
- Packaging conditions (vacuum packaging, for example, can be used to inhibit microorganisms that require air to grow).
- Cleaning and sanitizing, this can eliminate or reduce the levels of microbiological contamination.
- Implementing Personal and hygienic practices, which can reduce the levels of microbiological contamination.

b. Viruses control measures

Thermal processing:- heating or cooking methods such as steaming, frying or baking which may destroy many but not all viruses (the type of virus determines the appropriate controls)

Personal hygienic practices, including the exclusion of workers affected by certain viral diseases, e.g. hepatitis

c. parasites (worms and protozoa), control measures

- Dietary control (infection from Trichinella spiralis in pork, for example, has decreased as a result of better control of the pigs' diet and environment) a method

not always practical, however, for all species of animals used for food (the diet and environment of wild fish, for example, cannot be controlled)

- Heating, drying or freezing
- Salting or brining
- Visual examination, which can be used in some foods to detect parasites (e.g. a procedure called "candling" can be used for certain fish)
- Good personal hygiene practices by food handlers, proper disposal of human faeces and proper sewage treatment.

II. Controlling chemical hazards

The following are examples of control measures for chemical hazards

- **Source control**, i.e. specifications for raw materials and ingredients and vendor certification that harmful chemicals or levels are not present.
- **Processing control**, i.e. formulation control and the proper use and control of food additives and their levels.
- **Proper segregation** of non-food chemicals during storage and handling.
- **Control of incidental contamination from chemicals** (e.g. greases lubricants, water and steam treatment chemicals, and paints).
- **Labeling control**, i.e. ascertaining that the finished product is accurately labelled with ingredients and known allergens.

III. Controlling physical hazards

The following are examples of control measures for physical hazards

- **Source control,** i.e. specifications for raw materials and ingredients and vendor certification that unacceptable physical hazards or levels are not present.
- **Processing control,** e.g. use of magnets, metal detectors, sifter screens, de-stoners, clarifiers, air tumblers.
- **Environmental control**, i.e. ensuring that good manufacturing practices are followed and that no physical contamination occurs to the food through the building, facilities, work surfaces or equipment

Self-Check – 2	Written test

Name_____ ID_____ Date_____

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Part I. Choose the best answers from the following alternatives (1.5 points each)

1. Of the following one is essential in hazard control
   A. Prevent the hazard
   B. Eliminate the hazard from the product
   C. Reduce the hazard to an acceptable level
   D. All
2. The five hazard analysis procedure in meat industry may include
   A. Review incoming material
   B. Evaluate processing operations for hazards
   C. Observe actual operating practices
   D. Take measurements & Analyze the measurements
   E. All
3. Except one the others are physical hazards Control method
   A. Source control
   B. Processing control
   C. Environmental control
   D. None
4. Chemical hazards Controlling mechanism may include the following except
   A. Source control
   B. Processing control
   C. Labeling control
   D. Proper segregation of non-food chemicals
   E. All
   F. None

Test I: Short Answer Questions

1. Explain detail the five hazard analysis procedure detail(5 points)

You can ask you teacher for the copy of the correct answers.

Note: **Satisfactory rating - 11 points** **Unsatisfactory - below 11 points**

LG #52	LO #2- Identify elements of the Quality Assurance *(QA)* system

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Identifying purpose and elements of the QA and HACCP
- Identifying product specification

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify purpose and elements of the QA and HACCP
- Identify product specification

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6. If your performance is satisfactory proceed to the next learning guide,

Information Sheet 1- Identifying purpose and elements of QA and HACCP

1.1. Introduction to Quality

"Quality" can be defined in several different ways. One definition is "providing products that meet or exceed expectations and established requirements every time." Obviously, in the beef industry, established product requirements differ among the various production segments, but there are some common expectations.

As products of a stocker operation, feeder cattle should meet the requirements of cattle feeders for performance, health, carcass characteristics and food safety. Fed cattle must meet the requirements of beef processors for health, carcass characteristics and food safety. Commodity beef products must meet requirements of beef purveyors for fat trim, marbling, portion size, safety and lack of defects, such as injection site blemishes, dark cutters, etc.

Beef products sold to the consuming public must consistently meet expectations for both food safety and eating satisfaction.

1.2. Beef Quality Assurance purpose

To ensure the consumer that all cattle shipped from a beef production unit are healthy, wholesome and safe, their management has met FDA, USDA and EPA standards, they meet quality requirements throughout the production system and are produced with environmentally-sound production practices.

1.3. Beef Quality Assurance (BQA) Objectives

1. Set production standards for quality and safety that are appropriate to an operation and that can be met or exceeded. Key elements that influence production of defect-free food include biosecurity, animal health and well-being, production performance and environmental stewardship.
2. Establish data retention and recordkeeping systems which satisfy FDA/USDA/EPA guidelines will help allow for validation of management activities and fulfill program goals.

3. Provide hands-on training and education to help participants meet or exceed BQA program guidelines and help realize the benefits of the program.
4. Provide technical assistance through BQA program staff, veterinarians, extension specialists and other qualified individuals working with the BQA program.

1.4. Quality Challenges

The importance of beef quality assurance can be seen when analyzing the top quality challenges within the beef industry. These quality challenges include injection site blemishes, rib brands, excessive external fat, excessive seam fat, dark cutters, and inconsistent size of meat cuts, inconsistent cuts and non-uniform cattle.

1.5. Methods to manage quality and safety

In an industry quality management paly vital role and the following are how we manage quality in a meat industry.

- ✓ Good Hygienic Practices (GHP) / Good Manufacturing Practice (GMP) or Sanitation Standard Operating Procedures (SSOP)
- ✓ Hazard Analysis Critical Control Point (HACCP)
- ✓ Quality Control (QC)
- ✓ Quality Assurance (QA) / Quality Management (QM)
- ✓ Quality Systems
- ✓ Total Quality Management (TQM).

a. Good Hygienic Practices / Good Manufacturing Practices

They refer to measures and requirements which any establishment should meet to produce safe food. These requirements are prerequisites to other and more specific approaches such as HACCP, and are often now called prerequisite programs.

b. Hazard Analysis Critical Control Point

Hazard Analysis Critical Control Point (HACCP) is a systematic approach which identifies, evaluates, and controls hazards which are significant for food safety. HACCP ensures meat products safety through an approach that builds upon foundations provided by good manufacturing practice. It identifies the points in the food production

process that require constant control and monitoring to make sure the process stays within identified limits. Statistical Process Control systems are relevant to this operation.

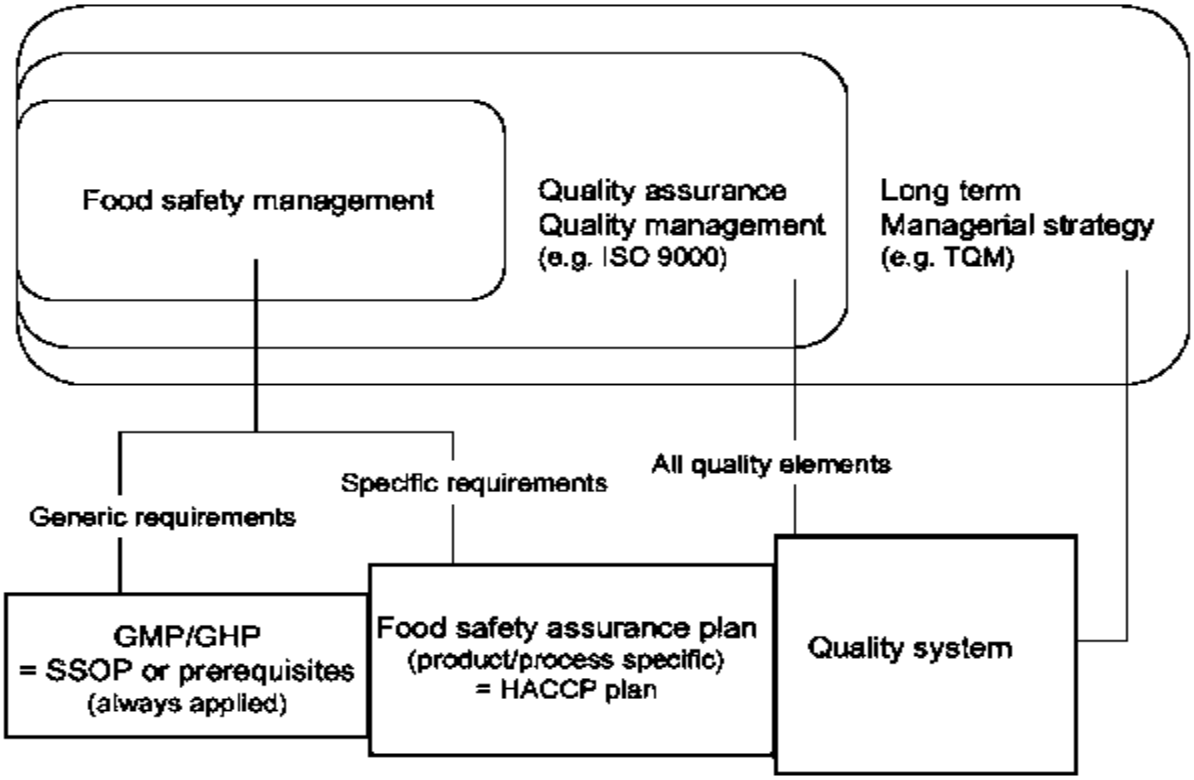

Figure 2.5 Food safety tools: an integrated

c.Quality Control

Can be defined as the operational techniques and activities that are used to fulfill quality requirements.

It is an important subset of any quality assurance system and is an active process that monitors and, if necessary, modifies the production system so as to consistently achieve the required quality.

It can be argued that QC is used as part of the HACCP system, in terms of monitoring the critical control points in the HACCP plan.

d. Quality Assurance / Quality Management

In a total system, this would include the technical, managerial and environmental aspects as explored to above. The best known of the quality assurance standards is ISO 9000 and for environmental management, ISO 14000.

