Meat and Meat Products Processing Level II

Based on May 2011, Version 2 Occupational standards

Module Title: - Identifying Species and Meat Cuts

LG Code: IND MPP2 M11 LO (1-4) LG (40-43)
TTLM Code: IND MPP2 TTLM 0920v1

October, 2020

United Nations
Educational, Scientific and
Cultural Organization

Table of Contents

LG #40	LO #1- Identify meat cuts

Instruction sheet

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

- Identifying and selecting Meat cuts correctly by cut name and species
- Applying relevant regulatory and work place requirements.

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

- Identify and selecting Meat cuts correctly by cut name and species
- Apply relevant regulatory and work place requirements.

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

Information Sheet 1- Identifying and selecting Meat cuts correctly by cut name and species

1.1. Introduction

Carcasses- the carcass is the whole animal, minus the entrails, head, feet, and hide (except pork, from which only the entrails and head are removed). Whole carcasses are rarely purchased by food-service operators because of the skill and labor required in cutting and because of the problem of total utilization.

Naming Animal and the cut of meat

What to call market animals and the meat that comes from them can be confusing newcomers to the agriculture industry. This chart may help you explain how the names are used.

Table 1. Naming of animal and cut of meat.

Market animal name	Meat name	Latinized name
Beef, beef cattle, steer, heifer, cow, bull	Beef	Bovine
Sheep, ewe, lamb, ram, whether (immature animal)	Lamb	Ovine
Sheep, ewe, ram, whether (mature animal)	Mutton	Ovine
Hog, pig, swine, gilt, boar, barrow, sow	Pork	Porcine

Two keys points to identify variety meats be found in meat markets to successful identification are as follows:

1. Determine the species (beef, pork, or lamb). There are several differences in the three species.

Color of lean. Beef is usually a bright, cherry-red color. Color varies from light, bright red to a dark red. Pork lean varies from greyish-pink to greyish-red, while lamb cuts vary from a light, reddish-pink to a brick red.

Type of fat. Beef fat is usually firm and white, cream-white, or possibly slightly yellow in color. Pork fat tends to be white and greasy, while lamb fat is often brittle and chalk-white in appearance.

Size of cut. Beef cuts are large in size, while the same cuts from pork and lamb are usually half the size of beef. Lamb tends to produce the smallest cuts.

2. Determine the wholesale origin of the retail cut. There are seven basic groups of retail cuts: leg, round, and ham cuts; sirloin cuts; loin cuts; rib cuts; blade cuts; arm cuts; and breast, brisket, and short plate cuts.

Bone structure can sometimes be the easiest way to identify a cut. Many cuts are named by the bones contained in the cuts, and they indicate where the cuts originated from on the carcass. The shape of bones is similar in all three species, with the size of each bone varying with both age and species.

Muscle structure can also help identify a cut. For this reason, it can be very useful to understand muscle structure and how the shape of muscles differs in various cuts. Studying retail cut charts is often helpful to becoming familiar with muscle structure.

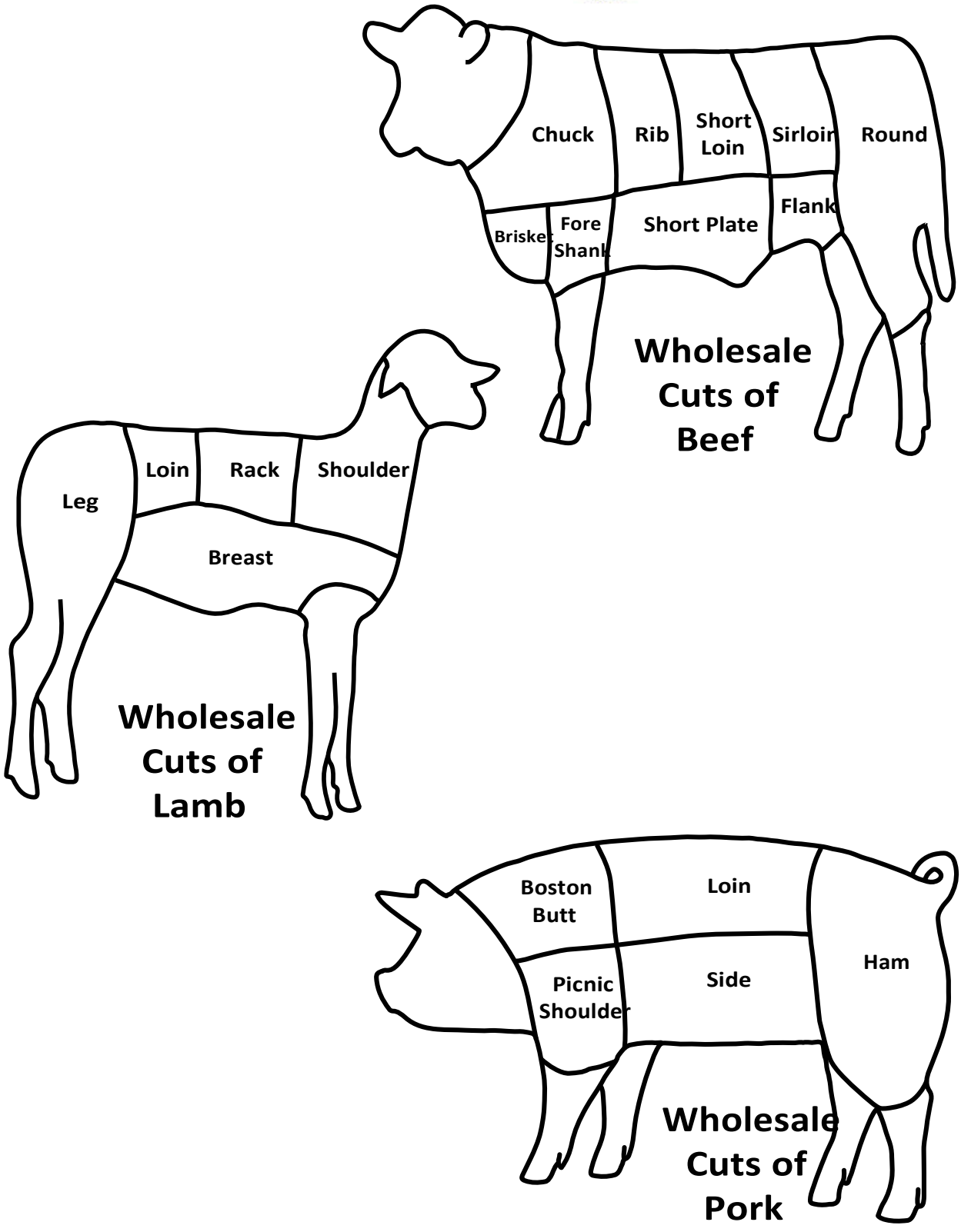


Figure 1. whole sale cut of Beef, Lamb and Pork.

The wholesale cuts of meat that are harvested from the animal are further divided into retail cuts for sale to consumers. A partial list of the retail cuts from beef, lamb and pork – separated by wholesale cut – follows. In addition, new retail cuts of meat are developed every year.

