Meat and meat products processing -Level-II

Based on May 2019, Version 2 Occupational standards

Module Title: -Performing slaughtering activities

LG Code: IND MPP2 M 9 LO (1-5) LG (32-36)

TTLM Code: IND MPP2 TTLM 2020v1

October 2020

Contents

LO1- Sticking and bleed the animals 5

Instruction sheet 5

Information sheet 1 Locating and identifying major blood vessels, trachea and esophagus 7

Self-check 1 10

Information sheet 2 Using knife to severs the major blood vessels safely 11

Self-check 2 14

Information sheet 3: Stuck animals in manner to avoid suffering 15

Treatment of livestock before slaughter and its impact on meat quality 15

Self-check 3 16

Information sheet 4 : Making incision exposing the trachea or esophagus 17

Self-check 4 19

Written test 19

Information sheet 5 Conducting Sticking procedures 20

Self-check 5 22

Information sheet 6 Identifying threats of contamination and cross-contamination 23

Self-check 6 31

Information sheet 7 Bleeding Animals in Fast and complete process 32

Self-check 7 35

Information sheet 8 Handling knife safely, hygienically and effectively 36

Self-check 8 38

LO 2- Performing opening cuts 39

Instruction sheet 39

Information sheet 1- performing opening cuts and releasing the hide/skin or pelt 40

Self-check 1 45

Operation sheet 1 46

Information sheet 2 Understanding Occupational health and safety 50

Self-check 2 53

Information sheet 3-Freeing hide and pelt from workplace 55

Self-check 3 58

Information sheet 4- Identifying quality implications of defective opening cuts 59

Self-check 4 63
LO3- Perform removing internal organs (Evisceration) 64
Instruction sheet 64
Information sheet 1- Removing organs and tissues 66
Self-check 1 71
Information sheet- 2 Removing of pluck without contaminating the carcass 73
Self-check 2 75
Information sheet 3- Removing the digestive tract 76
Self-check 3 80
Information sheet- 4 Inspection of organs 82
Self-check 4 86
Information sheet 5 Identifying Occupational Health and Safety (OHS) 87
Self-check 5 92
Information sheet 6 Taking of corrective action in the event of contamination 93
Self-check 6 97
LO4- Washing carcass and organic acid spraying 98
Instruction sheet 98
Information sheet 1 Washing and removing foreign matter from carcass product 100
Self-Check – 1 102
Information sheet 2 - Washing carcass to Occupational health and safety 103
Self-Check – 2 107
Written test 107
Information sheet -3 Identifying types and sources of potential contamination 108
Self-Check – 3 112
Information sheet 4 Trimming of meat to customer specifications 114
Information sheet 5 Handling product 117
Self-Check – 5 122
LO5- splitting Caracas 123
Instruction sheet 123
Self-check 1 129
Information sheet 2 Cutting of product 131
Self-check 2 141

Information sheet 3 Hanging of product 142
Self-check 3 145
Information sheet 4 Storing products 146
Self-check 4 150
LAP Test 152
Reference 153

LG# 32	LO1- Sticking and bleed the animals

Instruction sheet

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

- Locating and identifying major blood vessels, trachea and esophagus
- Using knife to severs the major blood vessels safely
- Stucking animals in manner to avoid suffering
- Making incision exposing the trachea or esophagus
- Conducting Sticking procedures
- Identifying threats of contamination and cross-contamination
- Bleeding Animals in Fast and complete process
- Handling knife safely, hygienically and effectively

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:

- Locate and identifying major blood vessels, trachea and esophagus
- Use knife to severs the major blood vessels safely
- Stuck animals in manner to avoid suffering
- Make incision exposing the trachea or esophagus
- Conduct Sticking procedures
- Identify threats of contamination and cross-contamination
- Bleed Animals in Fast and complete process
- Handle knife safely, hygienically and effectively

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 Locating and identifying major blood vessels, trachea and esophagus

1.1. Cattle,

Bleeding should be carried out by an incision made with a sharp knife in the jugular channel **at the base of the neck**, the knife being directed towards the entrance of the chest to sever all the major blood vessels arising from the heart (Figure 1). In the interest of good hygiene two knives should be used. the first to open the skin and the second to sever the blood vessels. This procedure is often referred to as 'sticking'.

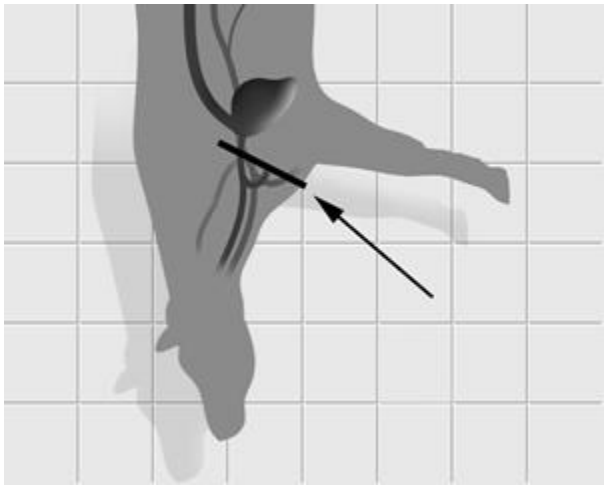


Figure 1: Bleeding cattle

A. Sheep and Goats

Bleeding may be carried out in a similar way as for cattle (Figure 2-1) or by **an incision made close to the head** using a blade at least 120mm long to sever both carotid arteries and both jugular veins, i.e. a cut across the throat (Figure 2-2).

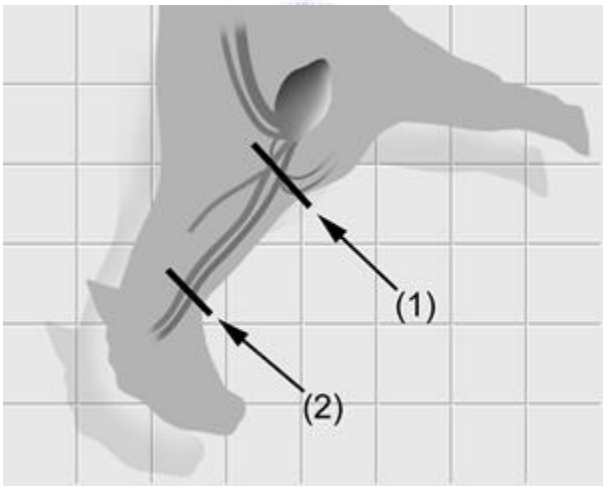


Figure 2: Bleeding sheep

B. Pigs

A knife at least 120mm long should be inserted in **the mid-line of the neck** at the depression before the breast bone, and the skin raised with the knife point using light pressure and a lifting movement.

When penetration has been made, the knife handle should be lowered so that the blade is in a near-vertical position, and pushed upward to sever all the major blood vessels which arise from the heart (Figure 3).

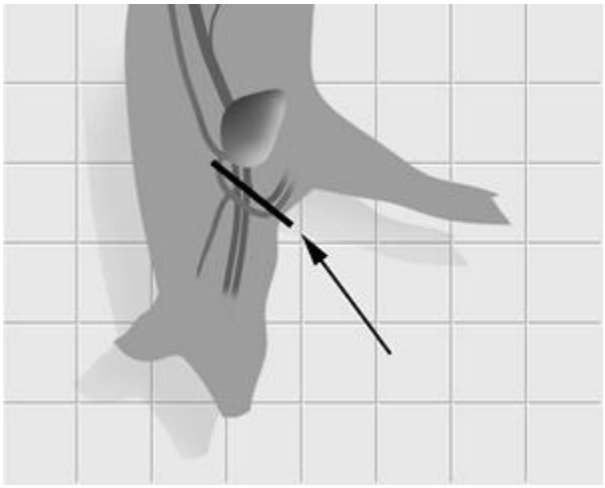


Figure 3: Bleeding pigs

Bleeding has to be done by making a deep, transverse cut across the throat close to the head to sever the four major blood vessels in the neck .See image below. This is an acceptable method of bleeding in sheep and goat.

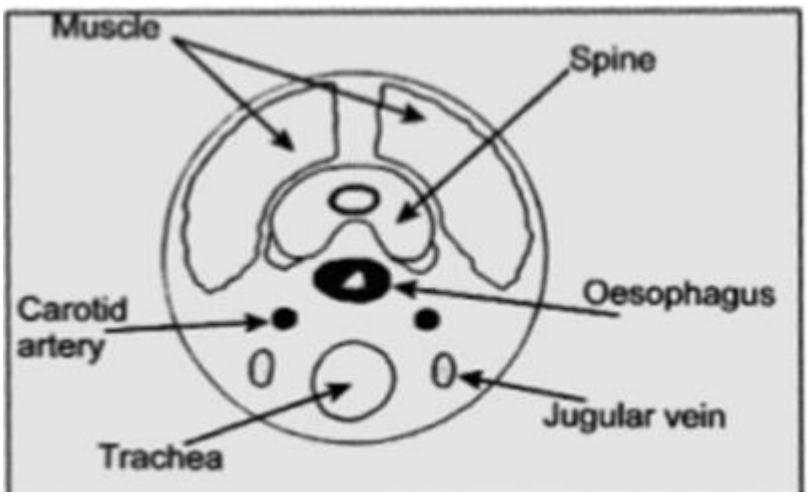


Figure 4 cross section of neck

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 point)

1. **In cattle where the ,bleeding should be carried out**
   A. At the base of the neck
   B. At the end of trachea
   C. A&B
   D. all
2. In sheep & goats, bleeding may be carried out by
   A. An incision made close to the head
   B. At the base of the neck
   C. A&B
   D. All

3. In pig, bleeding carried incision
   A. In the mid line of the neck
   B. At the base of neck
   C. A&B
   D. all

Test I: Short Answer Questions

1. What are the major blood vessels that are sever in bleeding process?

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

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

Information sheet 2 Using knife to severs the major blood vessels safely

Introduction

Knives

- Workers doing skinning and evisceration as well as meat inspection personnel must be issued with two knives to be used alternatively.
  Use one while the other is sterilized
- Dirty knives must be thoroughly washed and even scrubbed before sterilization especially the handle and where the blade and handle meet.
- Only clean knives can be sterilized
  - ✓ The bleeding knife should continuously be sharpened. A dull knife will prolong the incision and the cut ends of the blood vessels will be damaged.
  - ✓ This may cause premature clotting and blockage of the vessels, delaying bleeding out and prolonging the onset of unconsciousness and insensitivity.
  - ✓ Incisions should be swift and precise. In poultry, sheep, goats and, the throat is cut behind the jaw.
  - ✓ The knife should have a stiff 15 cm (6-inch) length blade with a non-slip handle and finger guard. Boning knives are ideal. It must be sharp. Carry a steel or sharpening stone if multiple animals are to be bled.
  - ✓ Some abattoirs may issue personal knives to relevant workers. Depending however what type of abattoir and the specific arrangements at abattoirs, a clean system for the sterilizing of knives may exist. In this case the knife, scabbard, sharpening steel, hook etc. may not be a personal issue but will be issued on a daily basis by the management.
  - ✓ You should be confident in your ability to sharpen and handle knives and saws. A dull knife is much more dangerous to use than a sharp one because dull knives require more pressure to cut, increasing your chances of injury.

Types of knife

- Throat cutting or bleeding knife for cattle, sheep and goats, chickens,
- Sticking/bleeding knife for pigs
- Skinning knife
- Dressing or evisceration knife
- Meat Inspection knife
- De-boning knife

Figure 1 types of knife

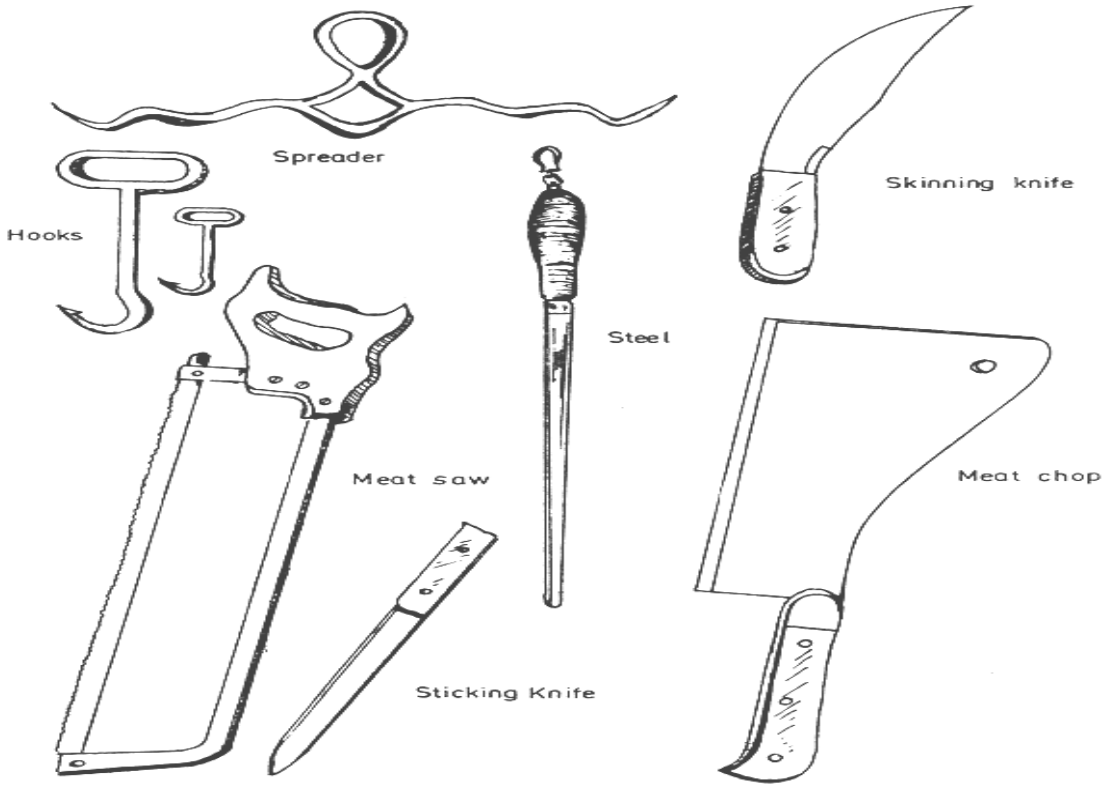


Figure 2. Type of knives to bleeding processes

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: Choose the best answer (2 point)

1. The bleeding knife should continuously be sharpened. A dull knife will prolong the incision and the cut ends of the blood vessels will be damaged.
   a. True b. false
2. Incisions should be swift and precise. In poultry, sheep, goats and, the throat is cut behind the jaw.
   a. True b. false
3. The knife should have a stiff 15 cm (6-inch) length blade with a non-slip handle and finger guard.
4. A. false b. true
5. Boning knives are ideal. It must be sharp. Carry a steel or sharpening stone if multiple animals are to be bled.
   a. True b. false

Test I: Short Answer Questions

1. What is the use of in bleeding process(2pt)
2. What are the types of knife that we use in slaughtering process (2pt)

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

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

Information sheet 3: Stuck animals in manner to avoid suffering

Introduction

Stun-to-stick

Time interval it is recommended that a maximum 20 second interval between stunning and bleeding occur when using non-penetrating captive bolt guns, causing cerebral concussion. Animal should be left to bleed at least for 30 seconds before any other procedures are carried out.

Treatment of livestock before slaughter and its impact on meat quality

Stress in its many forms, e.g. deprivation of water or food, rough handling, exhaustion due to transporting over long distances, mixing of animals reared separately resulting in fighting, is unacceptable from an animal welfare viewpoint and should also be avoided because of its deleterious effects on meat quality. The most serious consequence of stress is death which is not uncommon among pigs transported in poorly ventilated, overcrowded trucks in hot weather. From loading on the farm to the stunning pen animals must be treated kindly, and the lorries, lairages and equipment for livestock handling must be designed to facilitate humane treatment. Stress immediately prior to slaughter, such as fighting or rough handling in the lairage, causes stored **glycogen (sugar**) to be released into the **bloodstream.**

After slaughter this is broken down in the muscles producing lactic acid. This high level of acidity causes a partial breakdown of the muscle structure causing the meat to be pale, soft and exudative (PSE). This condition is mostly found in pigs.

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 point)

1. The animal is elevated off the floor on a box or sheep cradle. In modern abattoirs, sheep are dressed on the rail.
2. Sheep is held with back towards the sticker and head to the left.
3. The neck is stretched with the left hand and with the knife in the right hand both the carotid arteries and jugular vein are to be cut.
4. Then pierced through the pelt at the base of the ear or at the angle formed by the jawbone and the neck vertebrae and then is cut out.
5. To reduce the stress, animals must go into any box willingly.

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

Information sheet 4 : Making incision exposing the trachea or esophagus

Key sign of loss of sensibility is therefore a loss of posture.

The key aspect of the best practice

1. Sharp and long knife is essential for fast bleeding
2. Rapid swift knife stroke with a minimum of sawing motions.
3. Deep cuts is essential
4. Immediately after the cut, COMPLET release of the head holder, and rear pusher gate ensures that animal will relax.
5. Edges of the wound have to be held apart at all time. If the neck opening is too tight, it may restrict bleed out.

- ✓ With the external structures, skin, feet and head, removed the next step is to cut open the animal body to remove the contents and produce the carcass.
- ✓ To avoid contamination of the carcass through accidental cuts of the stomach and intestines, simple but well-directed steps are followed.

For this, it is important that the carcass remains or is placed in the hanging position. the body cavity is entered into to sever the ureter connections to the kidneys while the intestines are loosened up further, then the stomach and intestinal mass (also known as the paunch) are pushed slightly out of the midline opening. (In industrialized countries, the kidneys and spleen are often left in the sheep carcass.)

At this stage, the liver is held out and severed of its connecting tissues then pulled out together with the freed contents of the abdominal cavity and dropped into a paunch truck. The gall-bladder is cut from the liver, taking care not to spill its bitter contents onto the carcass and spoil the taste of the meat.

Fig.3.Incision for bleeding pigs

Fig. 1: Incision for bleeding of poultry

Fig. 2 Incision for bleeding cattle

Self-check 4	Written test

Name…… ID…… Date…….

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

Test I: true or false (2 point)

1. The head of an bleeding animal must be restrained in such a manner that the incision does not close back over the knife.
2. Within 17 to 60 seconds, cattle go into a hypoxic spasm and sensibility appears to be lost. There are several ways to assess loss of sensibility
3. The liver is held out and severed of its connecting tissues then pulled out together with the freed contents of the abdominal cavity.
4. The gall-bladder is cut from the liver, taking care not to spill its bitter contents onto the carcass and spoil the taste of the meat.

Test I: Short Answer Questions (5pt)

1. Explain the incision process
2. What are the key aspect of the best practice
3.

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

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

Information sheet 5 Conducting Sticking procedures

5.1. Animal sticking

An animal sticking apparatus for sticking an animal to be slaughtered comprises a sticking tool having two rotary cutting blades and support means mounting the sticking tool for insertion and withdrawal movements.