The term quality management is often used interchangeably with quality assurance. In the seafood and meat industry, the term quality management has been used to focus mostly on the management of the technical aspects of quality in the industry like other technical issues such as labelling.

e. Quality Systems

This term covers organizational structure, responsibilities, procedures, processes and the resources needed to implement comprehensive quality. They are intended to cover all quality elements. Within the framework of a quality system, the prerequisite programme and HACCP provides the approach to food safety.

f. Total Quality Management (TQM)

TQM is an organization's management approach, centered on quality and based on the participation of all its members and aimed at long-term success through customer satisfaction and benefits to the members of the organization and to society. Thus TQM represents the organizations' "cultural" approach and together with the quality systems provides the philosophy, culture and discipline necessary to commit everybody in the organization to achieve all the managerial objectives related to quality.

1.6. Components of the system and definitions of terms

Principles of HACCP

✓ The HACCP system consists of seven principles, which outline how to establish, implement and maintain a HACCP plan for the operation under study.

Principle 1

✓ **Conduct a hazard analysis**. Identify potential hazards associated with all stages of the production, using a flow diagram of the steps in the process. For example, everyone who helps you work cattle should be instructed to avoid giving intramuscular injections anywhere but the neck area.

Principle 2

✓ **Identify/Determine the CCPs.** Determine the points/procedures/operational steps that can be controlled to eliminate the hazards, or minimize the likelihood of occurrence, or reduce the hazards to an acceptable level. For

Example, storage of feed and/or chemical products is a control point were with meat and meat products should in separate areas.

- **Principle 3**

✓ **Establish Critical Limits** (target levels and tolerances), which must be met to ensure the CCPs are under control. They must involve a measurable parameter and may also be known as the absolute tolerance or safety limit for the CCP.

For example, identify the proper withdrawal time associated with a drug treatment determine the earliest date the treated animal could be sold.

- **Principle 4**
- **Establish a system to monitor control of the CCP** by scheduled testing or observation.

For example, pesticide use records should be maintained so that you can check grazing restrictions on a particular field or pasture before turning cattle out.

- **Principle 5**
- **Establish corrective actions** to implement if a problem occurs**.** Corrective action procedures and responsibilities for their implementation need to be specified.

  For example, corrective actions for a drug residue violation might include improving recordkeeping and employee training.

- **Principle 6**
- **Establish effective recordkeeping procedures** that document a system is working properly. Verification procedures must be developed to maintain the HACCP system and ensure that it continues to work effectively.

- **Principle 7**
- **Establish procedures for verifying** that the system is working properly. Records must be kept to demonstrate that the HACCP system is operating under control and that appropriate corrective action has been taken for any deviations from the Critical Limits.

  For example, a periodic review of your animal treatment records, production practices, critical limits, treatment protocols, etc.

Self-Check – 1	Written test

Name _____ ID _____ Date_____

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: choose the correct Answer (2 points)

1. Of the following one is the methods to manage quality and safety
   A. Good Hygienic Practices (GHP)
   B. Hazard Analysis Critical Control Point (HACCP)
   C. Quality Control (QC)
   D. Total Quality Management (TQM
   E. All

Test II: Short Answer Questions (6 points)

1. Explain the sequential steps of HACCP

You can ask you teacher for the copy of the correct answers.

Note: **Satisfactory rating - 8 points** **Unsatisfactory – below 8 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

1._____

2._____

_____-

Information Sheet 2- Identifying product specification

2.1. Introduction

The eating quality of meat is still the most important factor for the consumers in relation to rebuying meat products. The eating quality of meat is still the most important factor for the consumers in relation to rebuying meat products. In meat processing industry products specification is important to categorize the needs of the customers.

2.2. Basic Criteria of meat and meat products specification on quality

The quality of meat and meat products is defined by the following criteria:

- Palatability (typical texture and consistency, juiciness, good flavour);
- Proportion of lean meat to fat;
- Freshness and adequate conservability of the products;
- Absence of harmful micro-organisms or substances; and
- Appropriate (preferably minimal) use of additives and meat extenders.

The different criteria need different methods of quality control, such as:

- Organoleptic evaluation
- Physical test methods
- Chemical analysis
- Microbiological examination

According to the accuracy needed, the control method applied can be simple or more complicated and different auxiliary technical devices must be used.

In order to inform consumers and meat processors about the quality of meat and meat products, simple and fast control methods are best suited in many cases, although exact details on residues, toxins and special food components can only be obtained through specialized laboratories.

Basic methods for quality control must involve little or no equipment and obviously sensory evaluation will be most important. Some physical tests, however, can easily be performed using simple instruments such as thermometers, manometers, scales, etc.

By contrast, chemical and microbiological tests are more complicated. These methods not only require standard equipment but also skilled and experienced personnel to do the tests and to interpret the results.

A. Organoleptic evaluation

Organoleptic evaluation consists in describing the attributes of food, in this special case of meat and meat products that can be perceived by the sense organs. The attributes to be evaluated are **appearance, colour, texture and consistency, smell and taste**.

i. Appearance

The way meat looks, either as a carcass or as boneless meat cuts, has an important impact on its objective or subjective evaluation. Grading is an objective evaluation method in this context.

Special product treatments (for instance chilling, freezing, cooking, curing, smoking, drying) or the kind and quality of portioning and packaging (casings, plastic bags, cans) will be recognized by evaluating the appearance.

ii. Colour

Under normal circumstances the colour of meat is in the range of red and may differ from dark red, bright red to slightly red; but also pink, grey and brown colours may occur. In many cases the colour indicates the type and stage of the treatment to which the meat has been subjected, as well as the stage of freshness.

In judging meat colour, some experience is needed to be able to distinguish between the colours which is typical for a specific treatment or which is typical for specific freshness. Furthermore, meat deriving from different species of animals may have rather different colours, as can easily be seen when comparing beef, pork and poultry meat.

The natural colour of fresh meat, except poultry meat, is dark red, caused by the muscle pigment, myoglobine. Fresh meat surfaces which have been in contact with the air for only a short period turn into a bright red colour because of the influence of the oxygen in the air. Oxygen is easily aggregated to the myoglobine and drastically changes the colour of the meat surfaces exposed to it.

Table 2.1 The colour of the muscle tissues for normal product

Meat	Colour
Beef	Bright cherry red
Goat meat	Light pink to red
Lamb	Light pink to red
Pork	Greyish pink
Veal	Light pink to red
Venison	Dark red

iii. Texture and consistency (tenderness and juiciness)

Meat prepared for the consumer should be tender and juicy. Meat tenderness depends on the animal species from which the meat originates. Lamb, pork and poultry meat are sufficiently tender after slaughter, but beef requires a certain period of maturation to achieve optimal eating quality.

Texture and consistency, including juiciness, are an important criterion, still neglected by many consumers, for the eating quality of meat. Often consumers do not know that the eating quality of meat can be upgraded by ripening, especially in the case of beef and similar meats. There is also a great deal of consumer negligence in how to prepare meat. It should be cooked to become sufficiently tender, but cooking should not be too intense otherwise the meat becomes dry, hard and with no juiciness.

The simple way to check the consistency of foods is by chewing. Although this test seems easy, in practice it is rather complicated. Taste panelists need experience, particularly when the different samples have to be ranked, for example which sample is the toughest, the second toughest or the most tender.

iv. Smell and taste (aroma and flavour)

These characteristics are related to each other to a certain extent because they have to be evaluated together for the reliable determination of a product's flavour. The smell of

fresh meat should be slightly acidic, increasing in relation to the duration of the ripening period because of the formation of acids such as lactic acid. On the other hand, meat in decomposition generates an increasingly unpleasant odour owing to substances originating from the bacterial degradation of the meat proteins, such as sulphur compounds, mercaptane, etc.

B. Physical test methods

Physical test methods focus either on the actual condition of meat and meat products, or on the conditions around the product, for example in storage rooms, packages, etc. Equipment will be needed for all these tests which is easily applicable and resistant to utilization under the conditions of practical meat handling and processing.

i. Temperature

Storage of meat and meat products requires low temperatures to make sure that the growth of micro-organisms will be retarded (chilling between-1 to +4°C) or inhibited (freezing preferably in the range of -18 to -30°C).

Cooking of meat requires high temperatures (starting from a temperature of about 55°C needed for denaturation, but generally higher temperatures are applied, up to 100°C).

Canning of meat requires temperatures above 100°C, and for sterilized products where all micro-organisms are inactivated, at least 121°C.

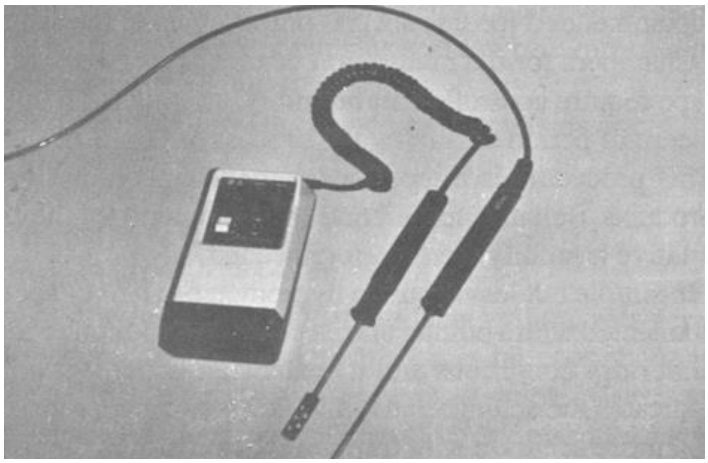

Figure 2.1 Electrical thermometer with digital display and two sensors for measuring air temperature (left) and the temperature of meat, liquids, etc. (right).

ii. Humidity

In some special field of meat processing and storage, air humidity is of importance.
In cutting rooms the humidity of the air should be below the level which would cause vapour condensation on the surfaces of the meat being deboned and cut. Vapour condensation may enhance bacterial growth.
Storage chillers for fresh meat require a balanced air humidity that does not cause wet surfaces on the meat with resulting accelerated bacterial growth, but on the other hand keeps evaporation losses low. The relative humidity recommended for this special purpose lies in the range of 70%.