Table 2. How wholesale cuts of beef are divided into retail cuts

Wholesale cut	**Retail cut**
Brisket	Whole brisket
Chuck	Arm pot-roast
	Blade roast
	Mock tender roast
	Petite tender
Flank and short plate	Flank steak
	Shirt steak
	Short ribs
Fore shank	Shank cross cut
	Soup bones
Rib	Ribeye roast
	Ribeye steak
Round	Bottom round rump roast
	Round steak
	Tip steak
Short loin	Porterhouse steak
	T-bone steak
	Tenderloin steak (flet mignon)
Sirloin	Top sirloin steak
	Tri-tip roast
Various (from all wholesale regions)	Ground beef

Table 3. How wholesale cuts of pork are divided into retail cuts

Wholesale cut	Retail cut
Boston butt	Blade Boston roast
	Blade steak
Ham	Pork fresh ham center slice
	Smoked ham
Loin	Back ribs
	Butter y chops
	Center rib roast
	Loin chops
	Rib chops
	Sirloin chops
Picnic shoulder	Tenderloin
	Arm roast
Side	Smoked picnic
	Fresh side
	Sliced bacon
Various	Ground pork
	Sausage
	Smoked pork hock

Table 4. How wholesale cuts of lamb are divided into retail cuts

Breast	Ribs
Leg	Center slice
	Frenched style roast
	Leg roast
	Sirloin chops
Loin	Loin chops
	Loin roast
Rack	Rib chops
	Rib roast
Shoulder	Arm chops
	Blade chops
Various	Square cut
	Shank

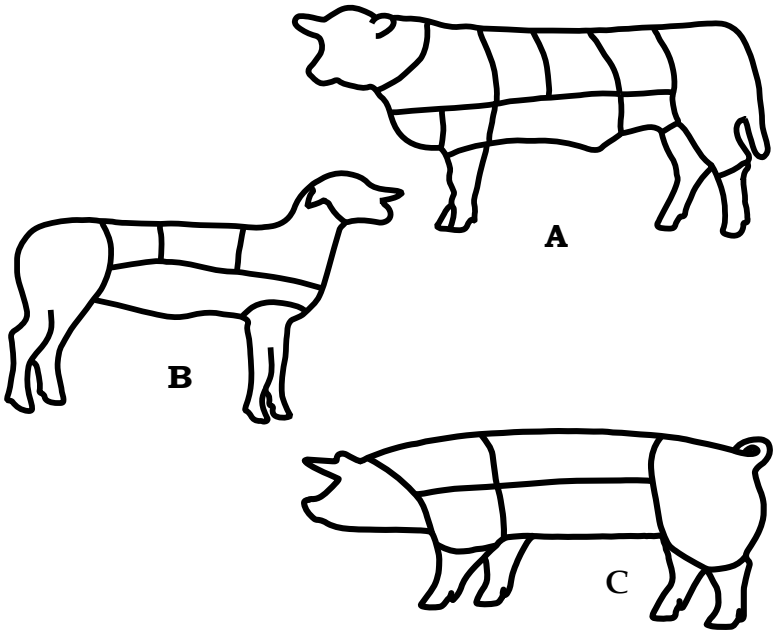
Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers. You can ask you teacher for the copy of the correct answers.

Test I: Short Answer Questions

1. Identify the species of the following picture and fill name of whole sale cut in the partition of the respected species picture. (10pts)



Test II. Fill the blank space.

1. . Beef lean meat is---------- -- color and Pork lean varies from ---------- to ---------, while lamb cuts vary from ---------- to ----------color.(5pts)

2. ----------is the whole animal, minus the entrails, head, feet, and hide. (2 pts)

Note: **Satisfactory rating - 15 points** **Unsatisfactory - below 15 points**

Information Sheet 2- Applying relevant regulatory and work place requirements.

2.1. Regulatory requirements

Personal hygiene and sanitation requirements

Meat handlers shall maintain a high degree of personal cleanliness with adequate and suitable clean protective clothing, head covering, face mask, gloves, gum boots etc. All wares should be washed, unless designed to be disposed, and should be maintained in a clean condition consistent with the nature of the work in which the person is engaged.

If wearing gloves during the slaughter and dressing of birds and the handling of meat, it has to be ensured that they are of an approved type for the particular activity, e.g. stainless-steel chain gloves, synthetic fibers, nitrile and they are used according to specifications, e.g. washing before use, changing or sanitizing gloves when contaminated.

All meat handlers working in the cutting and deboning hall must wash their hands with soap and sanitizer.

All persons entering the meat processing unit shall wash their hands step by step as mentioned below:

- ✓ Wet hands with potable water
- ✓ Apply liquid soap and make a lather for at least 30 seconds
- ✓ Apply to every part of hands including nails, between fingers, potable water followed cover full hands, and on both the sides of the hands.
- ✓ Wash with potable water
- ✓ Disinfect / dry their hands

Remove contaminants from carcass prior to cutting.

- ✓ Use approved method to remove fecal contamination as soon as possible.
- ✓ Wash carcass after removing bruises and completing inspection.
- ✓ Wash carcass from the top downward completely removing contaminants.
- ✓ When applied, clean shrouds are used after washing.
- ✓ Use microbial interventions tailored to the specific slaughter operation

Carcasses and meat cuts shall be;

- ✓ Free from visible blood clots, or bone dust
- ✓ Free from visible foreign matter (e.g. dirt, wood, metal particles, hair, skin)
- ✓ Free of offensive odor
- ✓ Free of obtrusive bloodstains) Free of contusions having material impact on the product such as
- ✓ protruding or broken bones
- ✓ Free from freezer-burn
- ✓ Free of spinal cord (except for whole unsplit carcasses)
- ✓ Of natural color
- ✓ Free from unwanted fat, bruise, spilling body fluids, aerosol and sprays of
- ✓ Insecticides

2.2. Workplace requirements

Standard Operating Procedures (SOPs)- Sanitation Standard Operating Procedures (SSOPs) document the steps that must be taken to ensure proper sanitation throughout a meat plant, both for food contact areas and elsewhere. SSOPs must be clear and detailed enough that staff following the SSOPs will clean all areas to adequately maintain food safety. SSOPs are the foundation of HACCP, and all HACCP plans must require that SSOPs are not only documented when they are performed but that they are also reviewed at least once a year.

SSOPs can be very simple or extremely complex depending on the task. An individual SSOP should include:

- ✓ **WHO** is responsible for the SSOP being performed?
- ✓ **WHAT** is to be cleaned – equipment or area identified by common name
- ✓ **WHEN** or how often the SSOP is to be performed
- ✓ **HOW** to disassemble the area or equipment, the method of cleaning and sanitizing, and tools necessary to clean the equipment or area.

There are two kinds of SSOPs: pre-operational and operational. Pre-operational SSOPs indicate how facilities and equipment are cleaned and sanitized before processing

begins. Pre-operational SSOPs are usually conducted at the end of one work day to prepare for the next work day. Operational SSOPs are about cleaning equipment and facilities during plant operations. For example, cleaning knives and surfaces, and maintaining clean aprons and/or frocks.

Self-check 2	Written test

Name…… ID……. Date…….