Manual sticking

The operation of sticking an animal has been carried out manually by a slaughter man. The operation involves plunging a knife into the animal after stunning so as to sever blood vessels, causing rapid bleeding and resulting in death by exsanguination. The animal is stunned (electrically or mechanically) and then after removal in an unconscious state from the "knocking box" is hung by the rear legs.

Mechanical sticking

A mechanical sticking implement which comprises a hollow knife which is pivoted into an operative position in which it penetrates a pig's neck and severs the carotid arteries. This mechanical sticking arrangement may be, if it does not accurately locate and cut the carotid arteries, also the bleeding may be relatively slow. It is an object of the present invention to provide an apparatus for animal sticking which is and susceptible to automation.

According to the present device there is provided an animal sticking apparatus for sticking an animal to be slaughtered which is positioned in a generally known position.

The apparatus comprising a sticking tool and support means mounting the sticking tool for insertion and withdrawal movements, the sticking tool being movable so as to be brought into contact with and to be advanced so as to be inserted into the animal in the known position, the sticking tool having a forward cutting means for performing a cutting operation upon insertion and advancement of the sticking tool into the animal, the cutting means comprising two cutting blades each having a cutting edge which is moved transverse to the general line of insertion of the sticking tool to perform the cutting action on the-tissues, the two cutting blades being movable relative to each other upon advancing movement of the sticking tool so as to thereby create a shearing action as the cutting means is inserted and advanced into the animal and enabling the stick wound to a remain open upon withdrawal of the sticking tool to promote rapid exsanguination.

Self-check 5	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 (10 point)

1. An animal sticking apparatus for sticking an animal to be slaughtered comprises a sticking tool.
   A. true B. false
2. The operation of sticking an animal has been carried out manually by a slaughtering man
   A. In mechanical sticking b. in manual sticking c. all d. none
3. The operation involves plunging a knife into the animal after stunning
   A. to sever blood vessels,
   b. causing rapid bleeding
   c. resulting in death by exsanguination
   d. all
4. In mechanical sticking, if it does not accurately locate and cut the carotid arteries, also the bleeding may be relatively slow.
   A. True B. false

Test I: Short Answer Questions

1. Define the manual sticking .2pt)
2. Define mechanical sticking (2pt)

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

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

Information sheet 6 Identifying threats of contamination and cross-contamination

6.1. .Source and vector

Pathogenic microorganisms can enter food (meat) processing areas from several main routes:

- ✓ The external environment,
- ✓ Raw materials, people, and
- ✓ Equipment and in-plant microbiology laboratories.

Once inside, pathogens can be temporary or sporadic visit or they may persist for long periods. When pathogens persist in the environment, they generally survive in harborage sites, which can be defined as physical areas in which pathogens can lodge and be protected from cleaning and disinfection actions, for example, poor hygienic design features of processing equipment or damaged areas of the plant's building structure.

6.2. Controlling of contamination in slaughtering house

6.2.1. Cattle Receiving/Unloading:

- ✓ The facility construction and trailer off-loading areas should be of sound condition to prevent injury and allow for humane handling practices. Trailers should be clean prior to loading cattle and trailers should be washed prior to reloading.

Figure 1 Receiving area

6.2.2. Holding Pens:

Holding pens should be kept clean. Recommend washing pens with a pathogen-free water supply. Water and feed troughs should be cleaned and sanitized on a routine basis. Based on current information, it is noted that incoming cattle may have a high level of E. coli O157:H7.

Figure 2 Holding pens

Cattle with visible mud/contamination on the hide present a potential for increasing visible contamination on the carcass that may cause zero tolerance failures.

6.2.3. Cattle Washing:

Figure 3a washing cattle's

There is still an uncertainty on the microbial benefits or problems created by washing cattle prior to entering the pens. Some establishments have demonstrated that washing the cattle helps reduce visible contamination and aids with the sanitary dressing procedures. Misting the cattle often helps reduce airborne dust and dirt particles on the slaughter floor.

Figure 3b washing cattle's

6.2.4. Stunning:

Based on the establishment's process, the stunning area should be maintained in a clean condition to ensure sanitary operating conditions.
Establishments must ensure that they are following proper stunning procedures to ensure Humane Handling.

Figure 4 stun animals

6.2.5. Hide Removal: (Manual and Mechanical)

a. Manual: Initial opening of the exterior of the hide should be on as clean of an area as possible, such as removing visible contamination with air knives, vacuuming the cut line, etc., to reduce contamination.

Figure 5a Hide removal

b. Mechanical: The use of mechanical hide pullers should be implemented to reduce the hide slaps, splatters, and operator contamination from the hide onto the carcass. The operator should maintain clean hands and equipment to prevent contaminating the carcass during removal. Operators should closely observe the equipment to ensure that it is functioning properly to prevent cross-contamination of the carcass from the equipment.

Figure5b. Hide removal

6.2.6. Open Brisket:

The brisket opening is usually a two-part process (knife and saw). The initial knife cut should be made with a clean and sanitized knife. The saw should be cleaned and sanitized between carcasses to prevent cross-contamination.

6.2.7. Head Removal:

Heads must be removed in a sanitary manner to prevent contamination. This process step may also involve the activities for dehorning, ear removal, etc. Regardless of the type of mechanical puller and/or procedure for head removal and skinning process, the procedures must be conducted I n a sanitary manner. All equipment should be cleaned and sanitized appropriately to prevent contamination. Employees must clean and sanitize hands and equipment throughout the head removal process to ensure sanitary dressing.

6.2.8. Evisceration:

Evisceration procedures must be developed and implemented for proper sanitary dressing, including the proper weasanding and bunging activities conducted previously. The equipment should be sterilized to prevent contamination.

An automated viscera table will often include automatic sanitation; however, establishments using carts/trucks should make sure that procedures are in-place to prevent contamination.

Figure 9 Evisceration

If there is a problem during contamination that results in major contamination, then the carcass should be identified and handled appropriately throughout the system to recondition the carcass. Viscera should remain intact and all paunch opening and viscera processing should be conducted in an area/manner that will prevent contamination of the carcass by either direct contamination or aerosol contamination.

6.2.9. Splitting Saw:

The saw blade should be continuously rinsed with 180°F water, and the housing on the splitting saw should be dipped between carcasses to prevent contamination. Any carcass, that is identified by the employee as having a problem will be identified and handled appropriately on the out rail to recondition the carcass. It is very important that carcasses identified earlier in the process as being contaminated are handled appropriately during splitting.

Figure 10 splitting saw

6.2.10. Spinal Cord Removal:

A process must be used for spinal cord removal on the slaughter floor. The establishment should handle the spinal cord appropriately (e.g., inedible rendering).

Figure 11 washing spinal cord

6.2.11. Final Trim:

All trim employees must be properly trained to conduct trimming of visible contamination. All equipment (hooks and knives) should be sanitized between each use to reduce cross contamination between areas.

Figure 12 trimmed meat

6.2.12. **Rail Out**:

All trim employees must be properly trained to conduct trimming of visible contamination. All equipment (hooks and knives) should be sanitized between each use to reduce cross contamination between areas.

Figure13 trimming of carcass

6.2.13. **Carcass Wash:**

The carcass washing procedure is designed to remove incidental contamination (blood specs, bone dust, hair, etc.).
Carcass washing is designed to impact carcass quality and to prepare the carcass for chilling and not to impact food safety hazards.

Figure 14 washing of carcass

Self-check 6	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 point)

1. The saw blade should be continuously rinsed with 180°F water, and the housing on the splitting saw should be dipped between carcasses to prevent contamination.
2. The carcass washing procedure is designed to remove incidental contamination blood specs, bone dust, hair.
3. Removal of head process step may also involve the activities for dehorning, ear removal.
4. The facility construction and trailer off-loading areas should be of sound condition to prevent injury and allow for humane handling practices

Test I: Short Answer Questions

1. What are the 2 types of hide removal ?(2pt)
2. Define Hide Removal Equipment and Employee Work Practices: (2pt)
3. Explain carcass wash briefly (2pt)

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

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

Information sheet 7 Bleeding Animals in Fast and complete process

7.1. Bleeding

- ✓ To prevent the risk of recovery, animals must be bled as soon as possible after stunning, ideally whilst still in the tonic (rigid) phase.
- ✓ Bleeding involves severing the carotid arteries and jugular veins, or the blood vessels from which they arise.
- ✓ The animal then dies from loss of blood. It is important that all major blood vessels are severed. If only one carotid artery is cut the animal may take over a minute to die.
- ✓ Bleeding is also known as bleeding-out or exsanguination. It is achieved by severing major blood vessels with a knife.

- ✓ The most suitable major vessels to be severed are those of the **neck, chest** or **armpit.** The procedures are known respectively as the throat cut, armpit cut and chest stick.

Figure 1-bleeding technique

Cattle‘s anatomy of blood supply to brain is very different from one in other farm animals

- ✓ **Sheep**. As we see on the picture (below) cattle brain blood supply is provided via carotid arteries running on both sides of the neck and vertebral arteries that are running in the spinal cord. It is estimated that more than 20% of blood supply to the

brain is via the vertebral artery. In order to cut both vertebral and carotid arteries in many parts of the world bleeding is carried out by so called **chest stick.**

That is performed by cutting the large vessels that emerge from the heart (carotid and vertebral arteries), thus, excessive blood loss deprives the heart from pumping a sufficient blood volume to tissues, including the brain, leading to hypovolemic shock. The cerebral function is gradually lost until the animal's death.

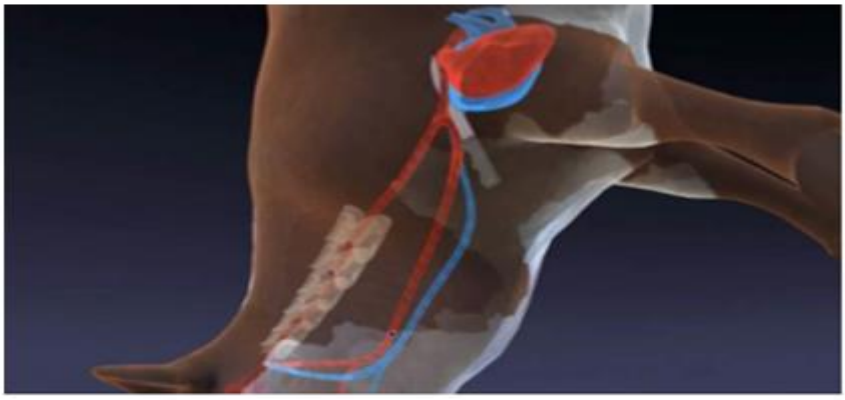


Figure 3a Bleeding by severing neck transversally

Although accepted, when performing transversal section of neck the vertebral arteries are not cut delaying onset of a death as blood supply to the brain is partially maintained; In transversal cut of the neck both carotids and jugulars have to be severed.

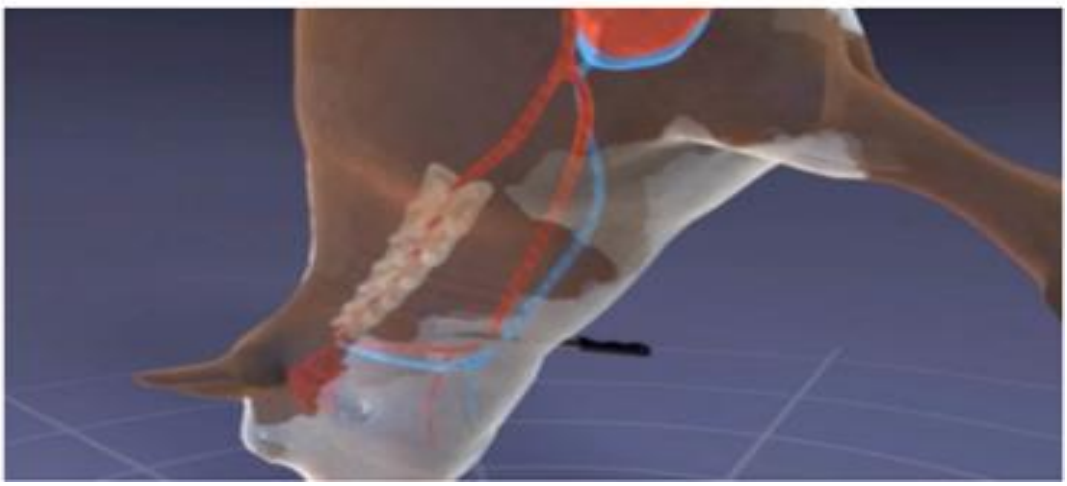


Figure 3b Bleeding by severing neck transversally

When bleeding is carried out after the stunning it should be

a) Rapid and complete

b) Completed before animal regains consciousness

Time to death

- ✓ The time needed to reach unconsciousness and death of a cow only by blood loss depends on method of bleeding, previous handling, blood clotting, and sharpness of the knife and positioning of the incision.

- ✓ The time taken for an animal to become unconscious from blood loss and eventually die will depend on the number of vessels that are cut and the efficiency of cutting.

- ✓ The bleeding should be carried out within **20 seconds from stunning**.
- ✓ The use of non-penetrating captive bolt equipment in stunning cattle induces an unconsciousness for certain time period. Therefore, it is essential that bleeding be carried out immediately post-stunning to prevent any recovery of an animal.

✓ The unconscious, insensible state following a stun is short. To ensure death without risk of recovery, stunned animals must be bled without delay. When blood vessels are cut, blood loss deprives the brain of oxygen and nutrients and consciousness will gradually be lost.

✓ Further blood loss will damage brain function and lead to death. When blood vessels are cut, blood loss deprives the brain of oxygen and nutrients and consciousness will gradually be lost. Further blood loss will damage brain function and lead to death.

Figure 3 bleeding of chicken cattle

Self-check 7	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 point)

1, ---------- should be performed by transverse cut of the neck at the C1 – C3 (cervical vertebra) level, and severe both carotids.

A. Bleeding
B. Evisceration
C. Lairage
D. All

2. The bleeding should be carried out within 20 seconds from stunning.

A. True B. false

3. If a good flow is not observed, the blood vessels should be cut again as they may not be entirely severed.

A. True B. false

4. No slaughter procedure subsequent to bleeding can be carried out until animal's death is ascertained.

A. True B. false

Test I: Short Answer Questions

1. Explain the bleeding procedure (4pt)
2. Write the working closes (4pt).

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

Information sheet 8	Handling knife safely, hygienically and effectively

8.1. Safe Knife Handling Practices

- Knives are used at various steps of the slaughtering process, the carcass preparation, and in the course of veterinary post- mortem inspection, Risks arise in the course of this process and have to be specifically addressed.
- There are specific rules regarding the use and the cleaning and disinfection of knives used for Specific Risk Material (SRM).
- Keep **knives** sharp
- Wear a cutting glove
- Always cut away from yourself
- Use the right **knife** for the job
- Cut on a stable cutting board
- Never grab a falling **knife**
- Keep your eyes on the blade
- Carry the **knife** pointed down, or in a scabbard

In the same way, the operations of cleaning and disinfection in food industries are realized in different ways according to sites: "opened" surfaces, cleaning in place.

8.2. Micro- organisms likely to contaminate knives

A number of bacterial pathogens able to cause food-borne diseases in humans can contaminate meat. Currently the most important bacterial pathogens associated with raw meat and poultry are

- ✓ Campylobacter spp.
- ✓ Clostridium
- ✓ Escherichia coli
- ✓ Salmonella
- ✓ staphylococcus

Contamination of knives

The extent of contamination distributed over the final product depends upon several factors that can be divided into five groups,

- ✓ The equipment,
- ✓ The animals,
- ✓ The personnel,
- ✓ The use of on-line sanitizers, and
- ✓ The efficiency of the sanitizing method.

8.3. Regulation for the use of knives

1. Knives are used at various steps of the slaughtering process and carcass preparation. They are also used by the control authorities in the course of veterinary post mortem inspection,
2. Contamination of knives with pathogenic organisms, as well as with organisms associated with spoilage, can occur during slaughtering, carcass preparation and veterinary inspection procedures, and to a lesser extent in cutting plants.
3. In some processing plants, the probability of microbial contamination associated with the continuous use of contaminated mechanical equipment for bleeding, evisceration and portioning are considerably higher than from contaminated knives.
4. Whatever disinfection protocols are selected, pre-cleaning and cleaning operations are essential, as the removal of soils and biofilms, using mechanical actions such as pressure or detergents, improves the efficacy of the subsequent disinfection procedures.
5. The currently approved procedure of sanitisation using running water at a temperature of 82°C or higher is considered not to be fully effective in the absence of cleaning.
6. The use of water at lower temperatures with the addition of solution of lactic acid at 2 or 5 % is as effective as the use of water at 82°C or higher.
7. During breaks in production, knives can be cleaned and disinfected in a thermo disinfector. This batch sanitization is an acceptable alternative, but probably takes longer than others procedures.

Self-check 8	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 point)

1. Knives are used at various steps of the slaughtering process and carcass preparation.
   A. True B. false

2. The currently approved procedure of sanitization using running water at a temperature of 82°C or higher is considered not to be fully effective in the absence of cleaning.

   A. True B. false
3. During breaks in production, knives can be cleaned and disinfected in a thermo disinfector.
   A. True B. false

Test I: Short Answer Questions

1 What are extent of contamination distributed over the final product?(3pt)

2 What are the Regulation for the use of knives ?(3pt)

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

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

Instruction sheet

LG# 33

LO 2- Performing opening cuts

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

- performing opening cuts and releasing the hide/skin or pelt
- Understanding Occupational health and safety
- Freeing hide and pelt from workplace
- Identifying quality implications of defective opening cuts

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:

- perform opening cuts and releasing the hide/skin or pelt
- Understand Occupational health and safety
- Free hide and pelt from workplace
- Identify quality implications of defective opening cuts

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,

Information sheet 1- performing opening cuts and releasing the hide/skin or pelt

1.1. **Terminologies**

Abattoir - registered /approved premises authorized by gov't where slaughtering of animals takes place (human consumption)

Carcass – body of any slaughter animals after bleeding and dressing

Dressing – removal of animal parts not intended for human consumption

Fabrication – process of cutting carcass into standard wholesale and retails cuts

Fresh meat – from animals not undergone any substantial physical, microbial and chemical change

Fleece and wool - hairs obtained from goats, sheep respectively

Procedures, including sticking and bleeding, are conducted in a hygienic manner with measures to avoid contamination, including:

- Ensuring that instruments/equipment are clean, and sanitized as necessary
- Ensuring bleeding does not happen in dry landing area and that blood is contained to a specific area
- Avoiding having the carcass contacted with splashing from the floor or unhygienic structures
- Avoiding the transfer of heads over unprotected edible meat products unless effective controls (e.g. Trays, pans) are in place to protect from cross-contamination
- Ensuring skin is cut from inside-out

1.2. **Particular care in this matter should be taken for the following:**

- Sticking knives
- Knives for splitting the brisket or opening the abdomen
- Gutting presentation equipment (e.g. Hooks, trays, tables)
- Utensils used to prevent the clotting of blood

1.3. **General principles of dressing**

- No dressing procedure shall begin if there is any potential return to or signs of, a return to consciousness.