Chambers for the maturation of raw hams or dry sausages of the salami type require controlled air humidity, starting from 90–95 percent and after a certain period finalizing the process at 70–75 percent relative humidity. This procedure is important for the balanced drying and ripening of the products. Suitable instruments (hygrometers) for the exact measurement of relative humidity are therefore needed.

iii. Water activity (a_w)

Water activity is the free water available for microbial growth in a food product. Free water is that part of the water content that can be eliminated from the product in the form of water vapour. Hence, the term “water activity” is defined as the ratio of the water vapour pressure measured in the product and the pressure of a saturated water vapour atmosphere at the same temperature. The minimum moisture content necessary for microbial growth varies with the single species of micro-organisms and can be expressed in terms of minimum water activity required.

The lowest a_w-values permitting growth of spoilage organisms are:

- Normal bacteria 0.91
- Normal yeasts 0.88
- Normal moulds 0.80
- Halophilic (nacl-tolerant) bacteria 0.77.

The keeping quality of dried meats and meat products without refrigeration depends on their water activity.

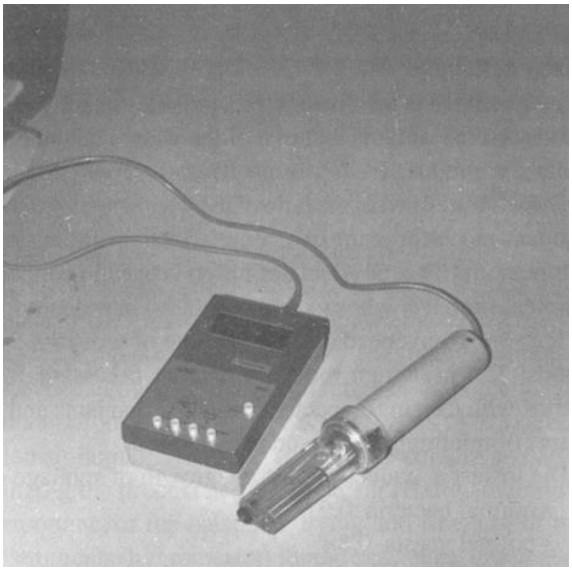

Figure 2.2 Electronic psychrometer (hygrometer) and sensor (right) for direct measurement of the relative air humidity.

Table 2.2 values of water activity (a_w) of different products

Product type	**water activity (a_w)**
fresh raw meat	0.99–0.98
cooked ham	0.98–0.96
frankfurter-type sausages	0.98–0.93
liver sausage	0.97–0.95
raw cured ham	0.96–0.80
dry sausage (salami type)	0.96–0.70
dry meat	0.75–0.50

A certain number of micro-organisms are inhibited at a_w 0.95, but other species are still able to grow. At a_w 0.92 all bacteria groups are inhibited, but the growth of moulds and yeasts is still possible.

Variations in the sensoric quality of meat

Large differences exist in the tenderness, juiciness and flavour of the various meat animal carcasses because of breeding, age, feeding and management. Within each animal carcasses and associated with the different muscles there are variations in tenderness that dictate how different cuts of meat should be prepared to yield the most palatable foods. Because of these differences in tenderness, juiciness and flavour, each

meat cut should be merchandised according to its availability and palatability characteristics.

Table 2.3 Comparative differences in various compositional aspects of market weight beef, pork and lamb

Market weight	Beef	Pork	Lamb
Average live animal weight (*kg*)	454–544	95–104	45
Age (*months*)	36	6	8–12
Dressing percentage (*carcass/live weight*)	60	70	50
Carcass weight (*kg*)	272–318	68–73	23
Carcass composition (%)			
Lean	52	50	55
Fat	32	32	28
Bone	16	18	17

Generally, meat animals should be maintained in an environment that permits optimum growth and development. Animals gaining weight rapidly are usually in good condition and the meat derived from their carcasses will be fatter, juicier and richer in flavour. Additionally, the amount of meat in proportion to hide, bone and offal will be greater.

The age to slaughter animals varies depending on many things. The highest quality beef comes from animals that are under 36 months of age. Old cows produce highly acceptable beef if properly fattened and processed. Depending on the calf and the feeding regime, calves are best slaughtered between three and 16 weeks of age. Hogs may be killed any time after they reach six weeks of age, but for the most profitable pork production may need to be fed for five to ten months. Sheep and goats may be killed any time after six weeks, but the more desirable age is from six to 12 months.

All meat animal carcasses are composed of muscle, fat, bone and connective tissue. The chief edible and nutritive portion is the muscle or lean meat. Almost always tissues from older animals are darker in colour.

Self-Check – 2	Written test

Name_____ ID _____ Date _____

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: choice the best answer (2points each)

1. Of the following one is not the parameter of meat evaluation in Organoleptic evaluation
   A. Appearance
   B. Age of animals
   C. Texture and consistency
   D. Smell and taste
2. One is no the criteria and methods of quality control meat evaluation
   A. Organoleptic evaluation
   B. Physical test methods
   C. Colour
   D. Microbiological examination

Test I: Short Answer Questions

1. Basic methods of meat and meat products specification on quality (6 points each)

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

1._____
2._____
3._____

LG #53	LO #3- Identified Critical limits, non-conforming and corrective actions

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Identifying critical safety hazard limits in meat processing
- Identifying non conformances in meat processing
- Identifying corrective actions in meat process non- conformance

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify critical safety hazard limits in meat processing
- Identify non conformances in meat processing
- Identify corrective actions in meat process non- conformance

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If your performance is satisfactory proceed to the next learning guide,

Information Sheet 1- Identifying critical safety hazard limits in meat processing

1.1. Applying HACCP in meat processing

In meat processing a high level of qualified potency must be created for the safety of the product produced by a processing system both by individual processors as well as processors operating under the system of control. Meat processing is generally a process step to prevent and reduce hazards to safe levels by applying HACCP.

The first step determines the kinds of hazards associated with the raw meat such as microbiological hazards, chemical hazards and physical hazards.

The main hazard associated with raw meat is microbiological and these are controlled both at the farm and abattoir level. The addition of curing salt and starter culture are also the critical control points.

It is essential that these ingredients should be of high quality in order to prevent the further contamination and should function correctly provide favorable condition for the growth of useful microorganisms used in fermented products.

The fermentation stage is another important CCP because of the rapid fall in the pH value which results the inhibition of the growth of most pathogenic microorganisms. The heating and drying stages may reduce the number of organisms and inhibit their growth

Table 3.1 List of hazard and its sources with possible prevention methods in meat industry

A. Health hazards:

Hazard	Source	Prevention
Metal fragments	Boneless meats; plant maintenance workers; thermometers;	Magnets; incoming inspection; proper use of staples; routine on-line checks for broken injector needles; evaluation of poultry hock lock usage; awareness by plant maintenance workers.

	pumping injectors; poultry hock locks.	
Wood splinters	Boxed beef; boxed pork; combo-bins.	Incoming inspection of boxes stacked on wooden pallets; review of bulk product handling practices.
Plastic fragments	Incoming raw materials; teflon equipment parts.	Incoming inspection; review of suppliers' practices; awareness by plant maintenance workers of excessive equipment wear.
Food-borne illness	Processed products	Increase awareness of processing practices related to the commonly implicated products.
Glass fragments	Products packed in glass containers; incoming raw materials.	Incoming inspection; evaluation of product connected with filler malfunction; awareness of glass fragments inside the cases with broken glass containers.
Accidental poisoning	Sodium nitrite	Knowledge of use; orderly storage area; denaturing pure substance; inventory.

B. Economic Hazards vs corona

Hazard	Source	Prevention
Giveaway	Retail packages	"Up-front" control of processing such as stuffing, filling, mixing, layering.
Poor quality	Raw materials	Evaluation of all suppliers' materials; develop specifications and suppliers manual.
Poor customer acceptance	Processed products	Canvass and follow up of customers' satisfaction.
Too much chicken	Chicken broth	Use "fill-in" weight with control charts for 80% boned chicken. Top with broth (cheaper ingredient) to reach the net weight label declaration.

C. Time hazards

Hazard	Source	Prevention
Loss of shelf-life; loss of freshness before expiration of pull date	Perishable processed products	Control of inventory (first in, first out); verification of packaging materials' integrity; program to educate the user; micro checks of food contact surfaces; evaluation of raw materials.
Fatting out	Cooked sausage	Prevent over chopping; control of raw materials' fat content prior to formulation.
Discoloration	Cured meats	Control of nitrites; rinse food-contact equipment to control hyprochlorite residues; reduce exposure to light.

D. Human hazards:

Hazard	Source	Prevention
Performance of a processing step out of sequence	Processed products	Provide product formulation recipes at processing site; verify correct batch make up; audit the daily batch make up sheets.
Failure to perform all of or part of a task	Processed products	Verify that key employees are amply trained; reduce physical stress.
Ingesta on poultry	Poultry deboning operation	Monitor person(s) who pull the crop on the slaughter floor (wash hands between birds); monitor growers to determine that feed has been withheld prior to slaughter; inspect upon receipt..
Employee sabotage	Processed products	Examine all customer complaints to determine if sabotage is a possible cause of user dissatisfaction; ascertain potential for the act.

E. Environmental hazards:

Hazard	Source	Prevention

Loose texture; poor bite resistance	Ground beef patties	Control temperature at time of forming.
Condensate	Processed products	Use micro monitoring rather than midshift cleanup.
Freezer burn	Frozen products	Proper application of skintight, moisture-proof packaging materials.
Inaccurate net weight	Retail packages	Provide level, vibration-free, clean weighing devices.

F. Fitness for use hazards:

Hazard	Source	Prevention
Bone chips	Sausage	On-line sampling by either visual detection methods or instrument detection.
Bacterial spoilage; off-flavor/odor; fat rancidity	Processed products	Control and verification of environmental conditions; inventory control (first in, first out).