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

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

Test I. True or false

1. All person entering to meat process have wash their hand and wear the required PPE. (1 pt)

Test II: Short Answer Questions

1. Describe personal hygiene requirements. (5 pts)
2. List at least 3 points of regulatory requirements of meat and meat cuts. (3 pts)
   a) ----------
   b) ----------
   c)----------

3. what are the types of SOPPs (2 pts)

a) ----------

b) ----------

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

LG #41	LO #2- Identify primal cuts

Instruction sheet

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

- Identifying primal cuts by name and species
- Selecting different categories of meat primal
- Selecting and handling products considering OHS

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

- Identify primal cuts by name and species
- Select different categories of meat primal
- Select and handling products considering OHS

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).

Information Sheet 1- Identifying primal cuts by name and species

2.1. Introduction

Meat animals are generally broken down from large carcasses into primal and sub-primal cuts. These are large parts of the animal that are then further broken down into retail or restaurant cuts. In some cases, primals and sub-primals are cooked whole, but for the most part they are broken down into a number of different types of smaller portion cuts or fabricated cuts.

These include:

Roasts – boneless or bone-in large cuts that are meant to be cooked whole and then sliced after cooking into portions

Racks – most common with lamb and pork, these are a special type of roast that contains the rib bones and has been trimmed to show the white portion of the bone. Bones which have been trimmed using this process are called frenched.

Steaks and chops – boneless and bone-in individual portion cuts that are cooked and generally served whole or sliced. Chops always have a bone, while steaks can be bone in (such as a beef T-bone or pork shoulder blade steak) or boneless (such as a tenderloin or sirloin).

Cutlets – thin slices of boneless meat, usually from the leg, which can be mechanically tenderized or pounded. Small round cutlets from the loin or tenderloin are also called medallions or noisettes.

Stew or cubed meat – cubes of meat used for stews and other similar dishes

Thinly sliced or emincé – used for stir-fry and similar dishes

Ground – usually made from trim, ground meat is a mixture of lean and fatty trim that has been passed through a grinder. It can be graded depending on fat content, and can be finely or coarsely ground.

Cured and smoked – most common with pork, meat cuts that are cured using a dry or wet cure (brine) and then may be smoked

Primal cuts. Basic major cuts into which carcasses and sides are separated. Primal cuts will be further processed into **sub-primals** or into **retail cuts.** The basic concept of cutting retail cuts is to separate tender muscles from less tender muscles, to separate thick muscles from thin muscles and to separate fatter from leaner portions.

2.2. Pork cut

Before you begin the actual cutting of steaks, chops and roasts on your pig you will need to break down your pig into primal cuts. Primal cuts of meat are initially separated from the carcass during processing. These are the basic sections from which steaks and other subdivisions are cut.

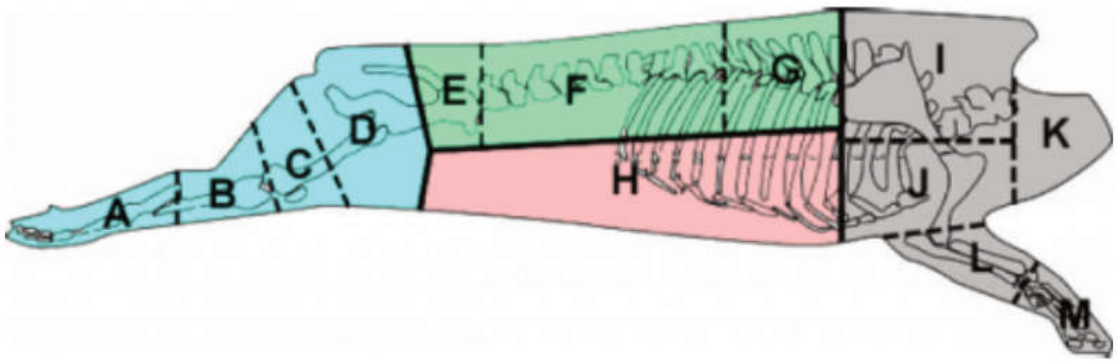


Figure 2. Pork primal and sub-primal cuts.

Table 5. Pork primals and sub-primals

Primal cut	Sub-Primal cut
Pork leg	Pork leg butt portion (D)
	Pork leg shank portion (C)
	Pork hock (B)
	Pork foot (A)
Pork loin	Pork loin rib end (G)
	Pork loin centre (F)
	Pork sirloin (E)
Pork belly	No further breakdown (H)
Pork shoulder	Pork shoulder blade (I)
	Pork shoulder picnic (J)
	Pork jowl (K)
	Pork foot (M)
	Pork hock (L)

2.3. Lamb cut

Lamb refers to young male and female sheep. They are slaughtered at approximately six months of age. The lamb carcass dressed weight is usually between 25 and 27 kg (50 and 60 lb). Because it is young, lamb is very tender, promoting dry heat cooking for most of the animal. Due to the high price per pound and small carcass size, lamb is most often marketed with the bone in. Sheep over the age of 12 months is referred to as mutton. Mutton has a much stronger flavour and is less tender than lamb.

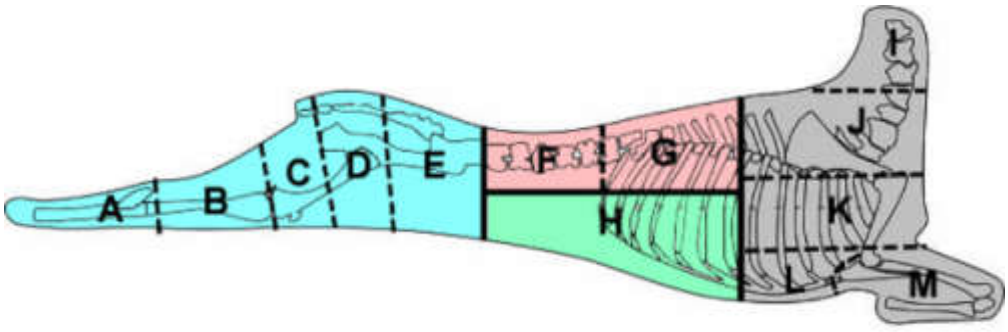


Figure 3. Lamb primal and sub-primal cuts.

The lamb carcass is broken into four primals: **front, leg, loin, and flank**. The lamb front is then broken into **four sub-primals:** the lab shoulder, neck, fore shank, and breast. The lamb leg can be left whole or split into leg shank and butt portion. The loin consists of two parts: the rib and loin. Locations of primal and cub-primal cuts of lamb are shown in Figure 3 above and Table 6 below.

Table 6. Primal and sub-primal cuts of lamb

Primal	Sub-primals
Leg	Shank (A), Leg, shank portion (B), Leg, butt portion (C and D), Sirloin (E)
Loin	Rib (rack) (G), Loin (F)
Flank	No further breakdown (H)
Front	Shoulder (J), Breast (L), Neck (I), Shank (M)

2.4. Beef cut

Beef front quarter: The beef front quarter contains four primal cuts, the brisket, fore shank, rib, and chuck (square chuck). The chuck is separated by first cutting across the carcass between the 5th and 6th ribs, which separates the chuck, brisket, and shank from the rib and plate. The second cut passes at a point slightly above the elbow joint and through the cartilage below the first (1st) rib and sternum, and separates the chuck from the brisket and shank. The rib is separated from the plate by a straight cut passing across the ribs at right angles to the first cut at a point slightly below the centre of the rib cage. The primal are then processed into sub-primal by following the cutting lines as shown in Figure 4 and Table 7 below.