- Carcasses should be dressed after being suspended by the hind legs. Dressing on a bed system is not recommended considering that there are great challenges to overcome in order to meet the outcomes below.

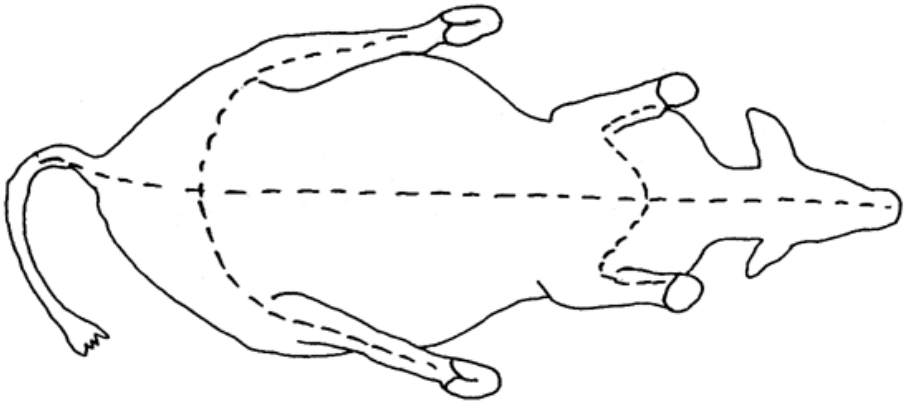


Fig Correct cutting lines for hide removal

1.3.1. Specific dressing procedures for red meat species

A. Carping (sheep, goats) dressing

- The lactating mammary glands and the mammary lymph nodes are removed.
- The penis and the prepuce are removed.
- The feet are removed prior to skinning the carcass: skin the area above and below where the leg will be cut.
- The horns are removed, as applicable, avoiding the opening of the skull.
- The hide is removed, proceeding from shackle downward and reflecting away from the carcass.
- The brisket and midline of the abdomen are opened after contamination has been removed along the incision line.
- The bung (rectum) is dropped by performing a circular cut around anus, followed by a step to mitigate any leaking from the rectum (such as tying off, use of a clip, intussusception, plugging) before dropping into pelvic cavity.
- The skinned head is removed; the head is thoroughly washed, including nasal and oral cavities, prior to any cuts.

- The tongue is dropped and the palatine tonsils are removed to expose retro-pharyngeal lymph nodes.
- The oesophagus is separated from trachea and surrounding tissues (e.g. rodding) and is tied-off before evisceration.
- The carcass is eviscerated.

B. **Dressing of swine (pig):**

I. hide-off

- The carcass is washed prior to hide removal.
- The lactating mammary glands and the mammary lymph nodes are removed.
- The penis and the prepuce are removed.
- The feet are removed prior to skinning the carcass: skin the area above and below where the leg will be cut.
- The hide is removed, proceeding from shackle downward and reflecting away from the carcass.
- The brisket and midline of the abdomen are opened after contamination has been removed along the incision line.
- The bung (rectum) is dropped by performing a circular cut around anus and dropping into the pelvic cavity.
- The skinned head is partially severed (drop) or fully removed; the head is washed thoroughly, including nasal and oral cavities, prior to any cuts.
- The tongue is dropped and the mandibular lymph nodes are exposed.
- The carcass is eviscerated.
- The carcass is split to the neck, at the limit of the head.

II. hide-on

- All hair, layer and dirt is removed (including on the feet) by scalding, dehairing, singeing, resin-dipping, polishing, or shaving and the inter digital spaces are removed if necessary to meet this requirement.

- Any toenails are removed.
- The carcass is washed prior to opening.
- Any bristle, scurf or dirt that remains after washing is to be skinned/ trimmed immediately prior to opening.

- The brisket and midline of the abdomen are opened after contamination has been removed along the incision line.
- The bung (rectum) is dropped by performing a circular cut around anus and dropping into the pelvic cavity.
- The head is partially severed (drop) or fully removed; the head is thoroughly washed, including nasal and oral cavities, prior to any cuts.
- The tongue is dropped and the mandibular lymph nodes are exposed.
- The carcass is eviscerated.
- The carcass is split up to the neck, at the limit of the head.

Figure 4 Dressed pig carcasses

1.3.2. Specific dressing procedures for poultry

Full dressing for poultry

- All feathers, hairs, dirt, scurf are removed from the carcass
- After de- feathering, the entire carcass is washed thoroughly to remove all visible foreign material and prior to any incision being made
- The heads, oil gland, and feet at the tarsal joint are removed
- The carcass is vented by incising around cloaca, followed by an incision that is no longer than that required to eviscerate, whilst ensuring that gastro-intestinal integrity is maintained
- The carcass is eviscerated, with or without the kidneys
- The epidermis is removed prior to chilling

Partial dressing for poultry - head and feet-on poultry carcasses

- All hair, feathers, dirt, scurf are removed from the carcass

- After de-feathering, the entire carcass is washed thoroughly to remove all visible foreign material and prior to any incision being made
- The feet and heads (with special attention to oral cavity and nostrils) are free from disease and visible contamination and prior to venting
- The carcass is vented by incising around cloaca, followed by an incision that is no longer than that required to eviscerate, whilst ensuring that gastro-intestinal integrity is maintained
- The carcass is eviscerated, with or without the kidneys
- The epidermis and the toenails are removed prior to chilling
- Carcasses with oil glands will be appropriately labelled

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 say true or false

1. avoiding having the carcass contacted with splashing from the floor or unhygienic structures

A. true B false

2. The feet and heads are free from disease and visible contamination and prior to venting.

A true B. false

2. The carcass is vented by incising around cloaca, followed by an incision that is no longer than that required to eviscerate,

A. true B. false

. 4. The carcass is eviscerated, with or without the kidneys

A. True B. False

Test I: Short Answer Questions

1) Explain Partial dressing for poultry - head and feet-on poultry processing(4pt)
2) Why we cannot give an adequate definition for process hygiene? explain it as you can(2pt)
3) Draw the flow- diagram of Processing principles (2pt)
4) Write the working closes (2pt).

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

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

Operation sheet 1 Bovine (cattle) dressing

Steps of Bovine (cattle) dressing

Step1. After the stunned animal is full blooded undertake open cut

Step 2. Remove the mammary glands and lymph nodes

Step 3. Remove the penis and prepuce

Step 4. Removing of feet prior to skinning the carcass, skin the area above & below where the leg will be cut.

Step 5. Removing of horns as applicable, avoiding the opening of the skull

Step 6. Removing the hide proceeding

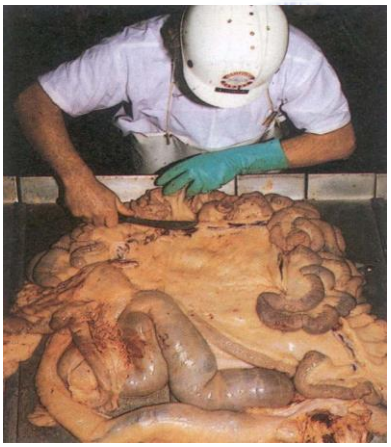
Step7. Opening brisket and midline of the abdomen.

Step 8. Dropping the rectum by forming a circular cut around anus

Step 9. Removing skinned head

Step 10 Dropping tongue and removing palatine tonsils

Step 11. Separating oesophagus from trachea and surrounding tissue



Step 12. Eviscerating carcass

Step13. Splitting the carcass

Step14. Removing spinal cord completely

2.1. Health and safety inspection

These records must contain the date, the person carrying out the inspection and the findings of the inspection. In designing the inspection record form, it is advisable to consult with the district health center as it may be interested in producing a form for all workplaces in the area.

2.2. Environmental monitoring

This is only applicable to places which require environmental monitoring on a routine basis. The scheme of monitoring is devised by either the occupational health or safety committee in the workplace or by the district health center.
The PHC workers are trained to take readings with simple instruments and record them systematically. The records are handed over periodically to experts for interpretation.

2.3. Health monitoring

This is only applicable to certain groups of workers in some workplaces. The (public health committee) PHC workers are trained either to collect specimens periodically and send them to the designated laboratories for analysis, or to arrange for the workers to have their specimens taken and examinations done periodically in designated laboratories.

The PHC workers are responsible for keeping the records supplied by the designated laboratories systematically and for submitting them to the occupational health and safety committee in the workplace or the district health center for information and any action which may be required.

2.4. First aid provided in the workplace

First aid treatment records are often kept at the first aid station at each work site rather than at a central occupational health clinic in a plant or in the district PHC center. This permits accidental injuries to be recorded at the work sites where they occur, eliminating the need for an employee with a trivial injury to leave work and go to the clinic simply to record the occurrence. The occupational health clinic/district PHC center should receive and keep copies of these records and a record of all first aid treatment which it has itself provided.

This record is called the acute care register. First aid records are sometimes mandated by government regulation and are always important to the assessment of compensation claims. They also provide data vital to the assessment of the accident prevention programmes.

2.5. Accident investigations

There are three reasons why companies need to record and investigate occupational accidents:

- To identify the real causes of injury and illness, property damage and near-misses (accidents that might have happened)
- To develop effective methods of preventing future similar accidents
- To meet legislative requirements.

This is usually done by an expert on the occupational health and safety committee in the workplace or a labor inspector. These records must be kept systematically.

The PHC workers must read the records thoroughly so that the knowledge on the findings can be applied.

- ✓ **Sickness certification**

This recording is usually done by medical practitioners and kept by the management. The PHC workers must be supplied with abstracts of these records on a periodic basis. This will enable the PHC workers to relate any common sicknesses among workers to the findings of the health and safety inspection and the health education programme.

- ✓ **Personal health records**

This set of records concerns the health status of each individual worker. It inevitably contains personal, privileged information which has special significance in law.
Personal health records should be kept in their original handwritten form even if typed or computerized versions also exist. A worker's personal health record should only reflect his/her health status insofar as it applies to the job. The content may therefore vary a great deal. The information which is usually found in the record includes:

- Results of physical examinations
- X-ray and laboratory reports including ECG pulmonary function
- results and audiograms
- Immunizations
- Occupational and medical history
- Participation in health programmes
- Workers' compensation and medical insurance
- Informed consent forms and authorizations for release of information
- Documentation of refusals to undergo examination, testing and programme
- participation
- Progress notes for rehabilitation
- Consultant reports.

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 point)

1. Accident investigations is not include
   A. To identify the real causes of injury and illness,
   B. To develop effective methods of preventing future similar accidents
   C. To meet legislative requirements.
   D. All
   E. none
2. The information which is usually found in the record includes:
   A. Results of physical examinations
   B. X-ray and laboratory reports including ECG pulmonary function
   C. results and audiograms
   D. Immunizations
   E. all
3. A worker's personal health record should only reflect his/her health status insofar as it applies to the job.
   A. True B. False
4. First aid records are sometimes mandated by government regulation.
   A. True B. False

Test I: Short Answer Questions

1) Explain the Sickness certification on work place?(2pt)
2) Draw the flow- diagram of Processing principles (2pt)
3) Write the working closes (2pt).

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

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

Information sheet 3-Freeing hide and pelt from workplace

3.1. Definition of Waste

Waste is “the unwanted remains, residues or by products which are no longer wanted by the owner”. Waste is assumed to be valueless to the owner. Slaughterhouse and Hides and Skins wastes are associated with discharge of highly organic matter.

These wastes if directly disposed of in the land create visually objectionable Public Health and Environmental pollution.

Composition of Slaughterhouse, Hides and Skins wastes include

A. Blood
B. Rumen ingesta
C. Horns
D. Hooves
E. Bones
J. Fetus etc.
F. Hides and Skins fleshings
G. Hide and skins splits and trimmings
H. Condemned meat
I. Gall bladder

3.2. Disposal of residual material

The non-carcass material harvested for use for human consumption will vary depending on legal requirements (e.g. in the EU, the TSE regulations mean that cattle intestines and some other material – classified as Specified Risk Material under the ABPR – cannot enter the human or animal food chain and have to be disposed of) and cultural attitudes (e.g. more of the population in the ETC and the WBC eat tripe, processed from stomachs, than in the United Kingdom). Blood, for example, can be used to manufacture food products or treated for use as fertilizer. Many plants will harvest the edible fats that are removed from the carcass during dressing (and later during primal and retail cutting), which will be used for either adding to manufactured products (e.g. sausages) or rendering into high quality oil. Some of the material not used for human consumption can be utilized for pet food, although in the EU all such material has to be

certified fit for human consumption even though it is not destined for humans (e.g. typically, the pet food sector will process livers, hearts, lungs and trachea, tripe).

The remaining material will be disposed of in one of three main ways:

1. Rendering. This is a pressure cooking process that produces fats (typically for industrial use or even for conversion to biodiesel) and meat and bone meal. Both meat and bone meal, if produced from material not prescribed by regulation, can be added to animal feed rations; otherwise, it has to be disposed of by incineration or landfill.

2. Incineration. This process reduces material to a fine ash that has some industrial uses (e.g. it can be added to building materials) but if derived from material not prescribed by regulation, the ash will usually be sent to landfill.

3. Landfill. This way of disposal is seen today as environmentally unsound. Landfill is the last resort. Wastewater effluent usually requires treatment before it is allowed into conventional sewerage systems or discharged into natural watercourses. Other options exist for some of the waste material and residual material described above.

Some of the options that are becoming more commonly chosen are:

1. Anaerobic and aerobic digestion.

This method is typically used to dispose of material from abattoirs and meat processing plants such as lairage material, effluent concentrates and sludge, blood, stomach and gut contents, and comminuted material. It produces methane gas that can be used for power generation and digested material that can be used as a soil improver.

2. Composting.

This method typically uses material from abattoirs and also produces material that can be used as a soil improver. Rendering

Rendering is a heating process for meat industry waste products through which fats are separated from water and protein residues for the production of edible fats and dried protein residues.

It does not include processes where no fat is recovered.

There are basically two different rendering processes:

i. High temperature rendering which involves cooking or steam application.

Five methods of high temperature rendering include

- simple cooking;
- open pan
- kettle rendering;
- wet rendering; and
- dry rendering.

ii. Low temperature rendering (at around 80°C).

This process requires finely ground material and temperatures slightly above the fat melting point. It results in better-quality fat. The rendering at low temperatures is a highly-sophisticated process requiring large throughputs and trained personnel. For many developing countries, the system is not suitable.

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: Choose the best answer (2 point)

1. What are Slaughterhouse wastes include

A. Blood
B. Rumen ingesta
C. Horns
D. Hooves
E. Bones
F. All

2. What are the features and common ranges of effluents?

A. Biochemical Oxygen Demand (BOD),

B. Chemical Oxygen Demand (COD),

C. Total Organic Carbon (TOC),

D. All

3. Viscera can be recovered as edible products (e.g. heart, liver).

A. True B. false

4. Rendering is a heating process for meat industry waste products through which fats are separated from water and protein.

A. False B. True

Test I: Short Answer Questions

5. List all slaughtering house wastes (2pt)
6. What the Category 1 (for disposal only) of wastes? descried them
7. What are the two different rendering processes(2pt).

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

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

Information sheet 4- Identifying quality implications of defective opening cuts

1.1. Purpose of meat inspection

Slaughterhouse inspection of live animals (ante-mortem) and their carcasses (postmortem) plays a key role in both the surveillance network for animal diseases and zoonosis and ensuring the safety and wholesomeness of meat and meat by-products for their intended uses).

i) Removal of grossly abnormal products from the meat chain;

ii) Prevention of the distribution of infected meat

iii) Assistance in the detection and eradication of certain diseases of livestock.

1.2. General methods of post-mortem inspection

The general methods you will use to detect diseases, abnormalities, and contamination will involve your senses.

These include:

- Sight – observing a disease lesion (abscess, tumor).
- Feel – palpating (feeling an abnormal lump in tissues, feeling abnormal firmness in an organ).
- Smell – smelling the urine odor of uremia, smelling the contents of a broken abscess).
- Hearing – listening to a carcass fall off the line on to the floor.

Livestock post-mortem inspection

The post-mortem inspection process for livestock involves the following steps:

- ✓ head inspection,
- ✓ viscera inspection, and
- ✓ carcass inspection

No step in the inspection process may be omitted.

In large establishments, inspectors are assigned to cover one of these areas and rotate to different sites according to a rotation pattern.

At small or very small establishments, the inspector may perform all of the post-mortem inspection procedures on each animal.

The inspection routines differ for each inspection site in each species. The differences reflect variations in anatomy, diseases, and method of dressing that the establishment uses.

In general, when abnormalities are observed while performing inspection, the following actions must take place:

1. If the disease or condition of the head, organ, or carcass is localized, have the establishment trim the affected tissues.
2. If the disease or condition is generalized and affects the majority of the head, organ, or carcass retain it for veterinary disposition.

- ✓ Visual inspection, which is the observation of the carcass and organs and the evaluation of their appearance;
- ✓ Palpation, which is an examination by touch of the meat and organs. It provides information concerning the consistency and the integrity of examined tissues;
- ✓ The specific details for the inspection procedures for each of the livestock species covered by the regulations – cattle, sheep, and swine, – differ. However, there are similarities.

- ✓ In order to perform inspection procedures appropriately, you must be familiar with the anatomy of a livestock carcass and its parts

- ✓ For example, for swine post mortem, the example we will be using,

A. you will need to learn how to locate and
B. identify the mandibular lymph nodes in the head;
C. the mesenteric, hepatic, and
D. tracheobronchial lymph nodes in the viscera;
E. the lungs,
F. heart, and
G. the liver; and
H. the kidneys of a carcass.
I.

Example: Swine head inspection

The head inspection procedures for swine are as follows:

1. Observe head and cut surfaces – the eyes, fat, cheek muscles, and
2. Incise and observe the right and left mandibular lymph nodes
3. When abnormal conditions are observed, keep the head for veterinary disposition.

Your veterinary mentor will show you how to perform these procedures in detail.

Here are some common abnormal conditions observed during head inspection.

1. Tuberculosis may be detected during head inspection in varying degrees.
2. Abscesses are another common finding during the inspection of the head. When slight, small, well-encapsulated abscesses are found on head inspection, the carcass should be tagged.
3. At the head inspection station you may see atrophic rhinitis
4. Head missing The head can't be inspected if it is missing. Remember, you must be able to determine at all times which parts belong to a carcass
5. Mandibular lymph nodes left in the neck instead of on the head.
6. Hog rings these should have been removed as part of the cleaning operation
7. Prior to head inspection.
8. Ear tags and rosin contamination.

Based on the severity and the frequency of the improper presentation, certain actions should be taken by inspection.

1. First, direct the designated establishment personnel to immediately remove the condition of improper presentation and delay inspection procedures until the condition is removed.
2. If action in #1 does not result in proper presentation, direct the designated establishment employee to stop the line and remove the condition if it cannot be removed prior to the carcass leaving the inspection area.
3. If conditions exist to the extent that the line has to be stopped repeatedly, delay inspection and ask establishment management to correct the problem.
4. The IIC may require the establishment to reduce the line speed until the conditions are favorable.