G. Sliced packaged products:

Hazard	Source	Prevention
Fail label declaration of net weight	Unreliable weight control	Use control charts to plot on-line sampling results.
Fresh/frozen meats:		
Excess fat rancidity	Ground beef	Use rapid fat analyses for "up front' verification of raw materials and compliance with 30% fat limitation.
Convenience foods:		
Too little meat	Meat pies	Use control charts to plot on-line sampling results of plant's production history and determine whether noncompliance is due to low target weights, excess variability or other causes.

Other products:		
Poultry meat	Breaded poultry	Provide control charts for on-line control of breading with maximum 30% limitation.

1.2. Critical limits

All critical limits should be scientifically based and refer to factors such as: time/temperature conditions, moisture level, water activity (aw), pH, titratable acidity, salt concentration, available chlorine, preservatives, organoleptic or sensory quality.

The critical limits for the Critical Control Points include at least one of the following criteria:

- ✓ Temperature
- ✓ Time
- ✓ Tolerance for contamination (chemical or physical)
- ✓ Packaging
- ✓ PH
- ✓ Water activity.

Self-Check – 1	Written test

Name_____ ID_____ Date _____

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Choice the correct answer (2 points each)

1. Of the following one is the Health hazards in food industry:
   A. Metal fragments
   B. Wood splinters
   C. Food-borne illness
   D. Glass fragments
   E. All
2. Of the following one is the Environmental hazards in food industry
   A. Loose texture; poor bite resistance
   B. Condensate
   C. Freezer burn
   D. All

Test II: Give short answer (4 points each)

1. Write at least 2 hazard and its sources with possible prevention methods in meat industry

Note: **Satisfactory rating – 8 points** **Unsatisfactory - below 8 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

1._____
2._____
3._____
_____

Information Sheet 2- Identifying non conformances in meat processing

2.1. Non-conformances

All meat and meat products that do not meet food safety, quality or regulatory requirements should be adequately identified and stored to prevent accidental use. Thus non-conformance explained as follow:-

- Non-conforming Product is product that does not fulfill its specified requirements
- Non-conformances can occur in both product and process
- Non-conforming processes can lead to nonconforming product

There are many attributes that can define a non-conforming meat product. Depending on the type of meat business that you operate these can include:

- Meat product is contaminated with microbiological, chemical or physical hazards.
- Finished product weight issues (generally underweight product)
- Quality attributes do not meet the required finished product specification. For example what it looks like, how it tastes, what it smells like and how it feels.

2.2. Identifying non-conforming meat products

Controlling non-conforming food product is essential in any food business. Lack of control can lead to customer or consumer illness and injury and also impact the viability of the business. In practices non-conforming food product is clearly marked and / or stored within the non-conforming food product areas or designated quarantine areas.

C flow

Step 1: Access a copy of your non-conforming food product policy and procedures.

Step 2: Review the procedure to see if they cover the following information:

- What attributes makes a food product non-conforming?
- How will non-conforming product be identified?
- How will non-conforming product be stored?
- How will non-conforming product be disposed or destroyed?
- How is information regarding non-conforming food product captured, recorded and reported?
- Who is responsible for taking action around non-conforming food product?

Step 3: Physically inspect any non-conforming food product for adequate identification and storage.

Step 4: Take appropriate corrective action if your find inconsistences with your procedures or physical conformance.

2.3. Common non-conformances raised during an abattoir inspection include

- Insufficient detail in the Animal Welfare Policy with respect to emergency procedures. For example: action to be taken in event of fire, flood and escaped animal
- Pre-planned arrival system not implemented or not being effectively managed
- Staff training not documented; evidence of animal welfare training not available
- Stocking density information not available for a pens
- Monitoring of the effectiveness of stunning not recorded
- Calibration and maintenance records not available for stunning equipment
- Knife sterilizers not functioning correctly; temperature too low or boiling and producing excessive condensation
- Carcass contamination evident after the final inspection point
- Contact points between platforms and carcasses
- Critical control points identified on the HACCP plan but no record of monitoring available

Self-Check – 2	Written test

Name _____ ID _____ Date _____

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions (3 Points each)

1. Write at least 4 Common non-conformances raised during an abattoir inspection include
2. Define non- conformance in different ways in meat industry

Note: **Satisfactory rating – 6 points** **Unsatisfactory - below 6points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

1._____
_____

2._____
_____

Information Sheet 3- Identifying corrective actions in meat process non- conformance

3.1. Introduction to Corrective action

Corrective action is the activities taken to eliminate the cause of a process non conformity. Corrective action is the activity of reacting to a process problem, getting it under control through containment actions, and then taking action needed to stop it from happening again. Corrective action take steps to fix the cause of a problem after the problem has occurred, whereas preventive actions notice the problems before occurs and takes steps to fix the cause of the problem before it happens.

3.2. Components of Corrective Actions

There are two components of corrective actions:

- To correct and eliminate the cause of the deviation and restore process control and
- To identify the product those was produced during the process deviation and determine its disposition.

The Four Steps used in determining product disposition and developing a corrective action plan in meat and meat producing industry:

Step One: Determine if the product presents a safety hazard:

- Based on expert evaluation.
- Based on physical, chemical or microbiological testing.

Step Two: If no hazard exists based on the evaluations in Step 1, the product may be released.

Step Three: If a potential hazard exists (based on the evaluations in Step 1), determine if the product can be:

- Reworked/reprocessed.
- Diverted for a safe use.

Step Four: If potentially hazardous product cannot be handled as described in Step 3, the product must be destroyed. This is usually the most expensive option and is usually regarded as the last resort.

Example:

If deviation: Product (e.g., hot smoked fish) does not reach required internal temperature for the required time.

- Then corrective action: Recook or destroy product.

If deviation: Temperature of frozen meat drops below critical limit.

- Then corrective action: meat products should remove immediately until temperature recovers. Check the operation of the heating/cooling units to determine the reason for the temperature deviation that caused the temperature variation. Repair if necessary, re-establish control and resume production.

Steps to be followed when handling a nonconformance:

1. Document the nonconformance and give the nonconformance a unique number
2. Issue the documented nonconformance to relevant department
3. Department (responsible person) to investigate root cause
4. Implement corrective action
5. Verification of implemented corrective action
6. Close out the nonconformance and file

What ensures the nonconformance are rectified effectively?

Root cause analysis: Seeks to identify the origin of a problem and uses specific steps with associated tools to find the cause of the problem by:

- Determining what happened
- Determining why it happened
- Figure out what to do to reduce the likelihood that it will happen again
- Use tools such as 5 why's and Fishbone diagram to determine root cause

Corrective and preventive action

- **Preventive action:** - is an action taken to eliminate a potential non - conformance.
- **Corrective action: -** is an action taken to eliminate the cause of a non-conformance.

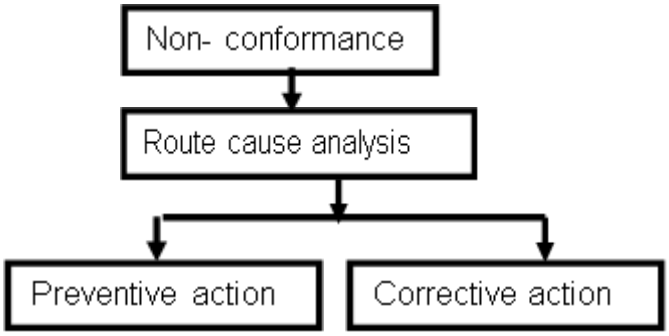

Figure 3.1 Non- conformance determination

The Fishbone Diagram is the tool used to identify the problems of nan- conformance. When using the tool, the first step is to clearly identify the problem or non-conformance e.g. the poor shelf life of a product. Supporting information should also be recorded as much as possible, including which products were affected, times and dates, quantities, trends and so on.

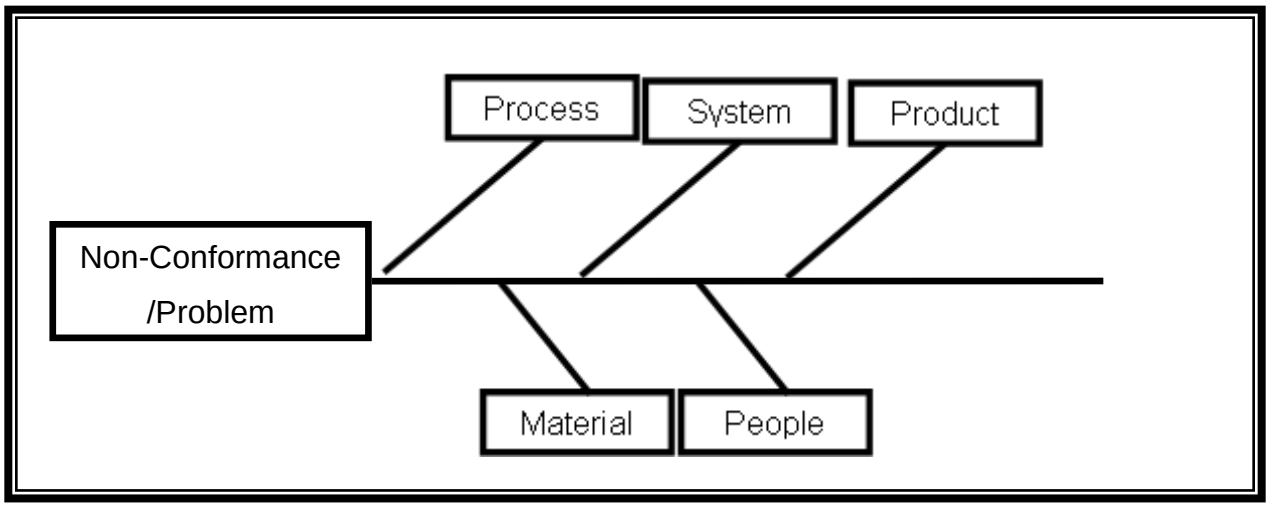

Figure 3.2 Fishbone Diagram to identify the problems

The next step is to identify the various factors that may contribute to the problem. In the case of a food manufacturing business these can include systems, equipment, materials, objective factors, human resources.