Table 7. Beef primals and sub-primals from the front quarter

Primal	**Sub-Primal**
Rib	Short rib (H)
	7-bone rib (G)
Square chuck	Neck (M)
	Blade (L)
	Shoulder (N)
	Cross rib (K)
Brisket	Brisket point (J)
	Brisket plate (I)
Fore shank	No further break down required (O)

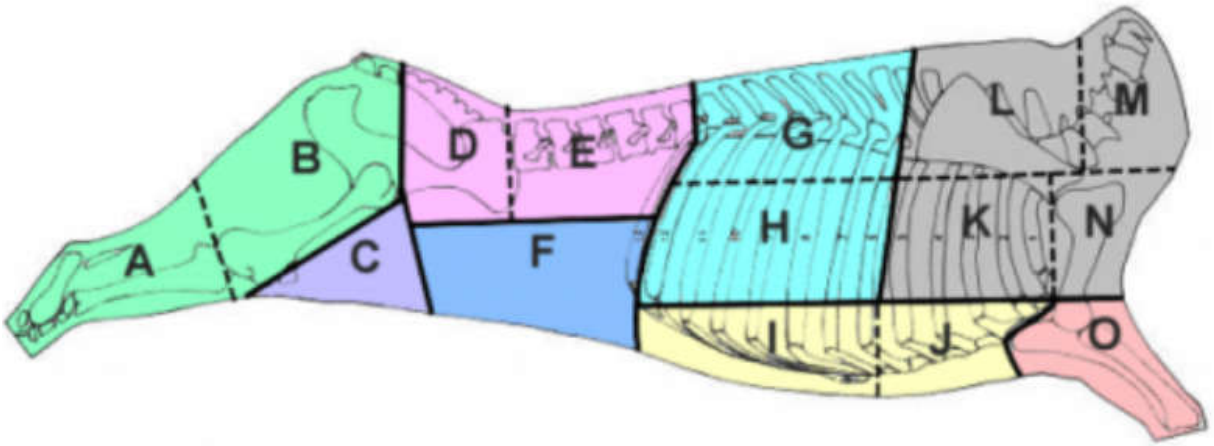


Figure 4. line of cutting

From these **sub-primal,** further usable portions are processed and retail cuts prepared for the consumer.

Beef Hind Quarter: The beef hind quarter is broken down into four primal cuts, the flank, the long loin, the hip, and the sirloin tip. The flank is separated by a straight cut passing approximately parallel to the lumbar backbone (lumbar vertebrae), beginning in close proximity to or through the flank lymph node (pre- femoral), and from the plate by a cut passing between the 12th and 13th ribs and cartilage. The hip is separated from the long loin by a straight cut that passes in front of the rump knuckle bone, thereby cutting the pelvic bone into approximately two equal parts. The sirloin tip is then separated from

the hip by a “V-shaped” cut beginning approximately at the knee cap, following the full length of the leg bone up to the rump knuckle bone, then towards the flank lymph node. The primal are then processed into sub-primal as shown in Figure 4 and Table 8.

Table 8. Beef primal and sub-primal from the **hind quarter**

Primal	**Sub-Primal**
Flank	No further break down required (F)
Long loin	Short loin (E)
	Sirloin butt (D)
Hip	Inside round (B)
	Outside round (B-opposite side of bone)
	Hind shank (A)
Sirloin tip	No further break down (C)

2.5. Poultry Cuts

Poultry refers to the edible flesh, with adhering bones, of any bird that is commonly used as food. Types of poultry include chickens, ducks, geese, turkey, quail, pheasant. All poultry is processed in a similar manner. It is either cooked whole or segmented in a number of ways depending on how it is to be used.

All segments of small, young poultry can be prepared using dry heat cooking methods. Older birds, once they stop laying eggs, are butchered and marketed as stewing hens or boiling fowl. These birds need moist heat preparation and are ideal for pot pies, stews, and soups. All poultry should be fully cooked to at least 74°C (165°F) to eliminate the presence of salmonella.

A bird can be split in half lengthwise through the backbones and keel bone, or it can be split into a front quarter and a hind quarter. The front quarter of the bird contains the breast and wing meats, while the hindquarter contains the legs. It is common to further break the poultry into segments.

For maximum yield and precise processing, poultry can be segmented by cutting through the soft natural joints of the bird. The term 8-cut chicken is used to describe a chicken segmented into two drumsticks, two thighs, and both breasts split in half across the rib bone (one half may contain the wing). This procedure is always done with the bone in. These segments can be processed further to boneless skinless cuts if desired. Figure 5 shows a fully segmented frying chicken, and Table 9 lists the common chicken cuts

Figure 5. Segmented frying chicken.

Table 9. Common chicken cuts

Whole cut	Retail Cuts
Chicken breast	Chicken breastbone in
Chicken breast boneless/ skinless	
Chicken breast fillets (or tenders)	
Chicken leg	Chicken leg (back attached)
Chicken drumstick	
Chicken thigh (bone in)	
Chicken thigh (boneless skinless)	
Chicken wing	Chicken wing (whole)
Chicken winglette (or wingette)	
Chicken wing drumette	
Chicken wing tip	
Backs and Necks	Chicken backs and necks

Self-check 1	Written test

Name…… ID…… Date…….

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

Test I: Short Answer Questions

1. List sub primal cuts of animal with the respective of primal cuts. (7 pts)

Pork primal cut	**List sub-primal cut**
Pork leg	
Pork loin	
Pork belly	
Pork shoulder	
Lamb primal cut	
Leg	
Loin	
Flank	
Front	

Test II. Matching. (9 pts)

A

1. Roast
2. Racks
3. Steak/chops
4. Cutlets
5. Stew/cubed meat
6. Thin sliced
7. Grounds
8. Curved and smoked
9. Primal cuts

B

a. Frenched
b. Boneless/bone in large cuts
c. Bone/boneless in individual cuts
d. Slice of boneless meat
e. Cubes of meats
f. Stir fry
g. Made from trimmed and ground meat
h. Most common in pork
i. Basic major cuts

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

Note: **Satisfactory rating - 15 points** **Unsatisfactory - below 15 points**

Information Sheet 2- Selecting different categories of meat primal

2.1. Veal cut

There are six primal cuts from a side of veal, the leg, flank, loin, breast, shoulder, and front shank. The front, containing the shoulder, breast, and front shank, is separated from the whole loin and flank by cutting between the 6th and 7th ribs. The breast and shank are further separated by a cut that goes from just above the joint of the arm bone perpendicular to the ribs. The shank is then separated by following the natural separation of the arm bone. The leg is separated from the whole loin and flank by a straight cut that passes in front of the pin bone. The flank is then separated from the whole loin by a straight cut approximately parallel to the backbone, passing at a point slightly above the cartilage of the 12th rib.

The primals are further broken down into sub-primals as shown in Figure *6* and Table 10 below.