Self-check 4	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 point)

1. What the purpose of meat inspection

   A. Removal of grossly abnormal products from the meat chain;
   B. Prevention of the distribution of infected meat
   C. All
   D. None

2. The inspection of anti- mortem includes

   A. confirmation that animals are properly identified;
   B. the detection of abnormalities;
   C. the evaluation of cleanliness; and
   D. Oversight of animal welfare requirements.
   E. All

3. Ante-mortem judgment categories

   A. Passed for slaughter;
   B. Condemned for meat suitability reasons;
   C. Condemned for public health reasons
   D. All

Test I: Short Answer Questions

3. What are key factors for risk-based ante-mortem inspection(2pt)
4. What are the two important competent of anti- mortem inspection (2pt).

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

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

LG# 34	LO3- Perform removing internal organs (Evisceration)

Instruction sheet

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

- Removing organs and tissues
- Removing of pluck without contaminating the carcass
- Removing the digestive tract
- Inspection of organs
- Identifying Occupational Health and Safety (OHS)
- Taking of corrective action in the event of contamination

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:

- Remove organs and tissues
- Remove of pluck without contaminating the carcass
- Remove the digestive tract
- Inspection of organs
- Identify Occupational Health and Safety (OHS)
- Take of corrective action in the event of contamination

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- Removing organs and tissues

1.1. Introduction to Harvesting

A complete preventive control plan will include control programs that demonstrate how all the applicable outcomes in this section will be met.

A. **Hearts** – all species are eligible. The pericardium will be removed. The following criteria apply to all species except rabbits and bird;

- The heart will be cut open or inverted to ensure all blood clots are removed.
- All of the aorta and other major blood vessels are removed, leaving at most the 2 cm from their origin on the external surface of the heart.
- The oscordis, if applicable, is removed.

After washing, hearts will be drained and refrigerated.

B. **Liver** – all species are eligible, except equine and wild game animal (because of heavy metal content, e.g. Cadmium)

- The gall bladder is removed without release of bile on edible product, before washing and chilling (it may be harvested separately).
- For ruminants, the hepatic ducts are incised longitudinally to ensure absence of parasites (flukes).
- Any liver with major pathological defects is to be rejected (parasites, tumors, abscesses). Livers with minor scar lesions (i.e. milk spots, parasitic scar lesions) need not be rejected if the product can be deemed/rendered acceptable to the consumer.

C. **Gizzard** – all bird species are eligible, as applicable

Gizzard will be separated from viscera, opened and the contents and lining removed, before washing and chilling. Contaminated fat on the outside surface of gizzards shall be removed.

D. **Urinary bladder** – all species are qualified, as applicable
Any bladder harvested for edible purposes must be:

- Emptied
- Rinsed until visibly clean

Preparation of casings: in addition to the steps above, the mucosa must be removed, the bladder inverted, placed in brine for 12 hours and subsequently rinsed.

E. **Gastro-intestinal tract** –distal ileum of all bovines is prohibited, otherwise all species eligible. Any portion of the GI tract harvested for edible purposes is to be

- Emptied
- Rinsed until the water dripping from the product runs clean
- Trimmed of any contamination or pathological lesion

a. Preparation of casings: In addition to the steps above, the mucosa must be removed from the portion of the gastro-intestinal tract.

b. Edible status can be achieved in a separate establishment but control programs will need to address preservation of the product (i.e. refrigeration, salting) and control over the product (labeling "for further preparation only" is required).

F. **Lungs/trachea** – all species are eligible.
The trachea and the main bronchi are to be split to ensure no presence of parasites or contamination (including scald water). The trachea will be washed.

G. **Spleens** – all species are eligible, as applicable

H. **Feet** – all species are eligible.

- Mammals:

- ✓ The feet are to be scalded and cleaned
- ✓ The hooves, if applicable, are to be removed.
- ✓ The surface of the articulation that was exposed to contamination during the scalding and the cleaning is to be trimmed.

- Birds:

epidermis and toenails to be removed. Please also consult Procedures for preparation of feet or paws (poultry), head and feet-on carcasses (poultry), head-on (rabbits) for edible purposes.

I. **Brains/whole heads** – bovine over thirty months are prohibited, otherwise all species are eligible

- Penetrative stunning methods should be avoided because of contamination and potential physical hazard (e.g. bullet/slug) issue.
- Blood clots to be removed.
- For poultry, please also consult Procedures for preparation of feet or paws (poultry), head and feet-on carcasses (poultry), head-on (rabbits) for edible purposes.

J. **Head meats** – all species are eligible, as applicable

- The tongue, the cheek meat, the head meat, the snout or the lips can be harvested.
- Tonsils (e.g. Lingual) will be removed.
- The thyroid gland and laryngeal muscles are to be removed.
- Salivary glands and mucous membranes are to be removed, although the diffuse portion of parotid gland may remain attached in swine.
- Deboning on hook or rack is recommended.

K. **Kidneys** – all species are eligible, except equine, ostrich, emu, rhea, wild game animal (because of heavy metal content, eg Cadmium)

L. **Uteri** –all species are eligible except wild game animal (because of risk of Brucella).

Only uteri from mammals that have never been pregnant can be identified as edible.

M. **Testicles and pizzle** – all species are eligible, except wild game animal (because of risk of Brucella).

The associated draining lymph nodes will be examined.

N. **Fatty tissue** – all species are eligible

O. **Tails** – all species are eligible , as applicable

P. **Weasand/oesophagus meat** – all species are eligible, as applicable

The oesophagus is to be harvested by cutting through its musculature distally adjacent to the rumen/stomach without cutting into the mucosal lumen of these organs. The oesophagus is then pulled away from the rumen/stomach.

Q. **Blood** – all species are eligible, except birds and rabbits

- Blood is harvested using a closed container connected directly to a cannula or a hollow knife.
- The blood will be defribrinated by use of sanitized mechanical means (use of hands is unacceptable) or using an approved anti-coagulant to avoid the formation of clots.

R. **Mammary glands/udder** – all species are eligible (as applicable), except wild game animal (because of risk of Brucella).

Only mammary glands of animals that have never been pregnant can be identified as edible.

S. **Thymus** – all species are eligible, as applicable

T. **Mechanically separated meat (MSM) or finely textured meat (FTM)** – The use of the vertebral column of over thirty month cattle is prohibited, otherwise all species are eligible

- If used in the preparation of MSM or FTM, the vertebral column of all eligible species must be free of spinal cord.
- Kidneys must be removed from poultry carcasses prior to use in MSM or FTM.
- Partially dressed poultry carcasses must have oil gland removed prior to use for MSM or FTM.

U. **Eyes** – bovine over thirty month are prohibited, otherwise all species are eligible
V. **Pancreas** – all species are eligible
W. **Spinal cord** – bovine over thirty month are prohibited, otherwise all species are eligible
X. **Salivary glands** – all species are eligible, as applicable
Y. **Ova** – all bird species are eligible
Z. **Poultry necks** – all species are eligible

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 point)

1. All of the aorta and other major blood vessels are removed, leaving at most the 2 cm from their origin on the external surface of the heart.

   A. liver
   B. heart
   C. lung
   D. All

2. Kidneys must be removed from poultry carcasses prior to use in MSM or FTM.

   A true B false

3. Partially dressed poultry carcasses must have oil gland removed prior to use for MSM or FTM.

   A. True B false

4. The ……is to be harvested by cutting through its musculature distally adjacent to the rumen

   A. oesophugus B liver C. lung D. all

5. For ruminants, the hepatic ducts are incised longitudinally to ensure absence of parasites (flukes).

A. true B. false

Test I: Short Answer Questions

1. Why we cannot give an adequate definition for process hygiene? explain it as you can(2pt)

2. Draw the flow- diagram of Processing principles (2pt)
3. Write the working closes (2pt).

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

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

Information sheet- 2 Removing of pluck without contaminating the carcass

2.1.Plucking and Cooling

Feather plucking is done mechanically using a batch feather-picking machine with rotating fingers model. The plucking machine is cleaned and disinfected after processing each batch to avoid cross contamination. Carcasses were washed during plucking. Sprinkling water to cool birds as they are plucked retards growth of bacteria washes the carcasses during plucking and facilitates removal of plucked feathers.

Inedible parts collected for animal food need not be trimmed to remove contamination, hide, bone splinters, blood clots, parasites or minor pathologies of aesthetic nature such as dry adhesions or scar tissue.

Removing the pluck

- Insert chest-spreader between breastbones.
- Cut away the diaphragm up to the saddle on either
- side, staying close to the rib cage and taking care
- not to cut into the meat.
- Pull out the kidneys.
- To remove the pluck, run the knife behind the
- pluck to cut the connective tissue close to the
- spine. Take care to avoid cutting the meat.
- Cut through the aorta at the point it leaves the
- spine to connect to the heart. Pulling steadily
- downwards, pull the pluck down through the
- neck, releasing the windpipe as you go and cut
- off the windpipe at the neck.

Figure1 Poultry de-fathering machine

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: Choose the best answer (2 point)

1. The floor should be constructed of concrete and sloping towards drains in order to facilitate cleaning.

A. Chilling/hanging

B. Evisceration

C. Lairage

D. All

Test I: Short Answer Questions

1. Why we cannot give an adequate definition for process hygiene? explain it as you can(2pt)
2. Draw the flow- diagram of Processing principles (2pt)
3. Write the working closes (2pt).

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

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

Information sheet 3- Removing the digestive tract

3.1. Anatomical description

The gastro-intestinal tract is vertically positioned in the abdominal cavity, with the intestines between the rumen and the abdominal wall on the right side of the animal.

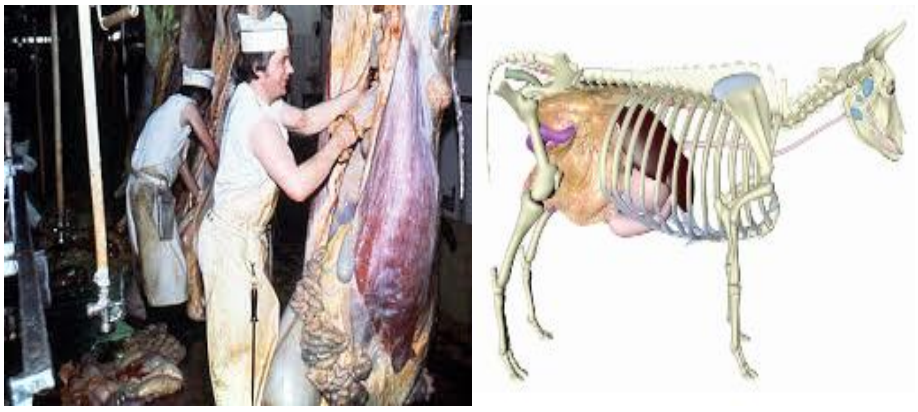


Figure 1. a, Removing of digestive tract b, Position bovine intestinal tract

Zooming in on the intestinal tract, the liver (1) becomes clearly visible on the front right side of the rumen, with the gall bladder protruding just below

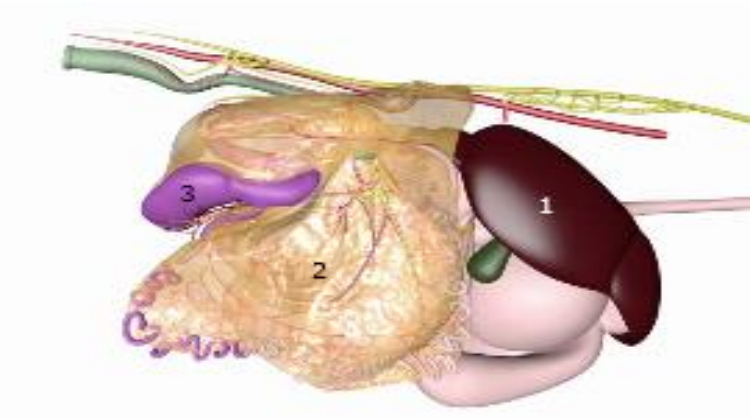


Figure 2 Overview position bovine intestinal tract

The intestinal tract is covered by the omentum majus (2) and the caecum, as part of the SRM (Specified Risk Material) (3) becomes visible at the rear of the entire GIT.

When the stomach complex, liver and omentum majus are removed, the remaining intestinal tract can be viewed in its original position

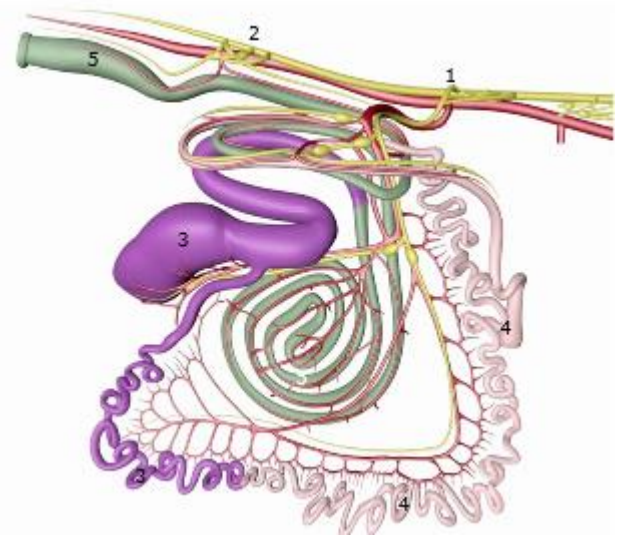


Figure 3, bovine intestinal tract, original position with suspension points (1,2),SRM (3) and duodenum-jejunum (4) and colon (5)

The main suspension point of the intestinal tract is located around the A. mesenterica cranialis (1), directly above the intestinal tract. All major blood vessels, nerves and lymphatic ducts from themesentery converge at this point. The caecum and last four meters of the small intestines (3) can be identified as SRM, whereas the duodenum-jejunum (4) and spiral shaped colon (5) are considered safe for further use. Towards the end of the colon a second suspension point is visible, located around the A. mesenterica caudalis(2).

3.2. Bovine slaughter line –animal id and traceability

After opening the abdominal cavity, spreaders are placed to allow good access to the cavity. The spleen is removed first and the ligaments which suspend the GIT are severed with great care to avoid unwanted punctures of the GIT and subsequent f.ecal contamination of the cavity and organs.

Figure 4 Evisceration of the carcass

B. Removal of the last 4 meters of small intestines as SRM

Figure2 shows the intact bovine intestinal tract, together with an illustrated version. The duodenum and jejunum(1)and colon (2)can be identified; as SRM, the last four meters of the small intestines (ileum and distal part jejunum), caecum (3)and surrounding the spiral shaped colon, the mesentery (4)can be identified

Figure 4 Intact bovine intestinal tract

The main suspension points of the intestinal tract (figure4), surrounding the A. mesenterica cranialis (1) and caudalis (2) can be clearly identified. The last four meters

of small intestines, including the ileum can be removed by cutting the small intestines from the mesentery starting at the stomach end and working towards the caecum.

Figure5. a, Suspension points intestinal tract b, hand measuring 4m of small intestine

B. **Removal of the colon and caecum from the mesentery**

In order to prevent faecal contamination of the remaining intestinal tract and mesentery, the caecum can only be separated from the colon as SRM after the two have been cut from the mesentery.

-The intestinal tract is positioned on the table with the caecum on the left. The colon is now manually torn from the mesentery, leaving as little as possible fatty tissue and suspensory ligaments attached to the colon. Any content of the colon is manually replaced to reduce the chance of burst and possible faecal contamination;

-When the entire colon is manually separated, the caecum is now carefully cut from the mesentery;

-In picture 7,presenting the colon (1)and caecum(2),the end of the ansa proximaliscoli (3)is clearly visible, which marks the starting point of the colon;

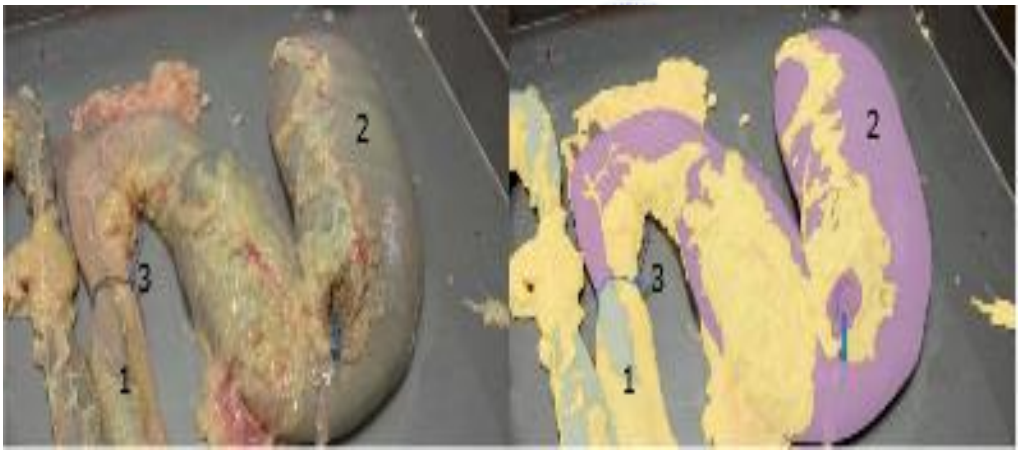


Figure 7 marking the caecum as SRM

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: Choose the best answer (2 point)

1. The floor should be constructed of concrete and sloping towards drains in order to facilitate cleaning.

   A. Chilling/hanging
   B. Evisceration
   C. Lairage
   D. All

Test I: Short Answer Questions
Define hygiene briefly (2pt)

1. Why we cannot give an adequate definition for process hygiene? explain it as you can(2pt)
2. Draw the flow- diagram of Processing principles (2pt)
3. Write the working closes (2pt).

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

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

Information sheet- 4 Inspection of organs

4.1. Post mortem inspection

- Routine post-mortem 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.

Post mortem 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:

i. Viewing, incision, palpation and olfaction techniques.

ii. Classifying the lesions into one of two major categories - acute or chronic.

iii. Establishing whether the condition is localized or generalized, and the extent of systemic changes in other organs or tissues.

iv. Determining 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.

v. Coordinating all the components of antemortem and post-mortem findings to make a final diagnosis.

vi. Submitting the samples to the laboratory for diagnostic support, if abattoir has holding and refrigeration facilities for carcasses under detention.

4.2. Carcass judgement

Trimming or condemnation: Trimming or condemning carcass is carried out when:

i. Any portion of a carcass or a carcass that is abnormal or diseased.

ii. Any portion of a carcass or a carcass affected with a condition that may present a hazard to human health.

iii. Any portion of a carcass or a carcass that may be repulsive to the consumer.

Type of carcasses judgment

i. Localized versus generalized conditions

It is important to differentiate between a localized and a generalized condition in the judgment of an animal carcass. In a **localized condition**, a lesion is restricted by the animal defence mechanisms to a certain area or organ. Systemic changes associated with a localized condition may also occur. Example: jaundice caused by liver infection or toxaemia following pyometra (abscess in the uterus).

In a **generalized condition**, the animal's defence mechanisms are unable to stop the spread of the disease process by way of the circulatory or lymphatic systems.
The lymph nodes of the carcass should be examined if pathological lesions are generalized.