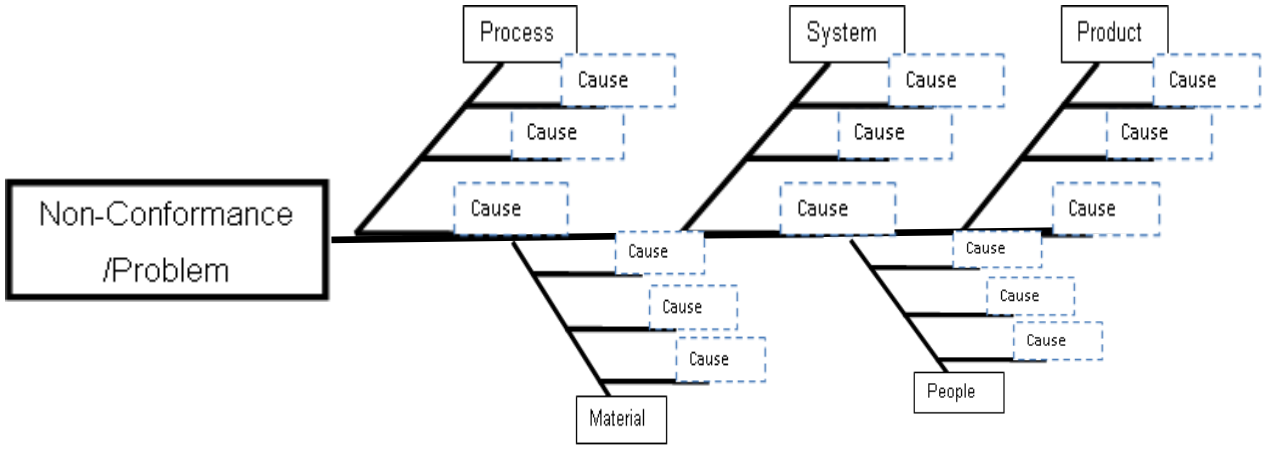

Figure 3.3 Factors causing non- Conformance

Self-Check – 3	Written test

Name _____ ID _____ Date _____

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: say true or false (2 points each)

1. Corrective action is the activities taken to eliminate the cause of a process non conformity.
2. It is not possible to identify the root cause of problems in any non- conforming in the meat industry as a whole.
3. Cause and effect diagram is the model helps to identify the major cause of problems and putting appropriate solution.

Test II: Give short answer (4 point each)

1. Explain the Steps to be followed when handling a nonconformance

Note: **Satisfactory rating – 10 points** **Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

1_____
2_____
3_____

LG #54	LO #4- Follow requirements of a HACCP based QA system

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Identifying and following work place requirements of the HACCP
- Communicating Non- conforming products to supervisor
- Explaining consequences in work place

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify and follow work place requirements of the HACCP
- Communicate Non- conforming products to supervisor
- Explain consequences in work place

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If your performance is satisfactory proceed to the next learning guide,

Information Sheet 1- Identifying and following work place requirements of the HACCP

1.1. Workplace Safety

The most important concept to remember is that you are responsible for your own safety and the safety of others. Most safety practices are common sense. Unfortunately, they can be forgotten or overlooked unless you make safe practices a habit or an instinct.

1.1.1. General Safety

By doing things right, you and your co-workers will commit yourselves to safety on the job and everyone will benefit. Accidents occur in many ways but most often can be traced back to one of two basic factors: ignorance or carelessness. You must always be concerned with your own safety and with the safety of others around you.

The following is a general list of safety precautions you must observe in any work area:

- Pay particular attention to moving objects, such as equipment, dollies, slaughters and packer's machines, and slicers.
- Walk; do not run, in the work areas.
- Stay completely alert on the job.
- Avoid back strain by lifting properly.

Rechecked

Perform sanitation standard operating procedures (SSOPs)

- Development of a written SSOP programme by the establishment that describes the procedures involved and the frequency of application in the work area.
- Identification of establishment personnel responsible for implementing and monitoring ssops;
- Documentation of monitoring and any corrective and/or preventative actions taken, which is made available to the competent authority for purposes of verification;
- Corrective actions that include appropriate disposition of product; and

- Periodic evaluation of the effectiveness of the system by the establishment operator

Different industry standard and HACCP can be used in meat industry

Figure 4.1 some guide lines in work area

Self-Check – 1	Written test

Name_____ ID_____ Date_____

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions (2 points each)

1. Define work place safety?
2. Elaborate some signs in meat industry

Note: **Satisfactory rating - 4 points** **Unsatisfactory - below 4 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

1._____

_____

2._____

_____

Information Sheet 2- Communicating Non- conforming products to supervisor

There are two situations in which a non-conformance can be detected. These are general categorized as internal with in an industry and external by our customers. The first is in the internal framework of the meat industry. To make it simple, the meat industry detects the anomaly itself by means of checks carried out during the various stages, from the design to the preparation of the delivery which is obviously passing through the manufacturing. Here, finding a non-conformance is not good news, but it shows that the controls are properly doing their job.

But what is even more annoying is when; the non-conformance is detected externally, once the product is in the hands of the customer, because it significantly affects his perception of the quality of this product that the company produces. This is the best way to lose business opportunities for the benefit of competition.

2.1. React as quickly and efficiently as possible to maintain and improve quality

It is extremely important to create processes in order to prevent, detect and correct non-conformances as early as effective. This implies a real collaboration between the actors that are concerned and the production chain progress needs to be carefully checked.

The ISO standard meat industry provides the necessary clues provides that "depending on the nature of the non-conformance, the organization must take appropriate corrective action" and also that "where non-conformance occurs, including those related to complaints, the organization must react to control and correct the consequences of assessing whether it is necessary to take action to eliminate the cause or causes".

The main meat processing incident management supports are the **non-conformance sheets**, on which the identified anomalies are described in detail: nature of the non-conformance, Concerned persons, stage of the process in which it occurred, the time, the place, the causes and their analysis, as well as the solutions proposed in order to

prevent it from happening again. These documents also include information regarding the establishment and monitoring of the corrective action, as well as the verification of its effectiveness.

By carefully recording these elements, you maximize your chances to prevent other non-conformances, in particular by having always **up-to-date working instructions** (modified by taking into account of detected and corrected anomalies).

Some ways to provide information to staff about products and non-conformity in processing of meat products include

- ✓ Induction training
- ✓ On-the-job training
- ✓ Other training sessions
- ✓ Briefings and staff meetings
- ✓ Noticeboards
- ✓ Staff intranet
- ✓ Memos, e-mail and sms
- ✓ Minutes of food safety team meetings
- ✓ Work instructions.

External non-conformance detection

Virtually everyone working in the meat industry who deals with customers will have to deal with complaints at some point in their career. Whether you work behind a counter, wait on tables, cook the food, or manage a large establishment, the occasional customer complaint is bound to arise. Whether it's something as simple as getting the wrong drink at a fast food restaurant or a service complaint at a high-end gourmet restaurant, how you handle the complaint makes all the difference.

- ✓ Listen to the customer's concern, be sympathetic and do whatever you can to fix the problem immediately.
- ✓ Train your employees to not assign blame or make excuses, but to just be responsive to the customer.

- ✓ Take advantage of the experience to make improvements to your products or service as necessary.

Give the Customer Your Full Attention

Focus your complete attention on unhappy customers and allow them to express complaints without interruption. Listen fully to what he or she is saying. Be empathetic, the faces you make and your body language communicate as much, if not more, than the words you choose. If the situation is complex, jot down notes so they'll know you're taking them seriously and that they are being heard.

Offer a Sincere Apology

Apologize to the customer for the problem, empathize with his situation and assure him you will act immediately to address his complaint. This is not the time to worry about that is to blame or to make excuses. Remain calm and try to keep the situation from escalating. Thank the customer for pointing out the problem.

Find the Best Remedy

Ask the customer what you can do to resolve the problem and offer any remediation within your authorization. Customers may feel better talking to someone "in charge" when they have a complaint and often provide more insight into their problem when they do.

Take Preventative Measures

Learn from the situation. Customer complaints often identify specific service or process issues that need improvement. Implement changes as appropriate to prevent problem situations from recurring. Be sure all employees are trained and aware of how to handle customer complaints, what types of things they are empowered to do themselves to address them and when they should request a manager's involvement.

Customer Complaint Program

- ✓ Customers want their complaints to be easy to report, acknowledged, and dealt with quickly, fairly and sensitively.
- ✓ A written complaint handling policy is a good way to ensure that complaints are taken seriously, and dealt with appropriately and consistently. It also helps to support your staff, so be sure they understand your policy and program.

Developing a Customer Complaint Program.

- ✓ Make it easy for all customers to complain (i.e. company phone number on the label, etc.)
- ✓ Decide which staffs have the authority to resolve a complaint, and make sure they know what to do. The more a complaint is escalated to someone higher in the business, the more dissatisfied the customer may become.
- ✓ Set a time frame to respond to a complaint. Taking too long makes the problem worse.
- ✓ Give one person responsibility for managing the complaint from beginning to end, so the customer does not have to repeat their complaint to different staff. state who is responsible for taking, recording / logging, resolving, analyzing and reporting on complaints
- ✓ Ensure staff knows the complaint policy and how to treat complaints fairly. Poor complaint handling, for example blaming the customer for the problem, or marginalizing them by saying “no one else has complained”, will only worsen the problem.
- ✓ If the complaint involves an injury or illness, direct the complaint to your liability insurance company. The liability insurance company will totally handle the complaint with the claimant. Company involvement with claimant will stop. Document all communications with the liability insurance company.
- ✓ Review your policy regularly, and make changes as necessary.