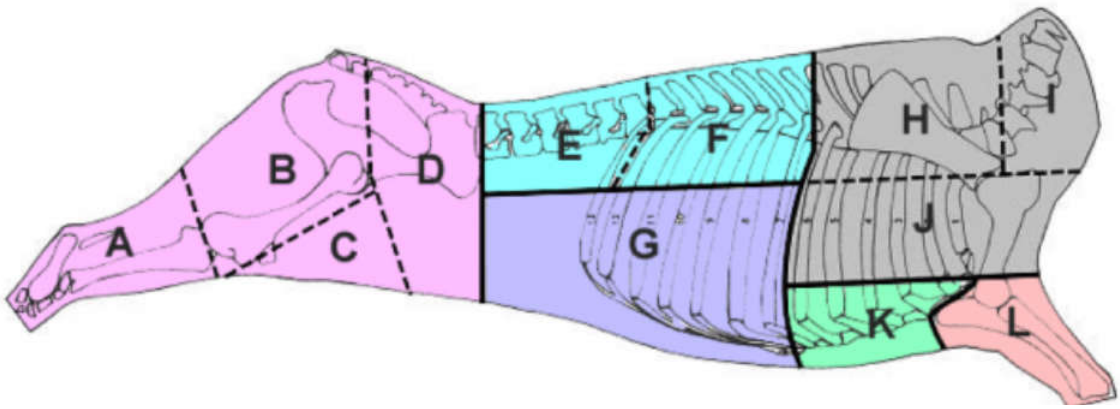


Figure 6. Veal primal and sub-primal cuts.

Table 10. Primal and sub-primal cuts of veal

Primal	**Sub-primal**
Veal leg	Leg cuts (sub-primal) and Alternative leg cuts (sub-primals)
	Shank (A) and Shank (A)
	Leg, shank portion (B, portion of C) and Heel of round (bottom portion of B), Round (B)
	Leg, butt portion (D, portion of C) and Sirloin Tip (C), Rump (top portion of B), Sirloin (D)
Veal flank	No further breakdown (G)
Veal loin	Loin (E)
	Rib (or rack) (F)
Veal shoulder	Shoulder arm (J)
	Shoulder blade (H)
	Neck (I)
Veal breast	No further breakdown (K)
Veal front shank	No further breakdown (L)

Self-check 2	Written test

Name…… ID…… Date…….

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

Test I: Short Answer Questions

1. List the primal cuts of veal in the space given in the table below. (10pts)

Primal	Sub-primal
1---------	Leg cuts (sub-primal) and Alternative leg cuts (sub-primals)
	Shank (A) and Shank (A)
	Leg, shank portion (B, portion of C) and Heel of round (bottom portion of B), Round (B)
	Leg, butt portion (D, portion of C) and Sirloin Tip (C), Rump (top portion of B), Sirloin (D)
2------	No further breakdown (G)
3-------	Loin (E)
	Rib (or rack) (F)
4--------	Shoulder arm (J)
	Shoulder blade (H)
5----------	Neck (I)
6--------	No further breakdown (K)
7--------	No further breakdown (L)

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

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

Information Sheet 3- Selecting and handling products considering OHS

3.1. OHS

Occupational safety and health (OSH), also commonly referred to as occupational health and safety (OHS), occupational health, or occupational safety, is a multidisciplinary field concerned with the safety, health, and welfare of people at occupation. These terms also refer to the goals of this field, so their use in the sense of this article was originally an abbreviation of occupational safety and health program/department etc.

The goal of an occupational safety and health program is to foster a safe and healthy occupational environment. OSH also protects all the general public who may be affected by the occupational environment. In common-law jurisdictions, employers have a common law duty to take reasonable care of the safety of their employees. Statute law may, in addition, impose other general duties, introduce specific duties, and create government bodies with powers to regulate occupational safety issues: details of this vary from jurisdiction to jurisdiction.

The essential requirements for personnel working in production area and stores are those mentioned below:

- ✓ Protective clothing, footwear and headgear issued by the company must be worn and must be changed regularly. When considered appropriate by management, a fine hairnet must be worn in addition to the protective headgear provided. Hair clips and grips should not be worn. Visitors and contractors must comply with this regulation.
- ✓ Protective clothing must not be worn off the site and must be kept in good condition. If it is in poor condition the supervisor should be informed immediately.
- ✓ Beards must be kept short and trimmed, and a protective cover worn when considered appropriate by management.
- ✓ Nail varnish, false nails and make up must not be worn in production areas.

- ✓ False eyelashes, wrist watches and jewellery (except wedding rings or the national equivalent, and sleeper earrings) must not be worn.
- ✓ Hands must be washed regularly and kept clean at all times.
- ✓ Personal items must not be taken into production areas unless carried in inside overall pockets (handbags, shopping bags must be left in the locker provided).
- ✓ Food and drink must not be taken into or consumed in areas other than the tea bars and the staff restaurant.
- ✓ Sweets and chewing gum must not be consumed in production areas.
- ✓ Smoking or taking snuff is forbidden in food production, warehouse and distribution areas where 'No Smoking' notices are displayed.
- ✓ Spitting is forbidden in all areas of the site.
- ✓ Superficial injuries (cuts, grazes, boils, sores and skin infections) must be reported to the medical unit or nurse via the supervisor and clearance obtained before entering production areas.
- ✓ Dressings must be waterproof and contain a metal strip as approved by the medical unit.
- ✓ Infectious diseases (including stomach disorders, diarrhoea, skin conditions and discharge from eyes, nose or ears) must be reported to the medical unit or nurse via the supervisor. This also applies to staff returning from travel abroad where there could be a risk of infection.
- ✓ All staff must report to medical unit on return from both certified and uncertified sickness.

Self-check 3	Written test

Name…… ID…… Date…….

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

Test I: Short Answer Questions

1. Write the essential requirements for personnel working in production area and stores. (4 pts)
2. Define OHS. (1 pt).

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

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

LG #42	LO #3- Prepare the deboning and filleting equipment and process for operation

Instruction sheet

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

- Washing and chilling carcasses or pieces
- Cleaning and setting equipment components
- Identifying and fitting personal protective clothing and equipment
- Check and adjust equipment performance
- Conducting pre-start checks to workplace procedures
- Identifying Meat deboning and cutting equipment's

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:

- Washing and chilling carcasses or pieces
- Cleaning and setting equipment components
- Identifying and fitting personal protective clothing and equipment
- Check and adjust equipment performance
- Conducting pre-start checks to workplace procedures
- Identifying Meat deboning and cutting equipment's

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).

Information Sheet 1- Washing and chilling carcasses or pieces

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 favors 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.

2.2. Chilling

Chilling is the process of cooling meat while the meat remains above its freezing temperature. The temperature of the cooling medium (air or water, for instance) doesn't matter and the lower the temperature the slower is bacterial growth and the chemical reactions that take place post-mortem. Chilling serves to transfer heat from carcasses and offal to other objects.

To chill carcasses the temperature must be lower than the surface temperature and forced convection (from fans) carries heat away from the surface more quickly which is

replaced by internal heat through conduction until the temperature of the carcass equilibrates with the surrounding temperature.

Rapid chilling in the early part of the chill cycle gives good microbial control and low weight loss. This can however produce tough meat through “cold shortening” and also dry the surface degrading the appearance. Also, if chillers are pre-cooled before they are loaded; to aid rapid chilling, condensation will form on overhead structures. Commonly much water is sprayed onto the carcass during dressing to satisfy regulations, but this does not remove bacteria and instead spreads them over the carcass. Minimizing the use of water will limit bacterial spoilage and help to reduce condensation in chillers.

There are separate conditions for hot boning of carcasses.