Some of the signs of a generalized disease are:

i. Generalized inflammation of lymph nodes including the lymph nodes of the head, viscera and/or the lymph nodes of the carcass
ii. Inflammation of joints
iii. Lesions in different organs including liver, spleen kidneys and heart
v. The presence of multiple abscesses in different portions of the carcass including the spine of ruminants.

Hygiene requirements for process control after post-mortem inspection

Meat passed as safe and suitable for human consumption should be:

- removed without delay from the dressing area;
- handled, stored and transported in a manner that will protect it from contamination and deterioration;
- held under conditions that reduce its temperature and/or water activity as quickly as possible, unless cut up or de-boned pre-rigor; and
- held at temperatures that achieve safety and suitability objectives.

In the case of poultry or farmed game birds undergoing immersion chilling:

- the immersion chilling process should meet hygiene criteria as specified by the competent authority;
- the reduction in carcass temperature should be as rapid as possible;
- carcasses emerging from the process should have a lesser microbiological count for indicator organisms and pathogens than those entering the process; and
- sanitation requirements should include complete emptying, cleaning and sanitation of tanks as appropriate.

When fresh meat is cut or de-boned pre-rigor:

- It should be transported directly from the dressing area to the cutting up or de-boning room;
- The cutting up or de-boning room should be temperature-controlled and directly linked to the dressing areas, unless the competent authority approves alternative procedures that provide an equivalent level of hygiene; and
- Cutting up, de-boning and packing should be done without delay and should meet all requirements for hygienic process control.

When raw meat is minced:

- It should be obtained only from parts of animals as approved by the competent authority e.g. striated muscle and adherent fatty tissues
- It should not contain bone fragments or skin;
- Any grossly abnormal tissues and / or post-dressing contamination should be removed before mincing; and
- The competent authority may specify compositional criteria.

When raw meat is mechanically separated, the competent authority should:

- restrict the type of animal parts that can be used e.g. non-use of skulls;
- set compositional standards for maximum calcium content; and
- require specific labelling of the final product.

When raw meat is minced, mechanically separated or used in meat preparations:

- the competent authority can specify maximum time/temperature schedules for process control at each step of production e.g. maximum times and temperatures from chilling or freezing of raw material to the time of preparation, maximum temperatures during production, maximum times before chilling or freezing;
- Unless used directly as an ingredient for meat preparations and manufactured meat, it should be immediately wrapped and/or packaged, followed by immediate refrigeration

Self-check 4	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 point)

1. Meat passed as safe and suitable for human consumption should be:

   A. removed without delay from the dressing area;
   B. handled, stored and transported in a manner that will protect it from contamination and deterioration;
   C. held under conditions that reduce its temperature
   D. all

2. Trimming or condemning carcass is carried out when:

   A. Any portion of a carcass or a carcass that is abnormal or diseased.
   B. A carcass affected with a condition that may present a hazard to human health.
   C. Any portion of a carcass or a carcass that may be repulsive to the consumer.
   D. All

3.When raw meat is minced:

   A. It should not contain bone fragments or skin;
   B. The competent authority may specify compositional criteria.
   C. Any grossly abnormal
   D. All

2. All organs and carcass portions should be kept together and correlated for inspection before they are removed from the slaughter floor.

   1. True B. False

3. Cutting up, de-boning and packing should be done without delay and should meet all requirements for hygienic process control.

   A. True B. False

Test I: Short Answer Questions

1. Define the difference of Localized and generalized conditions (2pt)
2. What are Post mortem inspection (2pt)
3. Write the working closes (2pt).

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

Information sheet 5	Identifying Occupational Health and Safety (OHS)

Hazard management: Identification setting priorities Assessment Control Implementation Monitoring Review

Incident investigation: Incident reporting Incident investigation Corrective action taken Corrective action reviewed and modified

Emergency procedures: Early warning Response and evacuation Training Practice drills and evaluation

Injury management : First aid Workers compensation Rehabilitation

OH&S planning and administration

- OH&S policy
- OH&S responsibilities at each level including managers, supervisors, workers
- OH&S performance indicators for each level (i.e. the measures to assess each level is carrying out their responsibilities)
- OH&S consultation process to include all levels, OH&S committee, OH&S representatives and other mechanisms
- where to access information on OH&S at the site (e.g. where to access material safety data sheets)
- Details of any model or safety system that is used in the management of OH&S on site.

Hazard management

For the following steps in hazard management each site should be able to detail what is done, how it is done, who is involved, and when it occurs.

- site information on the identification of potential and existing hazards including: past records and statistical information on workers compensation claims, incidents, illnesses. workplace inspection/audit procedures
- site information on the assessment process
- how, who and when assessments are conducted including:
- the setting of priorities and ranking of hazards
- the risk assessment process conducted for specific hazards, tasks, or processes

- Site information on the development and implementation of control measures
- The reporting and recording system used
- Control or actions plans
- Programs for any high risk hazards in the workplace such as manual handling.

Incident investigation

- The procedure for reporting incidents and the forms use
- The incident investigation procedure and the forms used
- Examples of completed incident reporting and investigation forms.

Injury management

- First aid policies and procedures
- Record-keeping procedures for work-related illnesses and injuries
- The workers compensation claims procedure
- The occupational rehabilitation procedures.

Goal of OH&S

The primary goal of occupational health and safety is the prevention of injury and illness.

OH&S responsibilities

By law everyone in the workplace has OH&S responsibilities. Managers and supervisors are responsible for the health and safety of those working in their area. Workers must take reasonable care for their own health and safety and that of others. Workers must also co-operate with action to protect health and safety.

Systematic management of OH&S

A systematic approach is required to effectively manage health and safety. There are numerous models for OH&S management systems. Any system to manage OH&S includes systems to prevent injury and illness through the management of hazards and potential emergencies.

It also includes systems to minimise the losses if accident and emergencies occur. Losses are minimised through accident and injury management programs. Injury management programs include first aid, workers compensation and rehabilitation management systems.

Management commitment

The commitment and leadership of management is required for any system to work. The commitment to OH&S should be part of the plant's business plan. In order to meet the objective in the business plan OH&S policy, programs and procedures should be developed.

OH&S should be incorporated into standard operating procedures and work instructions so that OH&S is an integral part of all aspects of the business. Management should also demonstrate their commitment through the allocation of human and financial resources to OH&S and promptly acting on OH&S issues.

Consultation

Meaningful and effective consultation processes are essential for the whole plant to work together to achieve health and safety outcomes.

Prevention

The main system to prevent illness and injury is the management of potential hazards. This system involves the identification, assessment and control of hazards.

Implementation

The system must be implemented with OH&S included in all aspects of the business including the plant's training program.

Evaluation

An OH&S management system should have a built in review system to check whether it is working or not, and, if not, what it is that requires changing to meet the objectives.

Hazard management

A. Preventing illness and injury through hazard management

Managers and supervisors have a legal responsibility to do whatever is reasonably practicable to make the workplace safe and free of the risk of illness. Prevention by managing hazards is an effective way of doing this. The process is most effective if employees participate through a consultation process.

B. Definition of hazards

A hazard is anything with the potential to cause injury or illness. Hazards may be related to the work environment, the plant, equipment, tools and substances or the way work is organised.

C. Steps in managing hazards

The steps to eliminate hazards are identification of hazards, assessment of the factors contributing to the hazards and controlling the hazards, ideally by eliminating them.

D. Identification

Hazards can be identified by inspecting the workplace, observing tasks, talking to employees and checking records, e.g. workers compensation claims.

E. Components of assessment

Assessment has two components. They are setting priorities and identifying the factors contributing to the hazard.

Fig Assessment – setting priorities

F. Assessment – identifying

Factors contributing to the hazard Assessment involve working out all the risk factors that may have contributed to that hazard. This step is vital to provide direction for appropriate controls. In order to identify risk factors associated with specific hazards refer to relevant regulations, advisory standards, and codes of practice or industry guidance material.

G. Control

The best way to control a hazard is to eliminate the hazard. If this is not feasible, apply the hierarchy of control to reduce the risk. Apply the hierarchy of controls in the order of substitution, isolation, engineering, administration, and personal protective equipment (PPE).

H. Implementation

An action or implementation plan defining tasks, responsibilities and timeframe for completion should be developed to ensure controls are implemented.

I. Monitoring and review

Controls should be monitored and reviewed to check the hazards are eliminated and no unintended outcomes have resulted.

Self-check 5	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 point)

1. Controls should be monitored and reviewed to check the hazards are eliminated and no unintended outcomes have resulted.

B. True b. false

2. Injury management

A. First aid policies and procedures
B. Record-keeping procedures for work-related illnesses and injuries
C. The workers compensation claims procedure
D. The occupational rehabilitation procedures.
E. All

3. The primary goal of occupational health and safety is the prevention of injury and illness.

A. True B. false

Test I: Short Answer Questions

1. What are OH&S planning and administration?
2. Explain Assessment identifying briefly?

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

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

Information sheet 6	Taking of corrective action in the event of contamination

6.1. Basic elements of HACCP in meat processing plants

- Every single meat product with product specific technology requires a specifically designed individual HACCP scheme.
- As a precondition for implementing HACCP concepts, hazard analysis and risk assessment referring to meat plant specific processing methods or products, have to be carried out.
- Critical control points (CCPs) have to be identified, critical limits be established and monitoring systems properly implemented.

The HACCP scheme is subdivided into seven consecutive steps (“principles”).

1. Hazard analysis and risk assessment

Examples for hazards in meat processing

Biological hazards: Parasites

- ✓ bacteria (causing food poisoning/food borne infections and intoxications),
- ✓ molds (mycotoxins causing food borne intoxications),
- ✓ viruses (causing food borne infections)

Physical hazards:

Rests of unwanted materials (glass, bone fragments, animal teeth/in case of processing head meat, metal fragments broken knife blades, needles, plastics, stones)

Chemical hazards:

- ✓ Contaminants (heavy metals, chemical solvents, cleaning& disinfection compounds)
- ✓ Residues (veterinary drugs, feed additives, pesticides)
- ✓ Food additives with risk of overdoses (nitrate/nitrite, chemical preservatives)

2. Identification of Critical Control Points (CCP)

Suggested control points directly related to meat processing and therefore suited for the establishment of CCPs are:

- ✓ Unloading bay for raw materials (meat and non-meat ingredients),
- ✓ Cold storage rooms,
- ✓ Meat cutting and preparation facilities,
- ✓ Facility for handling non-meat additives,
- ✓ Meat comminuting units (grinders, bowl choppers etc.),

It is up to the individual meat processing plant to decide, at which points in the processing line CCPs should be established.

3. Establishment of Critical Limits for each CCP

Monitoring may also be based on visual observation, e.g.

- ✓ dirt/faecal contamination of meat,
- ✓ changes to untypical color,
- ✓ Hanges in product structure or texture.

Besides such sensory parameters, numerical critical limits must be specified for each objective control measure at each CCP. Criteria often used include temperature, time, moisture level, pH, and water activity.

4. Establishment of a monitoring system for each CCP

Monitoring is the regular/periodic measurement or observation at a CCP to determine whether a critical limit or target level has been met.

The monitoring procedure must be able to detect loss of control at the CCP.

Monitoring at CCPs should deliver results rapidly in order to enable corrective action during processing.

Physical and chemical pattern to be instantly measured or monitored in meat processing lines include: Temperature, Time, limits pH, Moisture

5. Establishment of corrective actions

Corrective actions are those actions to be taken either when monitoring results show that

- a CCP has deviated from its specified critical limit or target level or
- when monitoring results indicate a trend towards loss of control

Action taken must reduce to safe level or eliminate the actual or potential hazard identified.

Corrective actions are for example

- Reject incoming meat with too high internal temperatures
- Adjust temperature for refrigerated storage and transport of meat
- Remove with clean knives minimal visual contamination of meat surface, reject heavily contaminated meat
- Adjust cooking and sterilization parameters (temperature/time)
- Reject meat with too high pH
- Adjust quantity of curing substances (level of nitrite, nitrite curing salt should contain 99,5% common salt and 0,5% nitrite)
- In case of dry fermented products: If aw of processed products is too high, stop packaging in water vapor impermeable packages

6. Establishment of verification procedures

Procedures are needed to ensure that the HACCP system is working correctly. Particular attention must be given to the monitoring frequency, which may be daily, or several times a day or more frequently. Checks on the persons doing the monitoring should be done regularly as well as calibration of instruments used.

7. Establishment of documents and records

Documents and records must be produced commensurate with the nature and size of the food business to demonstrate the application of principles 1-6. These documents serve for the competent authorities to evaluate the efficacy of the HACCP procedure carried out at the plant. Records also help to trace causes of problems that were encountered during past production.

Meat processing hygiene

There is many opportunity to contaminate the exposed tissues of the carcass with micro-organisms from:

a. exterior surface of the animal
b. contents of the gastro-intestinal tract
c. equipment and utensils
d. workers garments and hands
e. the abattoir itself (e.g. air, floor drains, water drip from ceiling)
f. water (and if used, ice)
g. food additives (e.g. spices for value added products)

Therefore, we need to control this opportunity for contamination by:

- Using properly cleaned equipment.
- Ensuring that the abattoir is properly cleaned/ sanitized.
- Use hygienic methods of dressing that control contamination.
- Clean utensils at appropriate intervals during the process.
- Apply a high standard of personal hygiene.

Self-check 6	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 point)

1) Reject incoming meat with too high internal temperatures
2) Adjust temperature for refrigerated storage and transport of meat
3) Remove with clean knives minimal visual contamination of meat surface, reject heavily contaminated meat
4) Adjust cooking and sterilization parameters (temperature/time)
5) Reject meat with too high pH

Test I: Short Answer Questions

9. We need to control opportunity for contamination, so by what corrective action that we can control contamination list them.
10. What is the group of bacteria?

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

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

LG# 35	LO4- Washing carcass and organic acid spraying

Instruction sheet

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

- washing and removing foreign matter from carcass product
- Washing carcass to workplace requirement
- Washing carcass to Occupational Health and Safety (OHS) requirements.
- Identifying types and sources of potential contamination
- Trimming of meat to customer specifications
- Handling product
- Washing of carcass and spreading organic acid to inhibit MOs

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:

- wash and removing foreign matter from carcass product
- Wash carcass to workplace requirement
- Wash carcass to Occupational Health and Safety (OHS) requirements.
- Identify types and sources of potential contamination
- Trim of meat to customer specifications
- Handle product
- Wash of carcass and spreading organic acid to inhibit MOs

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 Washing and removing foreign matter from carcass product

Visible contamination, such as mud or dirt, is removed from carcasses by cutting away the contaminated tissues and/or by vacuum cleaning with hot water or steam. All such treatments are effective for removal of visible contamination and bacteria that are associated with it.

However, there is no relationship between visible contamination and microbiological contamination; i.e., surfaces carrying no visible contamination can harbor large numbers of bacteria, while surfaces having visible contamination may carry few bacteria.

Thus, trimming and vacuum cleaning to remove visible contamination do not in general improve the microbiological conditions of carcasses when applied only to sites showing visible contamination.

Washing the Carcass After a carcass has left the final inspection point; it is sprayed with water to remove all blood, slight blood marks, bone dust and marrow before going to the cold room for cooling.

Carcass must not be washed until all contaminated portions have been cut away to prevent contamination. Further contaminated meat or fat surfaces cannot possibly be rendered microbe-free by spraying them with water.

On the contrary, when surfaces that are already contaminated get washed this can actually spread the bacteria if water droplets splash on to adjacent areas and other carcasses. Contaminated surfaces must of necessity be cut away and the intestinal membranes removed in order to get rid of visible contamination.

Chlorinated water can also be successfully applied after the visible contamination has been cut off. It is not advisable to wash carcasses before evisceration, as this encourages slaughter hands to wash their mistakes away. It is generally recommended therefore that only approved, uncontaminated carcasses should be washed with running water in order to remove from the carcasses any bone splinters and blood which might

be present. Adequate time and rail length should be available so that the carcasses can drip dry, eliminating excess moisture in the cold room.

The important precaution of carcass washing

- A usual part of the slaughter process to remove bone dust and other material from trimmed carcasses. It will also remove bacteria.
- It is recommended that a warm carcass wash be used (90-120^{o}F). This will more effectively remove debris from the carcass. ·
- Be careful not to allow spray from the carcass being washed to contact previously washed carcasses.
- Since this is a usual part of slaughter, it is not usually regarded as an intervention, but an important part of carcass dressing and preparing the carcass for other interventions.

Figure__ Carcass wash

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: say True / False for the following questions (2 points each)

1. Carcass Washing is the activity performed as final inspection point of sprayed with water to remove all blood, slight blood marks, bone dust and marrow before going to the cold room for cooling.
2. Trimming and vacuum cleaning to remove visible contamination do not in general improve the microbiological conditions of carcasses.
3. It is advisable to wash carcasses before evisceration.

Test II. Short Answer Questions (4 points)

1. Explain the important precaution washing carcass

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: _____

2.1. Carcass washing

The primary object of carcass washing is to remove visible soiling and blood stains and to improve appearance after chilling .Washing is no substitute for good hygienic practices during slaughter and dressing since it is likely to spread bacteria rather than reduce total numbers. Stains of gut contents must be cut off. Wiping cloths must not be used.

Carcass spraying will remove visible dirt and blood stains. Water must be clean. Soiled carcasses should be sprayed immediately after dressing before the soiling material dries, thus minimizing the time for bacterial growth.

Under factory conditions bacteria will double in number every 20 or 30 minutes.
In addition to removing stains from the skinned surface, particular attention should be paid to the internal surface, the sticking wound and the pelvic region.

A wet surface favours bacterial growth so only the minimum amount of water should be used and chilling should start immediately. If the cooler is well designed and operating efficiently the carcass surface will quickly dry out, inhibiting bacterial growth.
Bubbling of the subcutaneous fat is caused by spraying with water at excessively high pressure, which may be due to the pressure in the system or a result of holding the spray nozzle too close to the carcass.

2.1.1. Workplace requirement

Workers can be seriously injured by moving animals prior to stunning, and by stunning guns that may prematurely or inadvertently discharge while they try to still the animal.

Work Practices

Safe work practices are essential in helping to maintain a safe and healthful work environment. Workers must therefore be encouraged and be given sufficient time and equipment to keep surface clean and orderly.

To do this, spills must be cleaned up immediately. Water, blood, or grease on floors will cause falls. also, wet working conditions pose a serious threat of electrocution. Periods during the day should also be set aside for general housekeeping, and constant surveillance should be kept to spot slippery areas.

Moreover, employers should check refrigeration systems regularly for leaks and should make sure those hazardous substances, such as ammonia, are identified by appropriate hazard warnings (labels, signs, etc.)

Employers should make hand washing facilities readily available to employees working with or near toxic substances. It is equally important that hand washing facilities be made available for workers who handle meat without the use of protective gloves. Prompt hand washing and the use of disposable hand towels will help prevent the spread of infectious diseases.

2.1.2. To occupational Health and Safety (OHS) requirements.

Potential Hazards

Machinery such as head splitters, bone splitters snout pullers and jaw pullers, as well as band saws and cleavers, pose potential hazards to workers during the various stages of processing animal carcasses. These hazards are identified during carcass washing and removing foreign bodies.

a. Knife Cuts

Knives are the major causes of cuts and abrasions to the hands and the torso. Although modern technology has eliminated a number of hand knife operations, the hand knife remains the most commonly used tool and causes the most frequent and severe accidents.