Table 4.1 Example of customers complain form

Customer:	
Address:	
Phone Home: Work:	Email:

Date Complaint received: ___ / ___ / 20___			
Person receiving the complaint:			
How was the complaint received?	Phone	In person	In writing
Describe the product:			
Describe the problem/complaint:			
What does the customer want done?			
What is the business policy for this complaint?			
What is the agreed solution?			
Action required:			
Date action completed:			
Record of action taken:			
Date complaint resolved: Signature:			

Self-Check – 2	Written test

Name_____ ID_____ Date_____

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions (4 points each)

1. Explain the two major ways in which non- conformance can be detected.
2. Explain the ways of external non -conformance detection
3. Develop the complaint format for meat industry

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

1._____

_____

2._____

_____

3._____

_____

Information Sheet 3- Explaining consequences in work place

3. Introduction work place consequences

Every day, food companies collect data on non-conformances within their operations but this valuable information can often be lost in meat and meat producing industry and poorly designed systems that have been devised for analyzing the data. The variation in how companies manage non-conformances in their food safety system is vast, and the design of these systems can either support or hinder the effectiveness of the continuous improvement policy.

Good design and management of non-conformance data and specifically non-conformance categories is crucial to making improvement a real part of the company's activities and not just a documented policy. Non-conformance relates to a failure to comply with requirements. A requirement is a need, expectation, or obligation. It can be stated or implied by an organization, its customers, or other interested parties.

There are many types of requirements. Some of these include:-

- Meat safety requirements
- Quality requirements
- Process requirements
- Product requirements
- Customer requirements
- Management systems requirements, and
- Legal requirements

Whenever your organization fails to meet one of these requirements, nonconformity occurs.

Non-conformances identification

Within a typical food safety management system non-conformances are identified through a number of channels. These include customer complaints, internal audits, product recalls / withdrawals, external audits, regulatory notifications, incoming as well as in-process and final product inspection, testing and casual observation.

Why record non-conformances?

There are two reasons why a food business will record non-conformances.

• **Compliance Requirements**:-to meet the specific requirements of a customer, standard or regulatory obligation.

• **Process Improvement**:-recording non-conformance data can facilitate analysis leading to incremental and continuous improvement in business and operational processes.

Receiving Procedures in work place

Here are several steps to ensure that meat products are handled in a timely and safe manner once they arrive:

- Check to see that the order matches the invoice (number of boxes, etc., and list of product names; have driver and receiver sign off).
- Ensure all packages are still sealed and not damaged.
- Check the temperature of the delivery truck storage area (was it cold on arrival?).
- Sort and move all the meat products immediately to their correct storage coolers.
- Ensure fish, meats, and poultry are kept as far apart as possible and fish containers are kept sealed until ready to use.
- Check cooler temperatures daily and record data according to health department regulations.
- Ensure cooler and freezer doors are kept closed at all times.
- Immediately report any unusual temperature fluctuations to your employer.

Self-Check – 3	Written test

Name_____ ID_____ Date_____

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions (2 points)

1. Of the following one is not the results to nonconformity when it did not failed
   A. Meat safety requirements
   B. Quality requirements
   C. Process requirements & Product requirements
   D. All
   E. None

Test II: Explain the following (4 points)

1. Define non-conformance and requirement results for non-conformance in meat sector.

Note: **Satisfactory rating – 6 points** **Unsatisfactory - below 6 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

1._____

2._____

_____

LG #55	LO #5- Identify quality control practices in a HACCP-based QA system Explaining

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Identifying Measures for monitoring quality control
- Identifying Inspection and re-inspection procedures

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify Measures for monitoring quality control
- Identify Inspection and re-inspection procedures

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets
7. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
8. If your performance is satisfactory proceed to the next learning guide,
9. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information Sheet 1- Identifying Measures for monitoring quality control

1.2. Introduction to Quality Control

Quality as a necessary condition and relationship between suppliers or companies delivering products dedicated to the satisfaction and expectations of the customers or consumers.

The quality concept is focused on technological attributes and factors that can contribute to product quality performance. They are represented as a Quality triangle. A product has physical features that are turned into quality attributes by the perception of a consumer. With respect to agrifood products, quality perception appeared to be affected by different types of attributes. Relevant attributes for consumers involve safety, nutritional value (health aspect), sensory properties (like taste, flavour, texture, and appearance), shelf life, convenience (e.g. ready-to-eat meal) and product reliability (correct weight, right composition etc.). These attributes can be defined as intrinsic attributes and are directly related to the physical product properties.

1.3. Monitoring critical control points

Monitoring of critical control points is essential to ensure that the specified criteria are being met. Meat and meat products can be monitored in many ways depending on the type of control point and the instruments and equipment available.

Monitoring should aim to detect any deviation from the established criteria. It usually depends on observations, or physical or chemical measurements (e.g., temperature, pH, concentration of fat). Results should be obtainable immediately so that the process can be quickly adjusted if necessary.

1.4. Meat Quality Testing

Meat quality is normally defined by the compositional quality (lean to fat ratio) and the palatability factors such as visual appearance, smell, firmness, juiciness, tenderness, and flavor. The nutritional quality of meat is objective yet “eating” quality, as perceived by the consumer, is highly subjective.

Why quality testing of meat is important?

1. To improve the quality of product
2. Market shift from Quantity Oriented to Quality Oriented
3. Consumer consciousness about health
4. Safety of meat
5. competitiveness of food production more dependent on the reliability of the safety and the quality of the food
6. Acceptability of the production procedures than on quantity and price.

Methods:

- Sensory evaluation
- Physical testing
- Chemical testing
- Microbiological testing

Sensory Evaluation

It makes use of the senses to evaluate the general acceptability and quality attributes of the products.

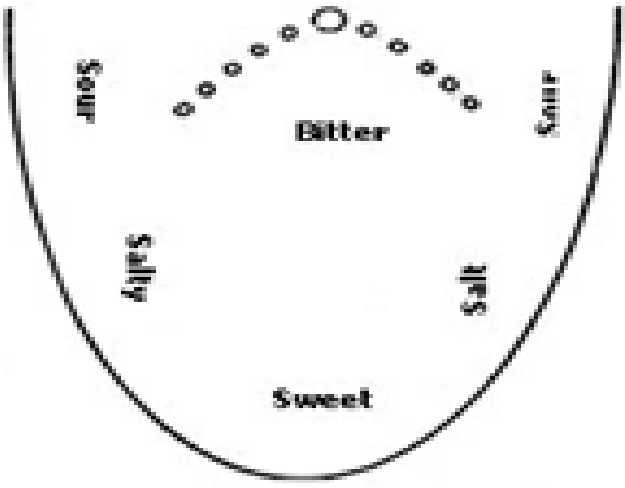

Figure 4.1 Areas of the tongue where taste buds and reception areas for different tastes are located

- ✓ Sense of sight is used to evaluate the general appearance of the product such as color, size, shape etc.
- ✓ Sense of smell for the odor
- ✓ Sense of taste for the flavor which includes the four basic tastes sour, sweet, bitter and salty
- ✓ Sense of touch for the texture either by mouth feel or finger feel
- ✓ In the simplest way of sensory testing it is useful to have an appropriate testing room available with lights, temperature and seating arrangements with individual testing compartments so as not to distract the members of the panel.
- ✓ Panel is composed of ten well trained panelists.

Common test methods used in sensory evaluation are

1. **Paired comparison test** for simple difference where two coded samples are presented to the panelists for evaluation on simple difference.

- **Color of meat**

"Fresh" color **– red for beef, veal for lamb products, pink for pork, and varying colors for chicken**. Before the meat product reaches consumers, meat and poultry processors use color to monitor processing and ensure the quality and freshness of the meat

- **Smell**

Another quality factor is smell. The product should have a normal smell. This will be different for each of the species (i.e. beef, pork, chicken), but should vary only slightly within the species. **Any rancid or strange smelling meat should be avoided.**

- **Firmness**

Meat should appear firm rather than soft. When handling the retail package, it should be firm, but not tough. It should give under pressure, but not actually be soft.

- **Juiciness**

Juiciness depends on the amount of water retained in a cooked meat product. Juiciness increases flavour, helps soften meat making it easier to chew, and stimulates saliva

production in the mouth. Water retention and lipid content determine juiciness. Marbling and fat around edges helps hold in water. Water losses are from evaporation and drip losses. Meat aging can increase water retention and therefore increases juiciness.

- **Tenderness**

Has been linked to several factors, such as the animal's age, sex or the muscle location. One important way to tenderize meat is by aging. Carcasses are aged by holding them at refrigeration temperatures for extended periods of time after slaughter and initial chilling.

- **Flavor**

Flavour and aroma are intertwined to create the sensation the consumer has during eating. These perceptions rely on the smell through the nose and on the sensations of salty, sweet, sour and bitter on the tongue. Meat flavor is affected by type of species, diet, cooking method and method of preservation (e.g. smoked or cured)

Physical Test Methods:

- ✓ Temperature,
- ✓ Acidity (pH)
- ✓ Water activity (a_w)
- ✓ Water binding capacity
- ✓ Light intensity
- ✓ Texture. All routine physical testing can be carried out with portable instruments.

Temperature:

Important temperature control points are:

- ✓ Refrigerated rooms (freezer -18°C to -30°C, chiller 0 to +7°C)
- ✓ Chilled meat (+4 to +7°C)
- ✓ Cutting rooms (+10 to +15°C)
- ✓ Water temperature in cooking vats (+75 to +78°C)
- ✓ Core temperature in meat products upon cooking/pasteurization (approx. +68/72°C)
- ✓ Sterilization temperature in autoclaves (above +100°C)

Electronic Thermometer:

Based on the thermo-electrical effect, the two metals are exposed to different temperatures. On one welding point reference temperature is taken. The other welding point is exposed to the temperature to be measured. We take temperature reading on the instrument.

Figure 4.2 *PH* Measurement

Why pH measurement is important?

PH measurement is useful in meat quality test for:

- ✓ Evaluation of meat quality for further processing, in particular the water binding capacity
- ✓ Control of ripening of raw fermented products, which is connected with drop in pH
- ✓ Control of acidity of ingredients such as brines, marinades etc.