- ✓ All carcasses must be placed under refrigeration within 2 hours of stunning.
- ✓ Surface temperatures of carcasses, sides and quarters shall be reduced to 7°C within 24 hours of stunning.

A range of chiller temperatures for sheep carcasses applied commercially from –2°C to 8°C. Export works producing a chilled product were characteristically using temperatures below 2°C for export product. If product was to be boned for the local market, higher temperatures were used.

Abattoirs operating chillers at <1°C could be expected to produce some “cold shortened” carcasses, although this would minimize moisture loss which is less for fatter carcasses.

- ✓ Air movement in the chiller should be uniform. Ideally the air velocity over carcasses should be about 0.5 to 1 m/s in the early part of chilling, but the air velocity can be reduced to 0.2 m/s in the later stages for storage of chilled lamb. The air velocity off the face of the evaporators should be no more than 4 m/s.
- ✓ Carcasses must be spaced in the chiller so that there is air movement over all surfaces. Touching surfaces cool slowly and do not dry. They provide ideal conditions for microbial growth.

- ✓ At the start of loading a chiller, the chiller air temperature (and chiller surfaces) should be at or above the temperature that can be maintained during loading. Typically, the air temperature during loading is 5–10°C. If the chiller is pre-cooled below 5 °C and the air temperature rises during loading, condensation will occur.
- ✓ Chilling conditions vary depending on what temperature is required in what time. Fast chilling rates are needed if, for example a load-out temperature of 7 °C must be achieved within 12 hours of slaughter.
- ✓ Chilled lamb carcasses for export are required to reach colder temperatures and will often be chilled in a chiller set at -1 to 0 °C. For meat chilled in cartons the heat transfer is different and the thermal resistance of the packaging and trapped air increase the time required to lower the meat's temperature. For this reason, cartooned meat should be stored in chillers operating at lower temperatures.

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: True or false

1. Chilling serves to transfer heat from carcasses and offal to other objects. (1 pt)
2. A range of chiller temperatures for sheep carcasses applied commercially from –2 °C to 8 °C. (1 pt).
3. Rapid chilling in the early part of the chill cycle doesn't gives good microbial control and low weight loss. (1pt).

Test II: Short Answer Questions

1. Define chilling and write-down the use of chilling carcasses. (3 pts)
2. Explain the purpose of washing carcass. (3 pts)

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

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

Information Sheet 2- Cleaning and setting equipment components

2.1. Cleaning

Cleaning is the complete removal of food soil using appropriate detergent chemicals under recommended conditions. It is important that personnel involved have a working understanding of the nature of the different types of food soil and the chemistry of its removal.

Cleaning Methods

Equipment can be categorized with regard to cleaning method as follows:

i. **Mechanical Cleaning**. Often referred to as clean-in-place (CIP). Requires no disassembly or partial disassembly.

Clean-out-of-Place (COP). Can be partially disassembled and cleaned in specialized COP pressure tanks.

ii. **Manual Cleaning**. Requires total disassembly for cleaning and inspection.

2.2. Sanitization

It is important to differentiate and define certain terminology:

Sterilize refers to the statistical destruction and removal of all living organisms.

Disinfect refers to inanimate objects and the destruction of all vegetative cells (not spores).

Sanitize refers to the reduction of microorganisms to levels considered safe from a public health viewpoint.

Appropriate and approved sanitization procedures are processes, and, thus, the duration or time as well as the chemical conditions must be described. The official definition (Association of Official Analytical Chemists) of sanitizing for food product contact surfaces is a process which reduces the contamination level by 99.999% (5 logs) in 30 sec.

General types of sanitization include the following:

Thermal Sanitization involves the use of hot water or steam for a specified temperature and contact time.

Chemical Sanitization involves the use of an approved chemical sanitizer at a specified concentration and contact time.

A seven-step process is commonly used for manual cleaning of hand tools, equipment, and facilities in the meat or delicatessen preparation areas. This involves the following:

1. Dry clean the area, picking up all scraps of meat, paper, etc.
2. Scrape equipment with a rubber scraper to remove as much contamination as possible.
3. Rinse all surfaces with lukewarm water of about 100˚F to 120˚F.
4. Wash with an alkaline solution and brush.
5. Rinse with hot water of about 180˚F.
6. Sanitize with a chemical solution.
7. Let drip dry or remove excess water with a clean rubber scraper

Cleaning does not remove all the bacteria. Therefore, chemical sanitizing of all food contact surfaces is necessary. Either chlorine or iodine compounds should be used at strengths of 100 to 200 ppm and 12 to 25 ppm, respectively. Chlorine is less expensive and readily available as bleach. However, it is irritating to skin and corrosive for metal surfaces. Iodine compounds are much less corrosive and less irritating to your skin. To be sanitized, surfaces must be clean. Contact time of at least 30 seconds is necessary. Put equipment on racks to drain, if possible. With a clean rubber scraper, remove excess moisture from surfaces that will not drain.

Self-check 2	Written test

Name…… ID…… Date…….

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

Test I: Short Answer Questions

1. Define cleaning. (2pts)
2. Write the two-cleaning method(2pts)
   a) ----------
   b) ----------

Test II. Fil the blank space

1. **--------** refers to the statistical destruction and removal of all living organisms. (1pt)
2. **-**---------refers to inanimate objects and the destruction of all vegetative cells (not spores). (1pt)
3. **-**---------refers to the reduction of microorganisms to levels considered safe from a public health viewpoint. (1pt)

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

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

Information Sheet 3- Identifying and fitting personal protective clothing and equipment

There are several measures that can deal effectively with safety and health problems. First, appropriate PPE needs to be provided. The personnel working in the plant are required to have good health, are properly attired with aprons, head wears, mouth mask, hand gloves, and gum boots. PPE does not eliminate risks, but it can protect workers if used properly. PPE must be fit for purpose and you have a responsibility to wear it, look after it and when it needs replacing to bring this to the attention of your employer. PPE is covered by Health and Safety legislation, whereas the need for hygiene clothing is covered by various Food Safety Laws.

Hygiene clothing- When handling meat it is essential that your outdoor, everyday clothes are covered. The important reason for this is to protect the product from any loose material such as hairs or fluff which might fall from your clothes onto the meat. Remember you are handling meat. People will eventually eat what you are producing.

Head coverings

- ✓ Either a hairnet or hat with a snood which completely encloses the hair;
- ✓ Beard net - moustache or beard should also be completely covered.

Overalls

- ✓ Everyday clothing covered by a clean washable overall;
- ✓ Waterproof apron – disposable or washable;
- ✓ Disposable plastic sleeve protectors.

Footwear

White rubber Wellington boots – waterproof and cleanable. Never wear outdoor shoes in a meat preparation area – if wearing special boots is impractical, outdoor shoes should be covered with disposable plastic boot covers. And, don't wear your rubber boots outside of the work area as you don't know what you will pick up on the soles.

Maintaining Clothing

Your hygiene clothing must be kept clean, to help prevent contamination of the products.

- ✓ When you have finished work, scrub clean your apron and boots, wash them with a dilute solution of detergent or bactericidal cleaner and leave to dry;

- ✓ Alternatively, you may have a cleaning service to do this for you;
- ✓ Fabric items, such as overalls and cloth hats must be laundered after each processing session.
- ✓ Disposable items must be used once only. Use fresh each time.