For example, one worker used a knife to pick up a ham prior to boning; the knife slipped out of the ham striking him in the eye and blinding him. Another worker was

permanently disfigured when his knife slipped out of a piece of meat and struck his nose, upper lip, and chin. Workers have also been cut by other workers as they remove their knives from a slab of meat. These "neighbor cuts" are usually the direct result of over-crowded working conditions.

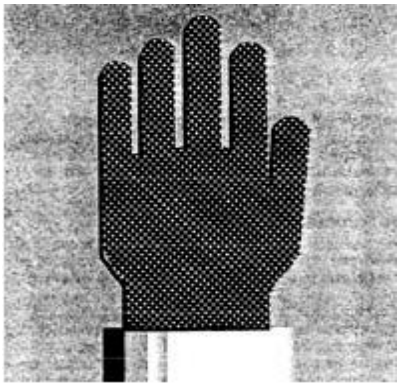
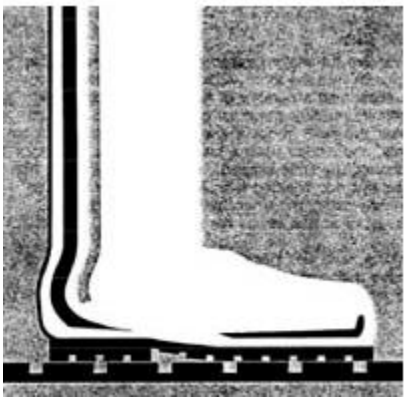


Figure ___ Hand glove

b. **Falls**

Falls also represent one of the greatest sources of serious injuries. Because of the nature of the work, floor surfaces throughout the plants tend to be wet and slippery. Animal fat, when allowed to accumulate on floors to dangerous levels, and blood, leaking pipes, and poor drainage are the major contributors to treacherously slippery floors.



c. **Back Injuries**

These injuries tend to be more common among workers in the shipping department. These employees, called "lugers," are required to lug or carry on their shoulders carcasses (weighing up to 300 pounds) to trucks or railcars for shipment.

d. **Toxic Substances.**

Workers are often exposed to ammonia. ammonia is a gas with a characteristic pungent odor and is used as a refrigerant, and occasionally, as a cleaning compound. Leaks can occur in the refrigeration pipes carrying ammonia to coolers. Contact with anhydrous liquid ammonia or with aqueous solution is intensely irritating to the mucous membranes, eyes, and skin.

e. **Infectious Diseases**

Workers are also susceptible to infectious diseases such as brucellosis, erysipeloid, leptospirosis, dermatophytoses and warts. Brucellosis is caused by a bacterium and is transmitted by the handling of cattle or swine. Persons who suffer from this bacterium experience constant or recurring fever, headaches, weakness, joint pain, night sweats, and loss of appetite.

Erysipeioia and leptospirosis are also caused by bacteria. Erysipeloid is transmitted by infection of skin puncture wounds, scratches and abrasions; it causes redness and irritation around the site of infection and can spread to the blood stream and lymph nodes.

Leptospirosis is transmitted through direct contact with infected animals or through water, moist soil, or vegetation contaminated by the urine of infected animals. Muscular aches, eye infections, fever, vomiting, chills, and headaches occur, and kidney and liver damage may develop.

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 / False for the following questions (1.5 points each)

1. Of the following one is a potential Hazard in carcass washing.
   A. Knife Cuts
   B. Falls
   C. Toxic Substances
   D. All
2. Carcasses spraying have the potential to remove visible dirt and blood stains.
3. Safe work practices are essential in helping to maintain a safe and healthful work environment.

Test II. Short Answer Questions (4.5 points)

1. Explain the detail potential hazards and work place requirement in carcass washing.

Note: **Satisfactory rating - 9 points** **Unsatisfactory - below 9 points**

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information sheet -3 Identifying types and sources of potential contamination

3.1. Controls on contamination in red meat establishments

Possible contamination of the meat products is prevented by ensuring hygienic procedures during dressing and evisceration. When contamination inadvertently occurs, it will be promptly identified and hygienically removed by the operator.

Fecal, ingesta and milk may contain pathogens that render meat products adulterated. Accordingly, operators must demonstrate, through their Preventive Control Plan (PCP) and subsequently by carcass evaluation, that carcasses are free of visible fecal, ingesta and milk (as applicable to the species slaughtered) after final trimming but prior to final carcass washing.

Also upon detection of visible fecal, ingesta or milk during this evaluation, the operator must investigate the root cause of the deviation and implement effective corrective actions. Records of these evaluations (including detection of fecal, ingesta or milk); root cause investigations and their corrective actions; and procedures to identify and return potentially affected carcasses to freedom from visible fecal, ingesta and milk defects must be maintained in an auditable format.

The operator should re-evaluate their Preventive Control Plan to incorporate carcass evaluation (after final trimming but prior to final carcass washing) and fecal, ingesta and milk control procedures, as appropriate.

Contamination Controls

Contaminated carcass, cavity and viscera are not acceptable for human consumption and have to be:

- Removed from the line for defect removal, or
- Removed online using an approved on-line procedure, or
- Rejected.

Sources Contamination

A. In cattle

1. Animal/carcass sources

A major source of microbial contamination on the carcasses of beef is faeces.

Faeces, as well as soil adhering to the animal, are carried into the abattoir on the hair, hide, hooves and tail of the animal. Parasites such as flies, grubs and worms carried by the animal into the plant also can be a source of microbial contamination. Infected body fluids such as urine, milk, blood, mucus, rumen fluid, intestinal fluid and fluid from lymph nodes.

2. On-farm/market factors

The health and immune system of the animal, as well as its history of treatment for disease, should be taken into account before the animal is transported to the abattoir. Animals should be clean before transport.

3. Transport factors

Transport factors such as the type and cleanliness of transport conveyance, distance travelled and duration of journey, harshness of ride, density of animals in the conveyance and frequency of stops, may affect the pathogen load.

4. Abattoir holding-pen factors

The length of time animals are held at the abattoir before slaughter can affect the pathogen load by increasing the probability of exposure and infection.

5. Non-ambulatory animals

Animals can arrive at the plant in a non-ambulatory condition or can become non-ambulatory after being received. Some plants refuse to accept such animals.

6. Pregnant, lactating or per parturient cows

Per parturient cows or cows which deliver while in the holding pens at the abattoir may have a higher pathogen load than other cows. Lactating cows may have mastitis and may thus have higher pathogen loads than other cows.

7. Processing sources

Contamination can occur at any point during processing. Although processing techniques vary depending on the abattoir, the basic steps were contamination occur are similar.

- ✓ Kill box
- ✓ Sticking and bleeding
- ✓ Head and shank removal
- ✓ Hide removal
- ✓ Evisceration
- ✓ Splitting

B. In poultry

1. **Fecal contamination**: Any identifiable stain and/or material determined to be from the lower gastrointestinal tract.
    - There should be a zero tolerance for fecal contamination.
    - The color of feces may range from varying shades of yellow to green, brown, and white which change the color of the meat.
    - The consistency of feces is characteristically semi-solid to a paste.
    - The composition of feces may or may not include plant material.
2. **Ingesta:** Identifiable stain and/or dry particles and/or liquid (aggregate) covering a minimum area > 5 mm (internal and external). The colour of the ingesta may vary depending on diet, and can be green, yellow, or brown. The consistency may vary from solid to granular to slimy.
3. **Bile contamination:** Caused by perforation of the gallbladder during evisceration which results in a green discoloration of affected tissue.
4. **Extraneous material**: Grease stains or other foreign material which cannot be removed on-line or off-line.
5. **Intestine / cloaca:** Refers to a length of intestine/cloaca attached to the carcass or inside the cavity.

Contamination in poultry establishments usually happens during the evisceration process. It has different causes:

- ✓ diarrhea
- ✓ improper fasting prior to slaughter
- ✓ poor work techniques (manual evisceration)
- ✓ poor adjustment of the evisceration equipment (mechanical evisceration)

- ✓ Variation in bird size within the flock

Preventive Control Plan for contamination

1. All the contamination from the carcasses, carcass parts and viscera is removed
2. If the contamination is not removed, the carcasses, carcass parts and viscera are condemned/rejected
3. Investigation of the root cause of the deviation and implementation of effective corrective actions
4. If a disease is detected during defect detection, the carcass and viscera are submitted for secondary examination

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: Choose the best answer (2 points each)

1. Of the following one is the activity undertaken on contaminated carcass, cavity and viscera not acceptable for human consumption.
   A. Removed from the line for defect removal, or
   B. Removed online using an approved on-line procedure, or
   C. Rejected.
   D. All
2. In cattle Contamination Sources may raise from the following except one
   A. Animal/carcass sources
   B. On-farm/market factors
   C. Transport factors
   D. Abattoir holding-pen factors
   E. None
3. All are contamination sources on poultry
   A. Fecal contamination:
   B. Ingesta
   C. Bile contamination
   D. Intestine / cloaca
   E. All

Test II. Short Answer Questions (6 points)

2. Explain the contamination sources of poultry and cattle carcass in meat industry.
3.

Note: **Satisfactory rating - 12 points** **Unsatisfactory - below 12points**

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

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Information sheet 4 Trimming of meat to customer specifications

Trimming is normally the last stage in butchery before packaging or presenting cut meat for customers. Trimming removes bone chips, fat and gristle so that finished cuts look right and meet specifications. It is usually carried out after the meat has been boned to prepare it for turning into joints or for portioning.

Trimming has to meet customer specifications and expectations. This means that if you do this task you must work accurately and precisely to ensure as much meat as possible can be presented for sale.

Trimming directly affects the yield and the value of the finished product so it is important to the profits of the company. In order to be assessed as competent you must demonstrate to your assessor that you can consistently perform to the requirements set out below. Your performance evidence must include at least one observation by your assessor.

Prepare to carry out trimming

- Prepare to carry out trimming in accordance with organizational standards
- Wear and use appropriate personal protective equipment for trimming in accordance with regulatory standards and organizational requirements
- Check with the relevant person the trimming required
- Check the availability and cleanliness of work area, tools and equipment
- Source the meat or poultry requiring trimming
- Choose the correct knives and ensure they are sharp, clean and suitable for purpose
- Check availability of storage areas for final product and waste materials

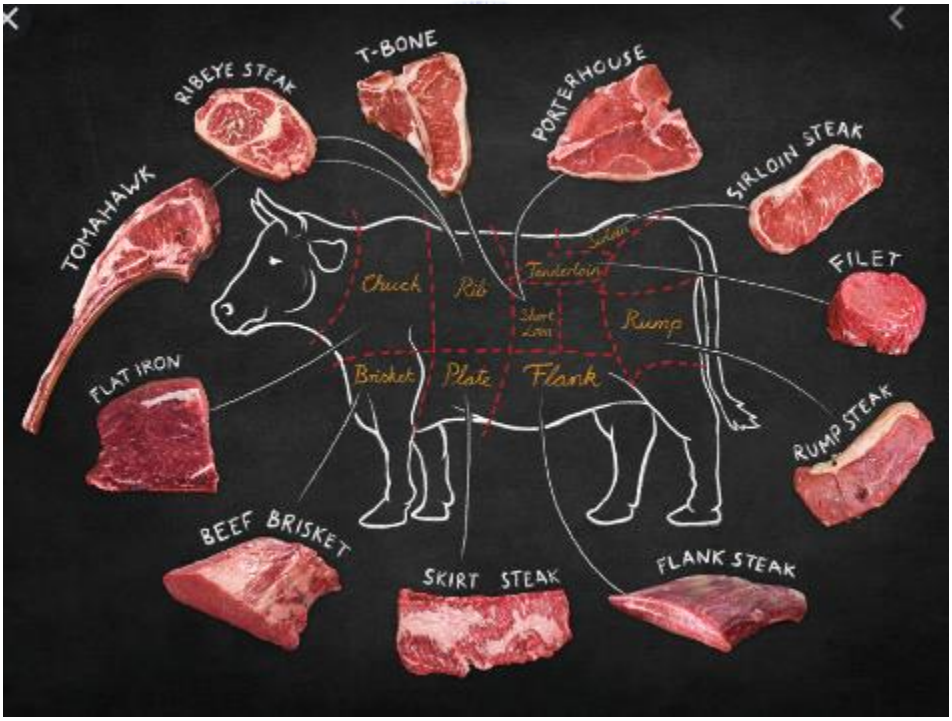
- Refer problems outside limits of your responsibility to relevant people

Trim meat cuts

- Check that the meat or poultry for trimming meets customer or organizational specifications and follow organizational procedures to deal with it if it does not
- Use appropriate tools and equipment to trim meat or poultry at the pace to meet production requirements efficiently, safely and hygienically
- Trim meat or poultry to meet customer or organizational quality and yield specifications
- Minimize waste from trimming and store for disposal
- Maintain pace of trimming to organizational requirements work within the limits of your responsibility and address problems to relevant people

Meat cut nomenclature and description

1. **Beef:** is meat derived from dressed carcasses of bovine animals having a warm weight of 160 kg or more. It may be derived from male or female animals or from steers.
2. **Dressed beef carcass:** means a beef carcass from which the skin, head, developed mammary glands and the feet at the carpal and tarsal joints have been removed and the carcass has been eviscerated and split.
3. **Beef side:** means one (1) of the two (2) approximately equal portions of a **dressed beef carcass** obtained by cutting from the tail to the neck along the median line.
4. **Front quarter:** means the anterior portion of the **beef side** which is separated from the **hind quarter** by a cut passing between the 12th and 13th rib.



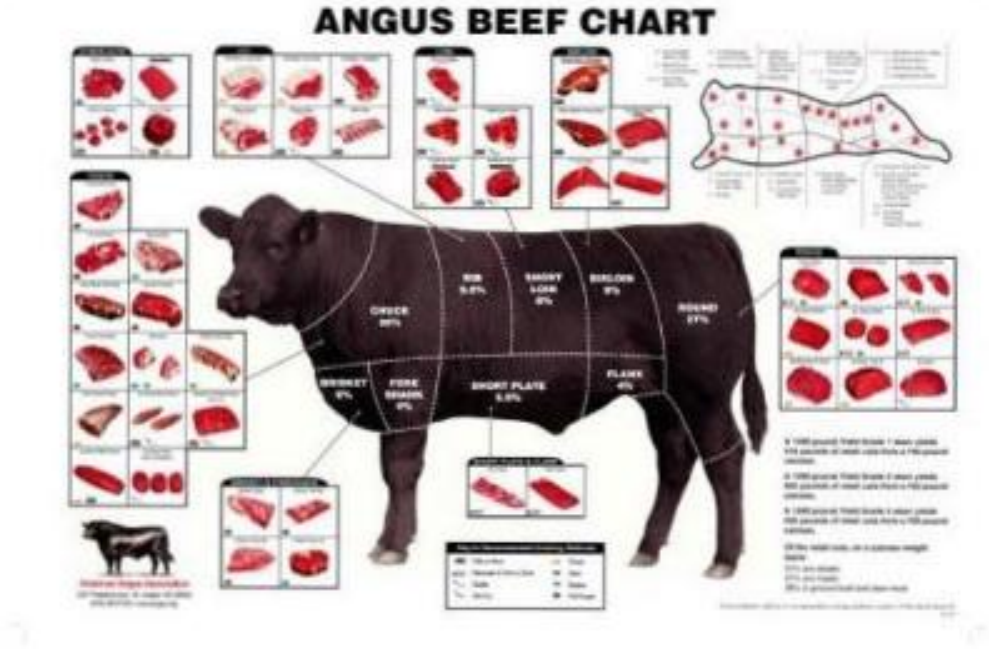


Figure___ General Meat cut parts

Information sheet 5 Handling product

Proper handling and storage are two of the most vital processes undertaken by staff once meat orders arrive at their point of sale.

Because foodborne illnesses have not been fully eradicated yet, and food storage is often subject to human error, rigid procedures need to be followed to ensure that all products arriving for sale are checked, refrigerated immediately, and stored correctly.

Poor food-handling and storage procedures can prove to be disastrous to a food service company and to customers alike.

Improper handling of meat products results in the contamination of meat and meat products which results to meat contamination in the meat industry.
The contaminated meat and meat products results for poor health during consumption and even can cause food poising to human.

Contamination of meat

- The healthy inner flesh of the meat contains few or no micro-organisms although they have been found in lymph node and bone marrow.
- Upon, death of animal, invasion of tissue by contaminating microorganisms takes place.
- In meat, microorganisms come from external source or from meat animal itself.
- Factors that influence invasion of meat by contaminating microorganisms are:
    - ✓ **The load of organism in intestine.** The greater the load, the greater will be the invasion of meat tissue. Therefore, starvation of animal for 24hrs before slaughter has been recommended.
    - ✓ **The physiological condition of the animal immediately before slaughter**:

- ✓ **The method of killing or bleeding:** The better and more sanitary bleeding method contributes less contamination.
- ✓ **The rate of cooling:** The rapid cooling will reduce the rate of invasion of meat by contaminants.

- Microorganisms are spread in the meat through the blood and lymph vessel, connective tissue spaces and by grinding in ground meat.

Microbial Spoilage of meat:

- Common type of microbial spoilage of meat can be classified on the basis of whether they occur under aerobic or anaerobic condition and whether they are caused by bacteria, yeast, or mold.

Spoilage of meat under aerobic conditions:

i. Bacterial spoilage of meat:

Surface spoilage:

It is caused by *Pseudomonas, Acenatobacter, Streptococcus, Leuconostoc, Bacillus* and *Micrococcus.*

Temperature and available moisture influence type of microorganisms causing slime.

Change in color of meat:

Red color of meat may be changed into green brown or grey due to production of oxidizing agent, H_2S, etc. by microorganisms. For example, *Lactobacillus* and *Leuconostoc* cause greening of sausage.

Change in fat:

Fat of meat may become rancid due to lipase producing microorganisms such as *Pseudomonas* and *Achromobacter.*

Surface color due to pigmented bacteria:

Serratia marcescens give red spots.

Pseudomonas syncyanea give blue color, *Chromobacterium lividum* gives greenish blue to brownish black color, *Flavobacterium* give yellow color.

Phosphorescence:

It is caused by luminous bacteria e.g. *Photobacterium* growing on surface of meat.

Off odors and off taste:

Undesirable odor and taste called taint are caused by many bacteria due to production of volatile acids such as formic acid, acetic acid, butyric acid etc.

Actinomycetes give musty or earthy flavor.

ii. Fungal spoilage of meat:

Stickness

Many molds grow on surface of meat and make it sticky to touch.

Whiskers: when meat is kept at temperature near freezing, mold grow slowly without sporulation on surface producing while cottony growth.

It may be caused by *Thamnidium, Mucor mucedo, Mucor racemosus* etc.

Black spot: It is caused by *Cladosporium herbarum.*

White spot: It is caused by *Sporotrichum carnis.*

Green spot: It is caused by *Penicillium* species.