Table 4.1 Typical pH values for meat and meat products are:

Product	**pH value (range)**
Meat mixes in jelly + vinegar added	4.5 to 5.2
Raw fermented sausage	4.8 to 6.0
Beef	5.4 to 6.0

Pork	5.5 to 6.2
Canned meats	5.8 to 6.2
Curing brines	6.2 to 6.4
Blood sausages	6.5 to 6.8
Muscle tissues, immediately after slaughter	7.0 to 7.2
Blood	7.3 to 7.6

Relative Humidity:

It is measured by Hygrometer. Hygrometers measure the relative humidity and are used in production and storage rooms of the meat industry. Recommended values for the relative humidity are:

Table 4.2 Water Activity Measurement

Meat boning and cutting rooms	45% to 60%
Meat packaging rooms	45% to 60%
Chilling rooms	85% to 95%
Storage / ripening rooms for meat	70% to 85%
Ripening rooms for raw fermented ham and sausages	80% to 95% (depending on the stage of ripening)

Water Activity Measurement

The amount of free water available for the growth of microorganisms. Bacteria usually require at least a_w 0.91 and fungi at least a_w 0.71.

Importance:

To check the stability of dry fermented products during their ripening to find out at which point the products remain stable at ambient temperature. Meat preservation for dried products (dried meat, meat floss etc.)

A_w – meter:

Through evaporation an equilibrium of humidity in the small airspace above the product and the humidity of the sample is build-up and this is directly measured by means of a hygrometer built into the lid of the instrument .Pure water a_w-value of 1.

Table 4.3 Typical a_w in meat products (left) and limiting a_w for the growth of microorganisms (right).

Product	**a_w range**	**Microorganisms**	**a_w**	
Fresh meat	0.99 (0.99 to 0.98)	Pseudomonas	0.93	Most bacteria between a_w 0.91 – 0.96
Cooked ham	0.97 (0.98 to 0.96)	E. coli	0.93	
Raw-cooked sausages	0.97 (0.98 to 0.93)	Salmonella species	0.91-0.95	
Liver sausages	0.96 (0.97 to 0.95)	Listeria	0.93	
Blood sausages	0.96 (0.97 to 0.86)	Cl. botulinum types	0.91-0.95	
Raw-fermented ham	0.92 (0.96 to 0.80)	Cl. perfringens	0.93-0.95	
Raw-fermented sausages	0.91 (0.96 to 0.70)	Bacillus species	0.90-0.95	
Dried meat	0.70 (0.90 to 0.60)	Lactobacillus	0.90	
		Staph. aureus	0.86-0.90	
		Most yeasts	0.87-0.90	
		Most moulds	0.80-0.85	

Water holding capacity (WHC):

- ✓ Role in meat processing.
- ✓ Low WHC results in separation of jelly and/or fat during heat treatment

✓

Self-Check – 1	Written test

Name_____ ID_____ Date _____

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: choose the correct answer (2 point each)

1. Of the following one is important in quality testing
   A. To improve the quality of product
   B. Market shift from Quantity Oriented to Quality Oriented
   C. Consumer consciousness about health
   D. Safety of meat
   E. All

Test II: Give short answer (4 point each)

1. Explain the Common test methods used in sensory evaluation in meat products

Note: **Satisfactory rating – 6 points** **Unsatisfactory - below 6 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

1_____

2_____

2.1. Meat Inspection

Meat inspection is mandatory and has the mission of assuring wholesomeness, safety, and accurate labeling of the meat supply. Although inspection procedures vary from country to country, they are centered around the same basic principles and may be performed by government officials, veterinarians, or plant personnel. For example, in the United States meat inspection is administered through the Food Safety and Inspection Service of the United States Department of Agriculture (USDA-FSIS) and is composed of several distinct programs. In general, these programs are representative of the basic inspection procedures used throughout the world and include ante mortem inspection, postmortem inspection, re-inspection during processing, sanitation, facilities and equipment, labels and standards, compliance, pathology and epidemiology, residue monitoring and evaluation, federal-state relations, and foreign programs.

Ante-mortem and postmortem inspection

Ante-mortem Inspection

Major objectives of ante-mortem inspection

- ✓ To screen all animals destined to slaughter.
- ✓ To ensure that animals are properly rested and that proper clinical information, which will assist in the disease diagnosis and judgments, is obtained.
- ✓ To reduce contamination on the killing floor by separating the dirty animals and condemning the diseased animals if required by regulation.
- ✓ To ensure that injured animals or those with pain and suffering receive emergency slaughter and that animals are treated humanely.
- ✓ To identify reportable animal diseases to prevent killing floor contamination.
- ✓ To identify sick animals and those treated with antibiotics, chemotherapeutic agents, insecticides and pesticides.
- ✓ To require and ensure the cleaning and disinfection of trucks used to transport livestock.

Both sides of an animal should be examined at rest and in motion. Ante-mortem examination should be done within 24 hours of slaughter and repeated if slaughter has been delayed over a day.

Spread hogs and animals affected with extensive bruising or fractures require emergency slaughter. Animals showing clinical signs of disease should be held for veterinary examination and judgment. They are treated as “suspects” and should be segregated from the healthy animals. The disease and management history should be recorded and reported on an A/M inspection card. Other information should include:

1. Owner's name
2. The number of animals in the lot and arrival time
3. Species and sex of the animal
4. The time and date of ante-mortem inspection
5. Clinical signs and body temperature if relevant
6. Reason why the animal was held
7. Signature of inspector

Ante-mortem inspection should be carried out in adequate lighting where the animals can be observed both collectively and individually at rest and motion. The general behavior of animals should be observed, as well as their nutritional status, cleanliness, signs of diseases and abnormalities. Some of the abnormalities which are checked on ante-mortem examination include:

1. Abnormalities in respiration
2. Abnormalities in behavior
3. Abnormalities in gait
4. Abnormalities in posture
5. Abnormalities in structure and conformation
6. Abnormal discharges or protrusions from body openings
7. Abnormal colour
8. Abnormal odour

- ✓ Abnormalities in respiration commonly refer to frequency of respiration. If the breathing pattern is different from normal the animal should be segregated as a suspect.

- ✓ Abnormalities in behavior are manifested by one or more of the following signs:

The animal may be:

a. Walking in circles or show an abnormal gait or posture
b. Pushing its head against a wall
c. Charging at various objects and acting aggressively
d. Showing a dull and anxious expression in the eyes

- ✓ An abnormal gait in an animal is associated with pain in the legs, chest or abdomen or is an indication of nervous disease.
- ✓ Abnormal posture in an animal is observed as tucked up abdomen or the animal may stand with an extended head and stretched out feet. The animal may also be laying and have its head turned along its side. When it is unable to rise, it is often called a “downer”. Downer animals should be handled with caution in order to prevent further suffering.

Abnormalities in structure (conformation) are manifested by:

a. Swellings (abscesses) seen commonly in swine
b. Enlarged joints
c. Umbilical swelling (hernia or omphalophlebitis)
d. Enlarged sensitive udder indicative of mastitis
e. Enlarged jaw (“lumpy jaw”)
f. Bloated abdomen

Some examples of abnormal discharges or protrusions from the body are:

a. Discharges from the nose, excessive saliva from the mouth, afterbirth
b. Protruding from the vulva, intestine
c. Protruding from the rectum (prolapsed rectum) or uterus
d. Protruding from the vagina (prolapsed uterus)
e. Growths on the eye and bloody diarrhea

Postmortem inspection

Routine postmortem examination of a carcass should be carried out as soon as possible after the completion of dressing in order to detect any abnormalities so that

products only conditionally fit for human consumption are not passed as food. All organs and carcass portions should be kept together and correlated for inspection before they are removed from the slaughter floor.

Postmortem inspection should provide necessary information for the scientific evaluation of pathological lesions pertinent to the wholesomeness of meat. Professional and technical knowledge must be fully utilized by:

1. Viewing, incision, palpation and olfaction techniques.
2. Classifying the lesions into one of two major categories - acute or chronic.
3. Establishing whether the condition is localized or generalized, and the extent of systemic changes in other organs or tissues.
4. Determing the significance of primary and systemic pathological lesions and their relevance to major organs and systems, particularly the liver, kidneys, heart, spleen and lymphatic system.
5. Coordinating all the components of ante-mortem and postmortem findings to make a final diagnosis.
6. Submitting the samples to the laboratory for diagnostic support, if abattoir has holding and refrigeration facilities for carcasses under detention.

Carcass judgment

Trimming or condemnation may involve:

1. Any portion of a carcass or a carcass that is abnormal or diseased.
2. Any portion of a carcass or a carcass affected with a condition that may present a hazard to human health.
3. Any portion of a carcass or a carcass that may be repulsive to the consumer.

Re-inspection during processing

Although previously inspected meat is used in the preparation of processed meat products, additional ingredients are added to processed meats. Re-inspection during processing assures that only wholesome and safe ingredients are used in the manufacture of processed meat products (e.g., sausage and ham).

Self-Check – 2	Written test

Name_____ ID _____ Date _____

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Choice the best answer (2 points each)

1. Abnormalities which are checked on ante-mortem examination include all except:
   A. Abnormalities in respiration
   B. Abnormalities in behavior
   C. Abnormalities in gait
   D. Abnormalities in posture
   E. None
2. All of the followings are abnormalities in structure (conformation) during inspection
   A. Swellings (abscesses)
   B. Enlarged joints
   C. Umbilical swelling
   D. Bloated abdomen
   E. All

Test II: Short Answer Questions (4 points)

1. Explain the major objectives of ante-mortem inspection

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

LG #56	LO #6- Inspect own work

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Carrying out Inspection of own work
- Taking corrective action in the work place

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Carry out Inspection of own work
- Take corrective action in the work place

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets
7. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
8. If your performance is satisfactory proceed to the next learning guide,
9. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information Sheet 1- Carrying out Inspection of own work

1.1.Workplace inspections

Workplace inspections are an important prevention tool that can prevent injuries and illnesses and ensure that your health and safety program is working. The goal is to find any unsafe acts or conditions and implement necessary controls.