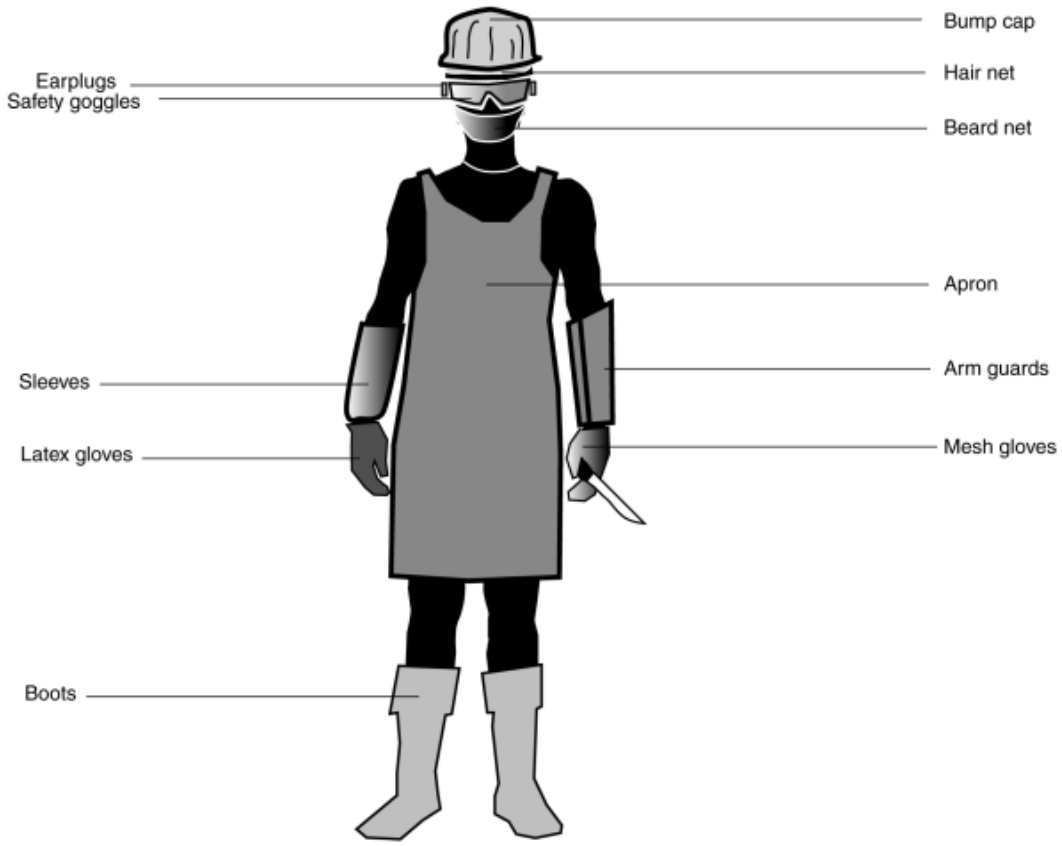


Figure 7. Safety and Other Equipment Worn by Meat and Poultry Production Workers

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: Matching(6pts)

A	**B**
1. Head coverings	a. White rubber Wellington boots
2. Overalls	b. Waterproof apron
3. Footwear	c. Either a hairnet or hat

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

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

Information Sheet 4- Check and adjust equipment performance

The purpose of an inspection/check is to identify whether work equipment can be operated, adjusted and maintained safely with any deterioration detected and remedied before it results in a health and safety risk. Not all work equipment needs formal inspection to ensure safety and, in many cases, a quick visual check before use will be sufficient. However, inspection is necessary for any equipment where significant risks to health and safety may arise from incorrect installation, reinstallation, deterioration or any other circumstances. The need for inspection and inspection frequencies should be determined through risk assessment.

Cutting, boning, slicing and dicing of fresh meat product are done, by present industry practices, either manually (hand saws, knives, wizards and electric saws) by designated employees or by automated equipment (such as may be used for poultry cutting and breast boning). In either case, the operator's Control Programs must include procedures that address the build-up of product material on the equipment, to minimize cross contamination of product over time on a given production line.

For effective, safe and consistent operation, equipment, instruments and measuring devices that have an impact on food safety must be calibrated and/or verified to ensure that they are performing accurately. Both calibration and verification may be required in a meat plant. Calibration is the process of standardizing a measuring instrument to ensure it will measure within the specific range in which it was designed to operate.

Manufacturers' recommendations, operating conditions, age of the equipment and history of the equipment breaking down are factors that should be considered when determining appropriate calibration and verification frequencies. Timing of the calibration/ verification must also be considered. For example, metal detectors must be calibrated at the beginning of each product run and thermometers which are dropped on the floor must be verified before use. Written procedures for calibration and verification are important so that the same procedure is carried out every time a particular piece of

equipment is calibrated or verified. This is essential when different people will be carrying out the procedures.

Only persons who are trained in the procedure for that instrument or piece of equipment should be assigned that responsibility. Records of calibration activities are required.

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 (2pts)

1. For effective, safe and consistent operation, equipment, instruments and measuring devices must be calibrated.
2. Calibration is the process of standardizing a measuring instrument to ensure it will measure within the specific range in which it was designed to operate.

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

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

Information Sheet 5- Conducting pre-start checks to workplace procedures

Pre start checks are pretty much exactly what they sound like, they are checks made to something - most often a piece of plant, equipment or machinery - prior to that thing being started or used; or checks made prior to doing something specific - like a day's work or specific hazardous activity.

Pre-starts often involve routine inspections conducted by the machine or equipment operator. Because of this, pre starts often take the form of a pre start checklist or inspection form. The idea behind a pre start is that the best way to avoid issues is to be proactive, to take the time to inspect equipment or situations prior to them beginning. A few basic checks on known risks and problematic areas can drastically reduce risk and potential consequence.

Pre start checks are most common in heavy industries like food industry, construction, oil and gas, mining and manufacturing. They are also an everyday occurrence across all walks of life, with people performing basic and intuitive checks before they perform many activities and tasks.

Importance of pre start checks

The most obvious reason for why they are important is for human safety. Heavy machinery or equipment which malfunctions is not just a project or financial risk, it can result in serious injury or death to people. Pre starts are one of the most relied upon and basic safety steps for almost any company who engages with dangerous equipment or activities. Pre starts protect the operator as well as other people on site, on the factory floor etc.

The less known and less focused on benefit of pre start checks are the financial gains which companies and projects get from doing good pre starts regularly. Pre starts enable companies to catch small/minor issues before they snowball into bigger issues. Catching minor issues which take minutes or hours to repair also minimizes the chance

of large-scale repairs and downtime, which has a very real cost in terms or production and productivity.

Pre starts are crucial for safety and an important part of good asset and equipment management.

While some meat production industries and operators perform intuitive pre starts, it's really important for a company to have a standardized and systematic approach to performing pre starts - which typically involves codifying what needs to be checked off and inspected for the object at hand.

A simple checklist can ensure that an operator or whoever is conducting a pre start does it in a standardized and comprehensive manner, further reducing the likelihood of injury or issue.

The exact layout and contents of a pre start are of course equipment or activity specific, with a vehicle pre start likely being different to a stationary machine pre start. But many of the principles are the same, and you probably only need to make a few tweaks to your master pre start template to adapt it to your different pieces of equipment or processes.