Change in fat: Many molds produce lipase and cause hydrolytic rancidity of fat.

Off odor and off taste:

Many molds give musty flavor to meat in the vicinity of their growth.

By yeast:

Under aerobic condition, yeast grow on surface of meat causing sliminess, rancidity of fat, off odor and taste and discolorations like white, pink, brown spots.

Spoilage of meat under anaerobic conditions:

In anaerobic condition, anaerobic or facultative anaerobic bacteria spoil the meat.

Souring:

It is caused by formic acid, acetic acid, butyric acid, propionic acid, higher fatty acids and other organic acids. E.g. lactic acid produced by bacteria.

Souring may also be caused by foods own enzyme.

Putrefaction:

It refers to the anaerobic decomposition of protein with production of offensive smelling compounds such as H_2S, mercapatans, indole, skatole etc.

It is usually caused by *Clostridium* species but species of *Pseudomonas proteus* and Alkaligens may cause putrefaction.

Taint:

It refers to any undesirable odor or taste.

Spoilage of different types of meat products:

Spoilage of fresh meat:

Fresh beef

Change in hemoglobin and myoglobin so as to cause loss of bloom and production of reddish-brown methemoglobin and metmyoglobin.

White, green, yellow, greenish blue, black spots due to pigmented micro-organism's phosphorescence.

Spoilage of cured meat

Curing salts make meat more susceptible to gram +ve bacteria and mold than to gram -ve bacteria.

Spoilage of Refrigerator packaged meat:

Packaging film permitting good penetration of oxygen and CO_2 favor more aerobic bacteria such as *Pseudomonas, Acenatobacter* and *Moraxella*.

They cause spoilage like off flavor slime and sometimes putrefaction.

Film with poor gas penetration encourages lactic acid bacteria causing sourness and slime.

Preservation of meat from spoilage:

i. Asepsis

ii. Use of heat:

Self-stable canned meat:

Non-self-stable canned meat:

.iii. Use of low temperature:

Chilling

Freezing

Self-Check – 5	Written test

Name_____ ID_____ Date_____

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

Test I: choose best answer (2 point)

4. Of the following is not the factors that influence invasion of meat by contaminating microorganisms
    A. The load of organism in intestine
    B. The physiological condition of the animal immediately before slaughter
    C. The method of killing or bleeding
    D. The rate of cooling
    E. None

Test II: Short Answer Questions

1. Explain detail the common type of microbial spoilage of meat in poor handling(5 points)

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: _____

LG# 36	LO5- splitting Caracas

Instruction sheet

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

- cutting carcass into standard primal cuts
- Cutting of product
- Hanging of product
- Storing products

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:

- cut carcass into standard primal cuts
- Cut of product
- Hang of product
- Store products

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	cutting carcass into standard primal cuts

Introduction

1.1 Types of meat cuts

Primal

Sub-primal

Secondary cuts

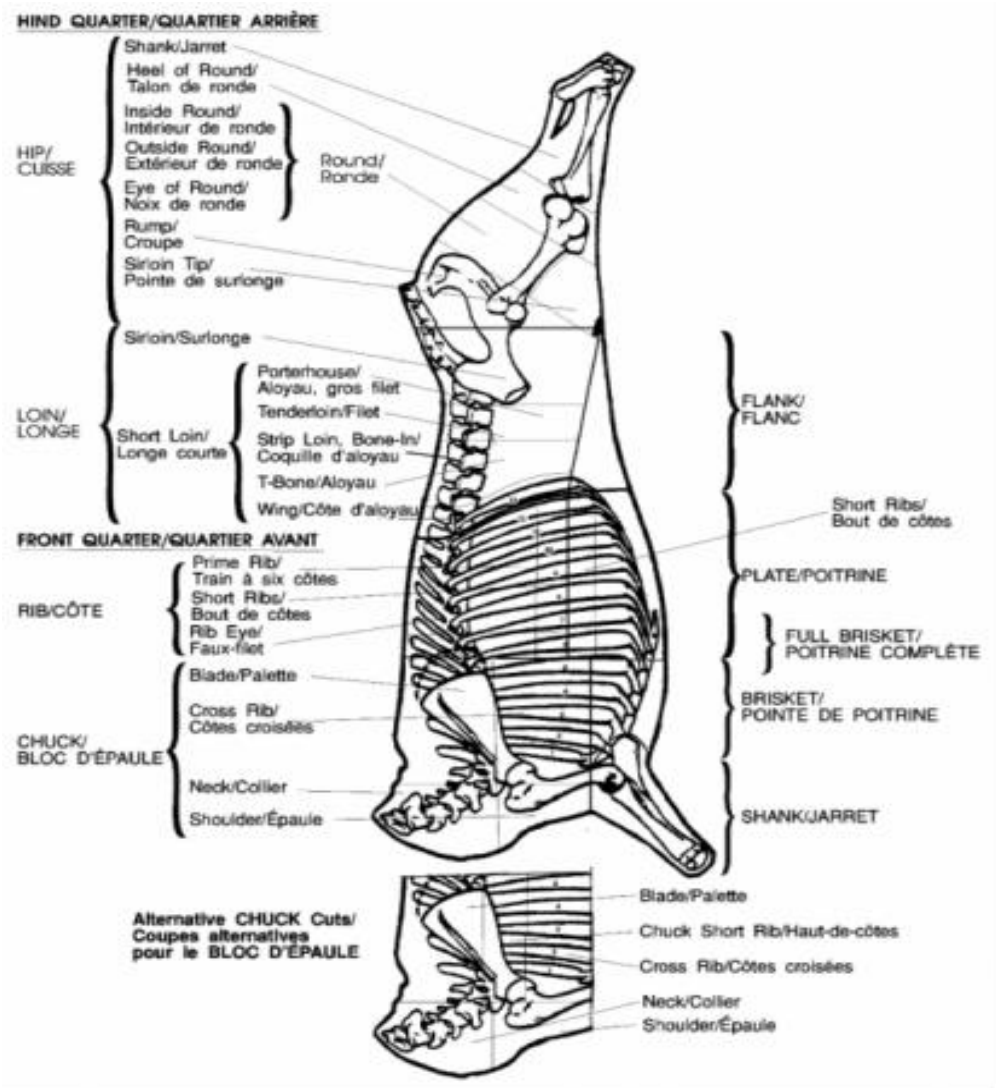


Figure 1. Beef carcass showing primal, sub-primal, and retail cuts

Primal (whole sale): beef

The beef animal is broken down into sides. A side is one-half of a dressed carcass that has been split lengthwise from the neck to the tail.

The side can then be split into the front quarter and hind quarter.

This cut is made between the 12th and 13th ribs counting from the front of the animal. The beef front quarter is heavily exercised, resulting in an abundance of connective tissue.

Moist heat cooking is required on the majority of the sub-primal from the front quarter, with the major exception being the 7-bone rib (prime rib).

The hind quarter of beef contains mostly sub-primal that can be prepared using dry heat.

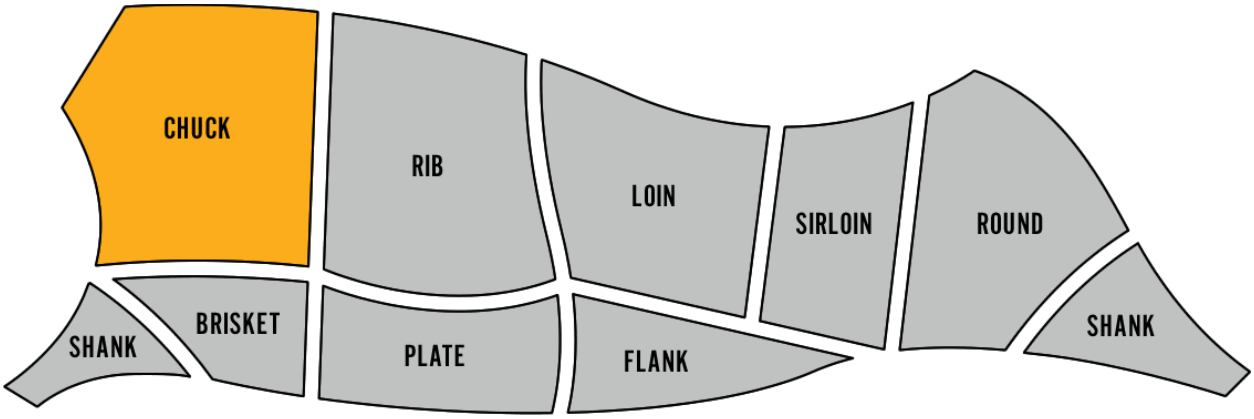


Figure 2 illustrates the primal, sub-primal, and retail cuts of beef.

Meat fabrication

Process of cutting carcass into standard wholesale (pimal) and retail cuts

General principle of meat fabrication

Tender meat is separated from tough meat

Thick portion must be separated from the thin portion

Muscle must be cut across the meat fibers/grain

Cheap part must be separated from the expensive parts

Primal cuts of beef carcasses

Front quarter

Chuck-pot roast ,ground beef

Rib/prime cut-dry-heat cooking

Brisket- corned beef

Plate /short plate-cane aseda

Shank/fore shank -osso buco

Hind quarter

Short loin –dry-heat –cooking

Sirloin-roasting and barbecuing

Tenderloin- grilling &broiling

Flank or navel – braising

Round- moist-heat cooking (i.e. Crockpot)

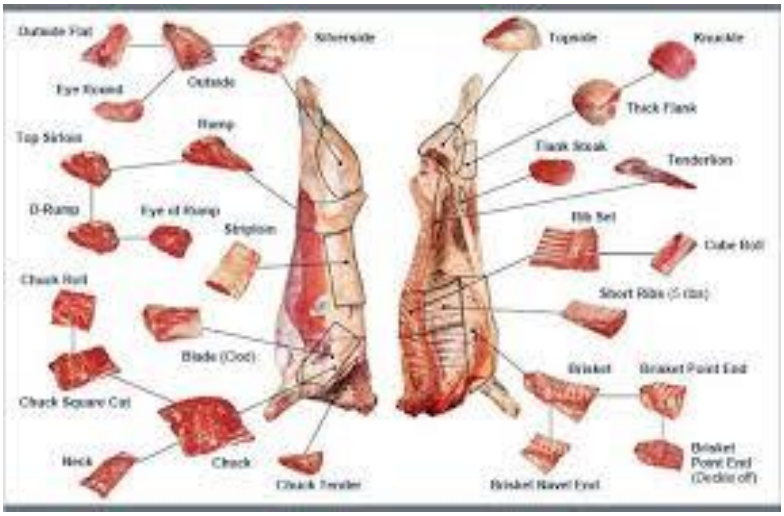


Figure 3 meat cuts

Primal cuts of beef and chevon (goat meat) carcasses

Front quarter

Neck 2. Shoulder 3. Party rack 4. Shank

Hind quarter

Loin 2. Eye of loin 3. Tender loin 4. Chump 5. Leg

Primal cuts of pork carcasses

jowl – sausages, bacon

Boston butt – sausage lard

picnic shoulder – cured or smoked

loin – dry- heat cooking (roasting)

spareribs – grilling (slowly over low temp)

side – braising

ham _ Serrano

foot _ pickled

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 point)

1. Primal cuts of pork carcasses include
   A. jowl – sausages, bacon
   B. boston butt – sausage lard
   C. picnic shoulder – cured or smoked
   D. loin – dry- heat cooking (roasting)
   E. all
2. Hind quarter chevon(goat meat) carcasses include
   A. Loin
   B. Eye of loin
   C. Tender loin
   D. Chump
   E. Leg
   F. all
3. Primal cuts of beef carcasses
   A. Front quarter
   B. Chuck-pot roast ,ground beef
   C. Rib/prime cut-dry-heat cooking
   D. Brisket- corned beef
   E. all
4. Types of meat cuts
   A. Primal
   B. Sub-primal
   C. Secondary cuts
   D. all

Test I: Short Answer Questions

1. List the General principle of meat fabrication.

2. what are the primal beef cuts

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

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

Information sheet 2 Cutting of product

CUTTING

As whole carcasses of beef or pork are too large to be easily transported in one piece, they are split into sides or cut into fore- and hindquarters. The development of meat processing introduced the need for cutting quarters, halves or whole carcasses into smaller pieces which, according to their quality and market value, are used for culinary purposes and processing respectively.

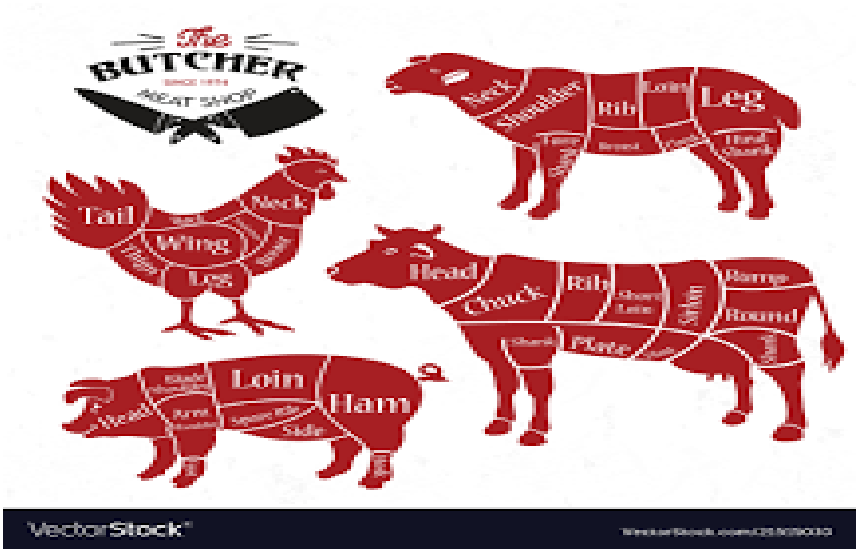


Figure1 butcher

The culinary meat in the form of primary cut is mostly sold to wholesale dealers who bone and cut it into sub-primals and finally into retail cut. The point at which wholesale cutting ends and retail cutting begins is not clearly defined.

In the traditional, small, independent butchers' shops these operations may take place on a cutting table behind the counter in order to give the butcher the maximum opportunity to select the most suitable piece of meat and prepare it in a manner which is most likely to satisfy the consumer.

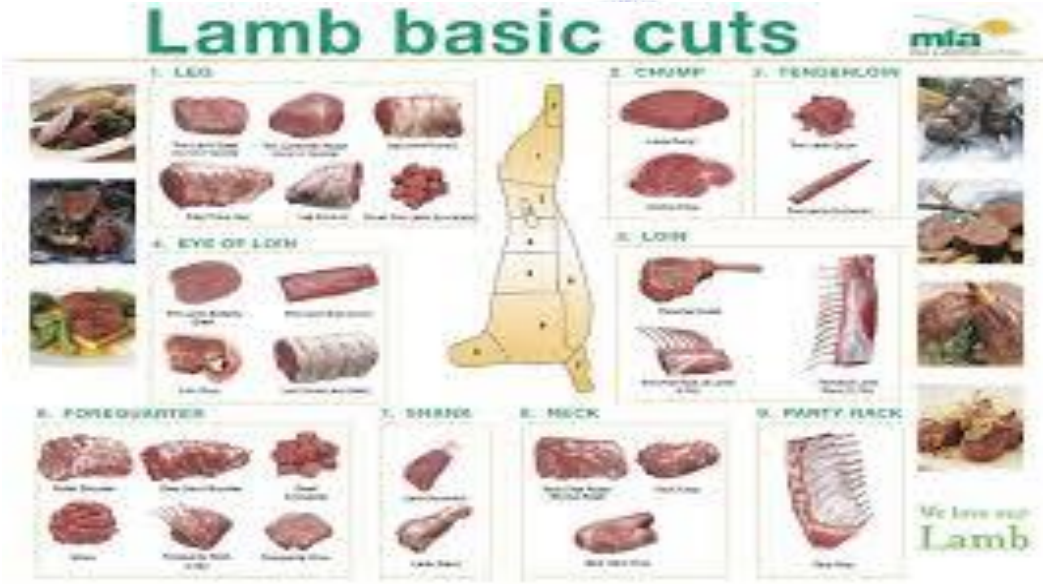


Figure.2 lamb basic cuts

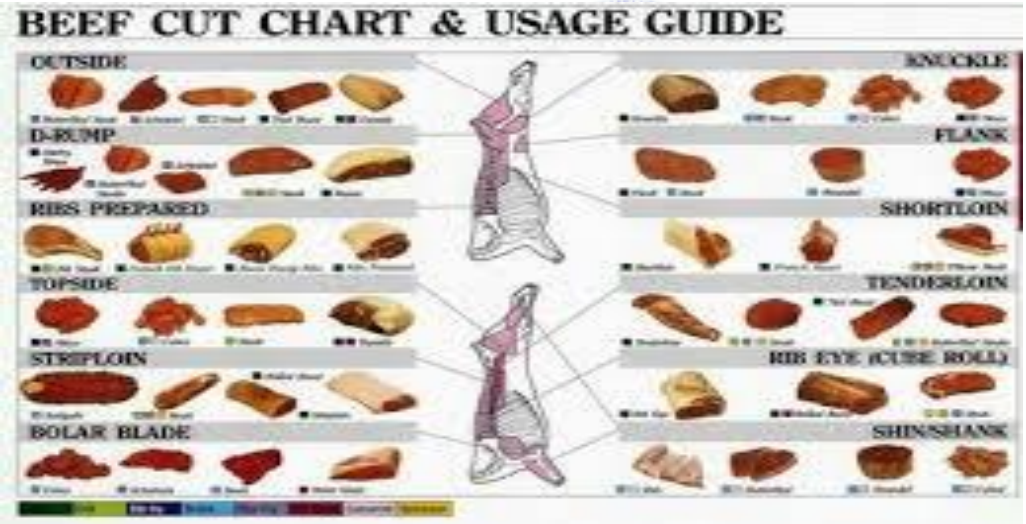
Meat for processing comprises parts of lower quality but also high-quality meat for the manufacture of special products like hams, smoked pork loins and dried meat. It can be divided into different classes according to the amount of fat and connective tissues.

There are several regional, country, and local differences in cutting the animal carcass into primary or retail cut and butchery practices vary depending on geographical location, tradition and habits, and demand for high-quality meat.

For the preparation of dried meat, two methods have been recommended. In both, carcasses are divided into two sides along the backbone. Each side is cut crosswise into two quarters which are divided into primal and retail cuts, and then boned and trimmed.

The pistola cutting system, with the side of beef quartered between the fifth and sixth ribs, allows the complete separation of all first-quality meat cuts in the hindquarters and loin regions.

After separation of the forequarters, the flank piece is removed by freeing the muscles of the abdomen from those of the proximal pelvic limb. Separation is completed by extending the cut down the side, parallel to and at a distance of some 20 cm from the backbone.



The hindquarter piece, which contains all the first-quality muscles, may be separated into the hind leg, rump and loin cuts by cutting and sawing directly across the *Bicepsfemoris* at a point just below the exposed point of the pelvic bone. The forequarter is similarly divided into two by removing the foreleg and blade cut from the thorax and neck.