The workplace can be divided into sections, each with its own inspection person or team. Inspections may also be scheduled daily, weekly, monthly or annually or at other frequencies depending on the nature of the issue, requirements of legislation and the regulations (for example, a lift truck must be inspected daily), or as recommended by equipment manufacturers. You can also use your hazard identification system and incident history to help identify areas that may require more frequent inspections.

There are four main types of inspections:

- **Formal (Planned**) - normally done by using a written checklist and carried out by a team at regular intervals.
- **Informal (On the spot)** - done by management, supervisors and JHSC or H&S representatives by observing the area for unsafe acts and conditions, and noting the issues in the daily log or by completing a simple form.
- **Specialized inspections** - conducted by specialists (for example on boilers, electrical equipment, mechanical or ventilation systems).
- **Regulatory -** normally consists of inspections required by the OHS regulations. Examples include inspection of fall protection equipment

An inspection team should include both employee and employer representatives. They should be familiar with the work process and, whenever possible, include members of H&S representative.

Formal or planned inspections should be done using a formal checklist, tailored to the workplace's needs. Items on the checklist should not be considered permanent as incidents, changes in process, and near misses may result in new items being added to the checklist. A sample checklist is provided as an example.

Identified hazards must be classified, using a hazard classification system; this will ensure that hazards are addressed by rankings. An example is provided at the end of the sample checklist.

Employer, in meat industry must:

- Include the procedures and schedules for inspections in the hazard identification system when a health and safety program is required in the workplace.
- Ensure that the place of employment is inspected at least monthly to identify any risks to employee health and safety.
- Develop a program for the inspection with the H&S representative and share the results of each inspection with the H&S representative.
- Train employees to regularly inspect their machinery, tools, and equipment in the meat industry.
- Ensure that inspection results are recorded and significant findings are acted on.

The steps to follow for a successful inspection include: meat inspection procedures

1. Planning your route and any primary concerns to be observed.
2. Observing tasks being done.
3. Asking questions, making notes.
4. Examining equipment, checking maintenance records.
5. Checking that the work area is tidy and those tools have a storage place.
6. Looking for what might not be obvious such as fire doors not opening outward or being blocked.
7. Establishing clear procedures that identify when and how often to conduct each inspection. Some tasks may require daily or start-of-shift inspections. Record who will do them and who will follow up.
8. While the workplace requires monthly inspections, more frequent inspections may be required and a schedule should be established based on the frequency of work, degree of hazard, and a history of incidents or near misses.
9. Keeping records of all inspections, findings, recommendations and follow-up.
10. Ensuring the H&S representative sees the reports and follow-up.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Choice the best answer (2 points)

1. Of the following one is not the main types of inspections in meat industry

   A. Formal (Planned)
   B. Informal (On the spot)
   C. Specialized inspections
   D. Regulatory
   E. None

Test II: Short Answer Questions (5 points)

1. Explain the steps to be followed for a successful inspection include

Note: **Satisfactory rating - 7 points** **Unsatisfactory - below 7 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

1._____

2._____

Information Sheet 2- Taking corrective action in the work place

2.1. Taking corrective action

Well written procedure for the management of corrective actions. In monitoring indicates that a process is out of control, or that established criteria are not being met, immediate action must be taken. The specific action will depend on the process being monitored and may include reheating or reprocessing, increasing temperature, decreasing Aw decreasing pH, extending the processing time, adjusting the concentration of certain ingredients, adjusting the processing at a later stage, rejecting incoming lots, diverting the product to use as animal feed, or discarding the product. The decision will be based on the hazards, their severity, and the risks involved and on the expected use of the product.

In meat and meat producing industry the non-conformance happened can managed and improved based on the potential capacity of the company and the company may re-correct the error in production.

Table 6.1 Types of non-conformance

High Level Category	Sources and examples of non-conformance
Product Non-conformances	These non-conformances may come from: • Customer complaints • Product non-conformances arising from operations, production, processing and handling • Other third party sources **Category Management:** Identify the general categories relating to product issues and then identify the necessary sub categories. For example, you may have many potential foreign body contamination issues. Then each specific foreign body can be classified as a sub category: • Foreign Body: Glass • Foreign Body: Plastic • Foreign Body: dust and other dung contaminants

	• Foreign Body: Metal **Similarly for labelling issues***:* • Label: No label • Label: Wrong label • Label: Label damaged • Label: No date code The above approach allows you to get the 'big picture' while retaining the detail that may be required later for analysis.
Process Non-conformance	Can arising from operations, processing, equipment and handling. They differ from most other non-conformance types in that they may not relate directly to the Effect displayed, e.g. 'temperature storage and chilling/ freezing below limit'. While the temperature limit failure is considered a non-conformance, its full effect may be 'short shelf life' in the product. **Category Management:** Example, you could focus on a heat treatment step and develop a clear list of non-conformances: • Heat Treatment: Low temperature • Heat Treatment: Over temperature • Heat Treatment: Divert alarm fail • Heat Treatment: Integrity check fail
System Non-conformance	These non-conformances relate usually to those detects arising from internal audits of processes and systems. The internal audit system will identify failings which in turn will generate corrective actions. At this point the non-conformance will be categorized for more effective analysis, trending and reporting. **Category Management:** Ask your company about: "We conduct all these audits during the year; how do I want to see the non-conformances summary report to identify emerging or trending issues and ensure we are always compliant with the standards."

	Developing this out you may have the following: • HACCP: Team member not trained • HACCP: Corrective action not defined for CCP • HACCP: Flow diagram not correct • HACCP: Flow diagram not verified
Material Non-conformances	Non-conformances of materials and ingredients, as well as non-conformances regarding the quality of service from specific suppliers such as packing material providers. Similarly if issues such as foreign matter contamination are detected in the material during utilization, these could be a cause for logging a material non-conformance. **Category Management:** These can be organized by material type, risk, supplier etc.
Supplier Non-conformances	Supplier non-conformances relate specifically to Supplier issues outside the specific materials or service they supply. This could be in regard to other aspects of the service, price, documentation and general performance.
People Non-conformances	These are specific non-conformances relating to human resource inputs into the process and operation. Non-conformance may arise from training events, supervision, poor personal hygiene, record keeping etc.

Self-Check – 2	Written test

Name…… ID……. Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: say true or false for the following questions (2 points)

1. In monitoring indicates that a process is out of control, or that established criteria are not being met, immediate action must be taken.

Test II: Give short answers (4 points)

1. Explain the non- conformance, their sources and their examples

Note: **Satisfactory rating – 6 points** **Unsatisfactory - below 6 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Operation title: Post mortem inspection

Purpose	**To acquire the trainees with meat and meat products quality determination**
Equipment ,tools and materials	Supplies and equipment needed or useful for meat quality determination include these: • Refrigerated rooms • Chilled meat • Canned meats • Fresh meat
Conditions or situations for the operations	• All tools, equipment's and materials should be available on time when required. • Appropriate table, working area/ workshop to undertake laboratory analysis.
Procedures	1. Viewing, incision, palpation and olfaction techniques. 2. Classifying the lesions into one of two major categories - acute or chronic. 3. Establishing whether the condition is localized or generalized, and the extent of systemic changes in other organs or tissues. 4. Determing the significance of primary and systemic pathological lesions and their relevance to major organs and systems, particularly the liver, kidneys, heart, spleen and lymphatic system. 5. Coordinating all the components of ante-mortem and postmortem findings to make a final diagnosis. 6. Submitting the samples to the laboratory for diagnostic support, if abattoir has holding and refrigeration facilities for carcasses under detention.
Precautions	• Care should be taken while undertaking post mortem inspection • Preparing materials, tools and equipment used for post mortem inspection
Quality criteria	• Did personal protective equipment worn while fitting and adjusting post mortem inspection

	• Did trainees prepare the them material to make proper post mortem inspection and identity any defects results for meat rejection • Use the guide to rejects the meat with quality defects

Post mortem inspection of meat

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions:

1. You are required to perform any of the following:
   1. Perform post mortem inspection of meat
   2. Request your teacher for evaluation and feedback

Operation title: Meat Quality Determination

Purpose	**To acquire the trainees with meat and meat products quality determination**
Equipment ,tools and materials	Supplies and equipment needed or useful for meat quality determination include these: • Fresh meat • Full equipped laboratory • Microscope and slide
Conditions or situations for the operations	• All tools, equipment's and materials should be available on time when required. • Appropriate table, working area/ workshop to undertake laboratory analysis.
Procedures	1. Prepare a sample of minced meat and pH Meter 2. Take a small sample of meat is sliced off and minced 3. Place the minced meat on the flat sensor of pocket pH Meter 4. Repeat sampling, by washing with diluted soap water and pat dry with a paper tissue 5. Place new meat sample on the senor and repeat testing process. 6. Check the PH value, Fresh meat must have a pH value in the range of 5.5 to 6.2. and rancid meat have the value below 5.3
Precautions	• Care should be taken while preparing meat sample to avoid cuts, and contamination of the products • Preparing materials, tools and equipment used for meat PH determination
Quality criteria	• Did personal protective equipment worn while operating in meat industry • Did trainees proper the trainees proper on the quality parameter • Check PH value to accept or reject the meat

Meat Quality Determination

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions:

1. You are required to perform any of the following:

   1. Meat Quality Determination

   2. Request your teacher for evaluation and feedback

Reference Materials

Book:

1. AN introduction to HACCP Bulletin No 71/2002
2. Food Quality and Food Safety. Cambridge university

WEB ADDRESSES

1. https://naldc.nal.usda.gov/download/CAT87798868/PDF
2. https://www.picomto.com/en/how-to-handle-non-conformances-on-production-lines/
3. https://www.horiba.com/fileadmin/uploads/Scientific/water_quality/Documents/Application_Notes/HIS/08_-_pH_Measurement_of_Meat_Products__Hi-res_.pdf
4. https://ohsguide.worksafenb.ca/topic/inspections.html
5. https://www.wsps.ca/WSPS/media/Site/Resources/SmallBusiness/sb_100-CCO-08-IGDO_WorkplaceInspectionChecklist.pdf?ext=.pdf
6. https://support.qualitysystems.com/support/learning/non-conformance/

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