According to the second method the carcass is split into sides, along the spinal column. After that, the sides are cut horizontally into two quarters: hindquarters and forequarters. The cut line runs immediately after the last rib, which excludes leaving any ribs on the hindquarters. The hindquarters are hooked by the Achilles tendon and the forequarters by the last two ribs..

In both cutting systems further division into commercial or retail cuts is usually necessary in order to separate the muscles or groups of muscles most suitable for drying from those which, by nature of their characteristics and retail value, should be sold fresh or processed by other methods.

Equipment used to cut product

solid cutting table,

oil or water sharpening stone

sharpening steel

knives(boning - 20 cm straight steak - 30 cm curved)

meat saw - hand or electric

totes, bins and meat trucks (plastic or other non-corrosive material)

wrapping table

paper or plastic foil/bags for meat wrapping

tool holder

metal mask/safety gloves

boning aprons/safety aprons

hand wash-basin

knife sterilizer

Figure 3 beef cuts

Beef cutting

Four essential points when cutting beef (or any other meat animal carcass) are:

Cut across the grain of meat when possible.

Use sharp knives and saws for speed and good workmanship.

Keep the cutting table orderly and have a place for everything.

Be clean and saintary in all operations.

Beef Chuck, Chuck Roll

This cut is generated from the blade portion of square cut chuck. The clod, chuck tender, thin outer muscle, bones and associated cartilages are removed.

Figure1.chuck roll

Beef Chuck, Short Rib Boneless

This cut is derived from bone-in short rib (130) by the removal of all bones, excess fat and intercostal meat.

Figure2 short rib boneless

Beef Chuck, Short Rib Bone In

This cut is generated from rib bones of the primal chuck. It includes 4 ribs (2nd- 5th ribs).

Figure3 Short Rib Bone In

Beef Chuck, Chuck Flap Tail

The chuck flap tail is generated from chuck roll .by the separation of chuck eye roll.A thicker portion of the Serratus ventralis muscle located near the 2nd-4th ribs is used for merchandizing purposes.

Figure 4 Chuck Flap Tail

Beef Chuck, Rope Meat

This cut is the strip-shaped Lingus coli muscle that extends from the first thoracic vertebra to the junction between the ribs and the 6th thoracic vertebra. It can also be called neck chain.

Figure5. Rope meat

Beef Chuck, Edge Roast Meat

This cut is Serratus ventralis, Rhomboids and Splenius muscles. It is separated from the chuck eye roll through the natural seam. The dorsal and ventral edges are straight cuts.

Figure6 Edge Roast Meat

Beef Chuck, Chuck Eye Roll

The chuck eye cut is separated from the chuck roll by cutting through the natural seam.

Figure7 Chuck Eye Roll

Beef Chuck, Chuck Tender

This cut is generated from the chuck. It is a single muscle (Supraspinatus) which is located at the lower portion of the scapula spinous processes. It is also called mock tender or Scotch tender.

Figure 9 Chuck Tender

Beef Chuck, Chuck Blade Bone-In

Blade is the portion of the chuck which is separated from the neck, short rib and shoulder by two straight cuts at right angles to each other and consists of the large muscle system that lies under and on top of the blade bone.

Figure 10 Chuck Blade Bone-In

Beef Chuck, Conical Muscle

This cut is a single muscle (Brachialis) that surrounds the humerus. It is removed by following the natural seam along the arm bone.

Figure 11 Conical Muscle

Beef Chuck, Pectoral Meat

This muscle cut is the Pectoral's profound. It is separated from the shoulder clod and round bone by cutting through the natural seam.

Figure 12 Pectoral Meat

Beef chuk, Square Cut Boneless

This cut has all bones and associated cartilages removed from the chuck square cut. The long cut shoulder clod is not attached. The shoulder clod may be included separately based on specified purchaser options.

Figure 13 Squares Cut Boneless

Beef Chuck, Shoulder Tender

This cut is a single muscle (Teres major) which is separated from the shoulder clod It is also called petit tender or clod tender.

Figure 14 Shoulder Tender

Beef Chuck, Short Cut Shoulder Clod

This cut is generated from the long cut shoulder clod after the removal of top blade muscle .It consists of the large muscle system of the thick end of the shoulder clod.

Figure 15 Short Cut Shoulder Clod

Beef Chuck, Top Blade Muscle

Generated from the long cut shoulder clod after separation of the shoulder clod. The muscle (Infraspinastus) lies on top of the blade bone (or paddle bone). This is separated from the blade bone and adjacent muscles through natural seams. There is a strand of sinew (connective tissue) inside this muscle.

Figure 16 Top Blade Muscle

Beef Chuck, Long Cut Shoulder Clod

This cut is inclusive of top blade muscle without being separated

Figure 17 Long Cut Shoulder Clod

Beef Chuck, Chuck Bone

This bone was attached to the neck bone.This cut usually consist of the 6th to 7th cervical vertebra (neck bone) and the 1st to the 5th thoracic vertebra. Purchaser may specify how much lean meat may stay on the bone.

Figure 18 Chuck Bone

Beef Chuck, Neck Bone

This bone is close to the head of the cattle. This cut consists of the 1st to the 5th cervical vertebra (neck bone). Some meat may stay on the bones

Figure 19 Neck Bone

Beef Chuck, Square Cut

The portion of the front quarter which is separated from primal rib, plate and brisket by two straight cuts at right angle to each other. It is a bone-in cut that has portions of the blade bone, arm bone and back bone present

Figure 20 Square Cut

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: Choose the best answer (2 point)

1. Four essential points when cutting beef (or any other meat animal carcass) are:

   a) Cut across the grain of meat when possible.
   b) Use sharp knives and saws for speed and good workmanship.
   c) Keep the cutting table orderly and have a place for everything.
   d) Be clean and sanitary in all operations.
   e) all

2, The portion of the front quarter which is separated from primal rib, plate and brisket by two straight cuts at right angle to each other

a. square cut

b. Edge Roast Meat

c. Chuck Eye Roll

d. All

Test I: Short Answer Questions

1. **Define Long Cut Shoulder Clod**
2.

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

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

Information sheet 3 Hanging of product

3.1. Hanging meat

Traditionally, meat was hung until "high" or "gamey", that is, approaching a state of decomposition.

Dry-aging beef

For dry-aged beef, the meat is hung in a room kept between 33–37 degrees Fahrenheit (1–3 degrees Celsius), with relative humidity of around 85%.

If the room is too hot, the meat will spoil, and if it is too cold, the meat freezes and dry aging stops. Good ventilation prevents bacteria from developing on the meat. The meat is checked on regularly.

Meat hanging allows processes to continue in the meat that would normally cease in dead animals. For example, the muscles in the meat continue to use the hemoglobin that is stored in the soft tissue of the animal.

This normal biological process creates lactic acid. Contrary to popular belief, animals are not completely derived of bodily fluid during slaughter as soft tissue retains some amount of fluid.

This can be well observed by cooking a steak and observing "blood" on the plate. Since the blood is no longer being circulated through the body, the lactic acid starts to break down the muscle and connective tissues around it.

The process takes at a minimum eleven days. The longer the meat is hung, the better the flavor will be, but also the higher the chance that the meat will spoil.

Most companies limit hanging to 20–30 days. Up to 10–15% of the water content may evaporate.As the meat ages, its color goes from red to purple, and the texture becomes firmer.

3.2. Popularity

The meat is 15–25% more expensive than wet-aged beef:

- ✓ dry hanging rooms are expensive;
- ✓ meat weight is reduced through evaporation;
- ✓ and some proportion of meat spoils.

After slaughter carcasses should be chilled in chilling rooms. Chilled meat is a requirement for many methods of further processing.

However, in rural areas of developing countries refrigeration facilities are generally lacking. Before cutting, carcasses should therefore be carefully examined for signs of taint caused by microbial spoilage.

Unchilled meat as a raw material is suitable for dried meat and certain meat products which undergo a heat treatment immediately after processing.

When dealing with hot carcasses, cuts and trimmings should be either consumed or processed (dried) on the day of slaughtering.

It is obvious that under these conditions good hygiene during slaughtering and meat handling is of great importance for the quality of the final product.

The higher the initial contamination, the faster the meat deterioration, especially under high ambiental temperatures.

In this context a new way of short-term meat preservation that could be especially beneficial for prolonged periods of handling of carcasses or meat cuts during transport, etc. should be mentioned.

Meat surfaces are treated with organic acids such as acetic, lactic, citric, tartaric and ascorbic acid, as well as sodium sorbate.

These compounds are from different natural foods and not toxic and may be used alone or in combination as dipping solutions or sprays on the surface of meat and meat products. Treatment of carcasses with these products has proved to be successful under conditions in developing countries.

With an aqueous solution of 20 percent sodium sorbate, 5 percent sodium acetate and 5 percent sodium chloride sprayed on warm beef carcasses, the shelf-life of meat at 25° to 35°C was doubled. However, more work is needed on the subject, especially for tropical conditions

3.3. **Carcass and meat handling and marketing without refrigeration**

Where refrigeration is unavailable either owing to financial or technical reasons (e.g. no power supply), the shelf-life of meat is reduced to days or hours, not weeks. Slaughter and dressing must be near the point of sale and it must be quick and clean.

If carcasses and meat are kept in well-insulated rooms, the temperature can be reduced with dry-ice blocks, if these are available. Since it is easier to chill boneless cuts rather than whole carcasses, hot-boning should be considered.

Stock must be handled carefully to avoid producing high-pH meat which will spoil more quickly. Rooms used for slaughter and handling meat must be clean and well ventilated, but out of direct sunlight, dust-free and verminfree (rodents and insects).

Hot water (82°C) must be available to clean all equipment and surfaces and personnel must work very hygienically. Receive all blood into sealed containers and have separate skips on wheels for hooves, skins, green offal and trimmings.

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: Choose the best answer (2 point)

4. After slaughter carcasses should be chilled in chilling rooms. Chilled meat is a requirement for many methods of further processing.
5. Meat surfaces are treated with organic acids such as acetic, lactic, citric, tartaric and ascorbic acid, as well as sodium sorbate.
6. The longer the meat is hung, the better the flavor will be, but also the higher the chance that the meat will spoil.
7. For dry-aged beef, the meat is hung in a room kept between 33–37 degrees
8. Fahrenheit (1–3 degrees Celsius), with relative humidity of around 85%.

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

Information sheet 4 Storing products

Refrigeration of carcasses

Carcasses should go into the cooler as soon as possible and should be as dry as possible. The object of refrigeration is to retard bacterial growth and extend the shelf-life.

Chilling meat post-mortem from 40°C down to 0°C and keeping it cold will give a shelf-life of up to three weeks, provided high standards of hygiene were observed during slaughter and dressing.

Carcasses must be placed in the cooler immediately after weighing. They must hang on rails and never touch the floor .

After several hours the outside of a carcass will feel cool to the touch, but the important temperature is that deep inside the carcass. This must be measured with a probe thermometer (not glass), and used as a guide to the efficiency of the cooling.

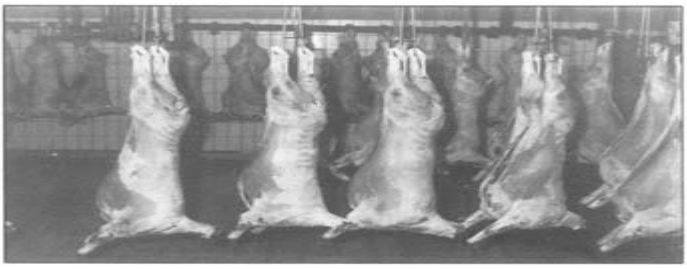


Fig. 1 Sheep carcasses in the chill-room hung on rails clear of the floor and spacallow air circulation to speed drying.

The rate of cooling at the deepest point will vary according to many factors including the efficiency of the cooler, the load, carcass size and fatness. As a general guide a deep muscle temperature of 6–7° C should be achieved in 28 to 36 hours for beef, 12 to 16 hours for pigs and 24 to 30 hours for sheep carcasses.

Failure to bring down the internal temperature quickly will result in rapid multiplication of bacteria deep in the meat resulting in off-odors and bone-taint.

Fig 2 pig carcasses in the chill-room

High air speeds are needed for rapid cooling but these will lead to increased weight losses due to evaporation unless the relative humidity (RH) is also high. However, if the air is near to saturation point (100 percent RH) then condensation will occur on the carcass surface, favoring mold and bacteria growth.

A compromise between the two problems seems to be an RH of about 90 percent with an air speed of about 0.5 m/second. Condensation will also occur if warm carcasses are put in a cooler partially filled with cold carcasses.

The cooler should not be overloaded beyond the maximum load specified by the manufacturers and spaces should be left between carcasses for the cold air to circulate. Otherwise cooling will be inefficient and the carcass surface will remain wet, favouring rapid bacterial growth forming slime (see below).

Once filled, a cooler should be closed and the door opened as little as possible to avoid sudden rises in temperature. When emptied, it should be thoroughly washed before refilling.

Personnel handling carcasses during loading and unloading operations should follow the strictest rules regarding their personal hygiene and clothing and should handle carcasses as little as possible.

Marketing of meat under refrigeration

Chilled meat must be kept cold until it is sold or cooked. If the cold chain is broken, condensation forms and microbes grow rapidly.

The same rules about not overloading, leaving space for air circulation, opening doors as little as possible and observing the highest hygiene standards when handling the meat apply.

An ideal storage temperature for fresh meat is just above its freezing point, which is about - 1°C (- 3°C for bacon because of the presence of salt). The expected storage life given by the International Institute of Refrigeration of various types of meat held at these temperatures is as follows:

Type of meat	**Expected storage life at - 1°C**
Beef	up to 3 weeks (4–5 with strict hygiene)
Veal	1–3 weeks
Lamb	10–15 days
Pork	1–2 weeks
Edible offal	7 days
Rabbit	5 days
Bacon	4 weeks (at - 3°C)

Under commercial conditions, meat temperatures are rarely kept at - 1°C to 0°C, so actual storage times are less than expected. The times would also be reduced if RH were greater than 90 percent.

Meat should be placed in the refrigerator immediately following receipt. Any parts which show signs of mould growth or bacterial slime should be trimmed off and destroyed.

Hands must be thoroughly washed after handling such trimmings and knives must be sterilized in boiling water. The refrigerator should be thoroughly cleaned after finding such meat and should also be cleaned on a regular basis.

Carcasses, quarters and large primal should not be cut into smaller portions before it is necessary as this will expose a greater surface area for bacteria to grow.

Freshly cut surfaces are moist and provide a better medium for bacterial growth than the desiccated outer surfaces of cuts that have been stored for some time.

An accurate thermometer should be placed in the refrigerator and checked regularly. The temperature should remain within a narrow range (0° to + 1°C).

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 point)

1. The rate of cooling at the deepest point will vary according to many factors including the efficiency of the cooler, the load, carcass size and fatness.
2. Carcasses, quarters and large primal should not be cut into smaller portions before it is necessary as this will expose a greater surface area for bacteria to grow.
3. Meat should be placed in the refrigerator immediately following receipt. Any parts which show signs of mould growth or bacterial slime should be trimmed off and destroyed.
4. An ideal storage temperature for fresh meat is just above its freezing point, which is about - 1°C (- 3°C for bacon because of the presence of salt).
5. Failure to bring down the internal temperature quickly will result in rapid multiplication of bacteria deep in the meat resulting in off-odors and bone-taint.

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

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

Operation sheet 1 Perform bleeding in fast and complete way

Steps to perform effective bleeding:

Step 1: the knife is stuck at the neck midline, at the depression ahead of the chest bone (sternum bone);

Step 2: the skin must be cut with the knife's tip using light pressure;

Step 3: When the knife penetrates, lower the handle so that the blade tip points toward the pig's tail;

Step 4: Section all large vessels that emerge from the heart (carotid arteries and Jugular veins);

Step 5 : the knife's cut length must produce a large and rapid blood flow.

If a good flow is not observed, the operation must be repeated. Only after bleeding is complete and death reached, should the pig proceed to subsequent stages, such as scalding and dehairing.

LAP Test	perform bleeding in fast and complete way

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 3hour.

Task 1: perform effective bleeding

Reference

Grandin, T. 2001. How to determine insensibility. www.grandin.com/humane/insesibility.html. Available as of 9/17/01

National Meat Association. 2002. Good manufacturing guidelines for the removal of spinal cord during slaughter operations and sampling and testing of advanced meat recovery product for glial fibrillary acidic protein analysis. www.nmaonline.org.

Mejlholm, O., Gunvig, A.. Borggaard, C., Blom-Hanssen, J., Mellefont, L., Ross, T., Leroi, F.. Else, T., Visser, D. & Dalgaard, P. (2010) Predicting growth rates and growth boundary of Listeria monocytogenes - An international validation study with focus on processed and ready-to-eat meat and seafood. International Journal of Food Microbiology, 141:137-150.

Pecina, P., Bonn, G., Burtscher, E. & Bobleter, O. (1984) High performance liquid chromatographic elution behaviour of alcohols, aldehydes, ketones, organic acids and carbohydrates on a strong cation-exchange stationary phase. Journal of Chromatography, 287:245-258.

Phillips, D., Jordan, D., Morris, S., Jenson, I. & Sumner, J. (2008) A national survey of the microbiological quality of retail raw meats in Australia. Journal of Food Protection, 71:1232-1236.

Web site Off-line and On-line Reprocessing and Reconditioning Procedures

anon (1987), Rapid cooling of ham. Report no. 2. Institute of Food Research – Bristol Laboratory. Chemical Engineering Group report. burfoot d,self k p,hudson w r,wilkins t j and james s j (1990),Effect of cooking and cooling method on the processing times, mass losses and bacterial condition of large meat joints. International Journal of Food Science and Technology. 25 657–667. cooko d(1985),A cooling rate survey comparing rapid chill refrigeration and walkin refrigeration in chilling cooked foods. Dairy and Food Sanitation. 5 204–208. evans j and gigiel a g (1987), Investigation of the occurrence of freezer burn on the lids of pork pies part 1. AFRC Institute of Food Research Chemical Engineering Group Industrial Report. evans j, russell s and james s j (1996), Chilling of recipe dish meals to meet cook–chill guidelines. International Journal of Refrigeration. 19 79–86.

AKNOWLEDGEMENT

We wish to extend thanks and appreciation to the many representatives of TVET instructors and respective industry experts who donated their time and expertise to the development of this Teaching, Training and Learning Materials (TTLM).

We would like also to express our appreciation to the TVET instructors and respective industry experts of Regional TVET bureau, TVET college/ Institutes, Federal Technical and Vocational Education and Training Agency (FTVET) who made the development of this Teaching, Training and Learning Materials (TTLM) with required standards and quality possible.

This Teaching, Training and Learning Materials (TTLM) was developed on October 2020 at Bishofitu federal management institute.

The trainers who developed the learning guide

No	Name	Qualification	Educational background	Region	E-mail
1	Tamirat Chanyalew	B	Animal Science	04	tamiratgeletac@yahoo.com
2	Eden H/Mariam	B	FTPE	10	hayilemariameden@yahoo.com
3	Ewunetu Bekele	A	Animal Production	04	esewunetu@gmail.com