The below example gives you a good idea of the depth of a good pre start, and the layout which makes it relatively easy to complete and then interpret later.

Daily pre starts are a common sight and activity on many meat industrial sites. Pre starts provide a forum for workers, supervisors and other personnel to come together and discuss key or highly contextual safety issues and topics.

As you can see from this daily pre start template, daily pre starts usually include time for:

- ✓ Identifying safety concerns and reporting on actual issues from previous days
- ✓ Implementing changes to site to rectify the above issues
- ✓ Summarizing the work taking place in different areas today
- ✓ Flagging specific work and safety permits
- ✓ Getting sign offs from people in attendance

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: true or false (4pts)

1. Pre starts often involve routine inspections conducted by the machine or equipment operator.
2. Importance of pre start checks is reason for human safety.
3. Pre starts are crucial for safety and an important part of good asset and equipment management.
4. The idea behind a pre start is that the best way to avoid issues is to be proactive.

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

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

Information Sheet 6- Identifying Meat deboning and cutting equipment's

6.1. Equipment for the meat-cutting and deboning

Oil or water sharpening stone - sharpening stones. It is the collective term for all stones you use to sharpen knives, chisels, scissors, axes, in short everything with an edge. There are natural sharpening stones that are taken directly from nature, and artificial sharpening stones that are produced in a factory. The last group is often categorized based on the sharpening material used, or the country of origin.

Figure 8. water sharpening stone

Sharpening steel- The function of sharpening steel removes material from your knife. By moving the edge alongside the steel remove steel to restore the V-shape of the edge. A sharpening steel can therefore be used to sharpen knives that have become blunt after frequent use. If you would use a sharpening steel on a daily basis little would be left of your blade after some time.

Figure 9. Sharpening steel

Boning Knife

Narrow blade, straighter edge

- ✓ Sharp tip
- ✓ Slightly stiffer/less flexible than filleting knife
- ✓ Approx. 5 – 6.5 inches in length
- ✓ Best used: to debone and break down thick cuts of meat (beef and lamb, some poultry parts).

Figure 10. Boning Knife

Filleting Knife

- ✓ curved blade
- ✓ Sharp tip
- ✓ Very thin/more flexible than a boning knife
- ✓ Ranges in size from 6 to 11 Narrow inches
- ✓ Best used: to debone fish as well as certain parts of poultry (small joints, removing skin, separating breast fillets)

Figure 11. Filleting Knife

Hand meat saw - these saws will quickly and easily cut through meat and bone. Each saw is made of hardened stainless steel with a razor-sharp high carbon stainless steel blade and heavy-duty riveted handle!

Figure 12. Manual meat saw

Electric meat saw- used for cutting of meat by using electric power.

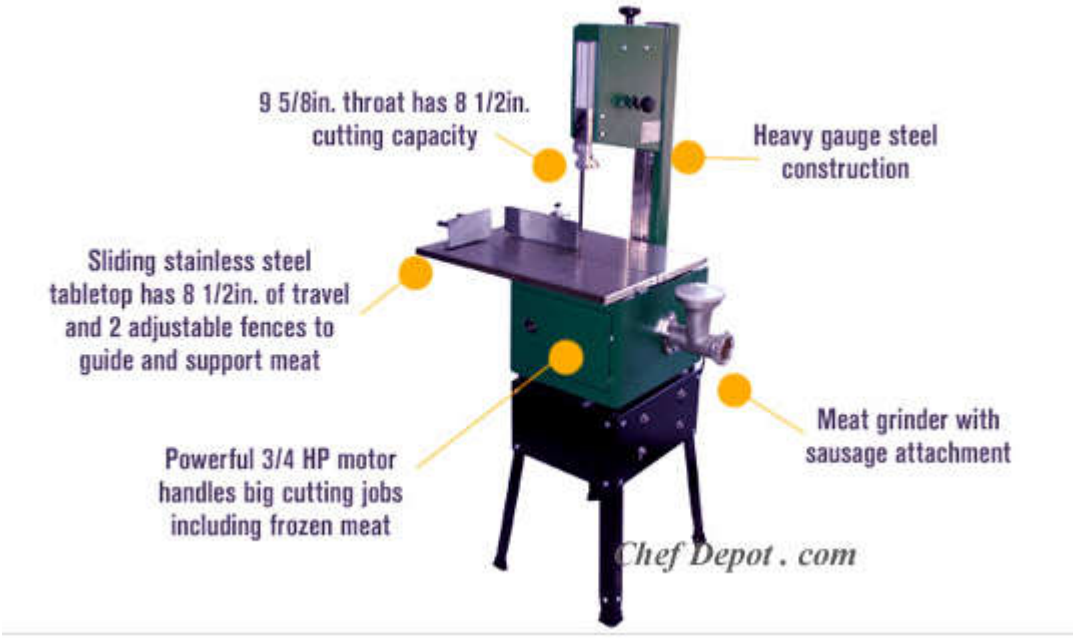


Figure 13. Electric meat saw

Totes and bins (plastic or other non-corrosive material) -used for storing meat while cutting meat.

Figure 14. Totes and bins

Table- solid cutting table, preferably made of non-corrosive material (stainless steel, aluminum or galvanized material) with hard plastic top. If wood has to be used instead of plastic only tight wooden tops/cutters should be used.

Figure 15. Table-

Cone deboning table-used for deboning poultry that by inserting the cone in to the eviscerated body of poultry after that remove the bone from the meat.

Figure 16. Cone deboning table

Meat hook tool holder from Bucket Boss holds most cordless tools and nailers. The hook rotates 360 degrees and the stainless-steel clip fits most tool belts and pouches.

Figure 17. Meat hook tool holder

Safety gloves- Constructed of high tensile strength, corrosion-resistant solid stainless-steel rings. Each ring is individually welded for maximum strength and flexibility, providing a high level of protection against cuts, slashes and laceration hazards in manual cutting operations.

Figure 18. Safety gloves

Boning aprons/safety aprons- constructed of high tensile strength, corrosion-resistant solid stainless-steel rings. Each ring is individually welded for maximum strength and flexibility, providing a high level of protection against cuts, slashes and laceration hazards in manual cutting operations.

Figure 19. Boning aprons

Hand wash-basin- With strong pedestal support, Washbasin is a perfect hand-washing solution for large production areas with a considerable number of personnel.

Figure 20. Hand wash-basin

knife sterilizer- Sterilizers electric knives UVC lamps. Stainless steel. Capacity 10 or 20 knives. Support knife in rack or with magnet. Professional Equipment reliable, secure, easy to use, in accordance with HACCP. Essential for the safety and hygiene of

the knives. The lockers sterilizers thanks to UV-C ultraviolet germicidal properties with (against bacteria, viruses, spores, fungi, molds, mites) provide a thorough cleaning and decontamination total mandatory on the knives used in the food industry.

Figure 21. knife sterilizer

Sternum cut saw- To cut sternum and hip. Great power in reduced size. Motor armored tight. Easy sterilization. Complies with international standards of safety and hygiene.

Figure 22. Sternum cut saw

Hydraulic saw- Ideal for: Cut ribs in hot or cold and cuts. Removing broken spine and front and chest quarters. Marking bovine hams and shoulders. Constructed entirely of stainless steel.

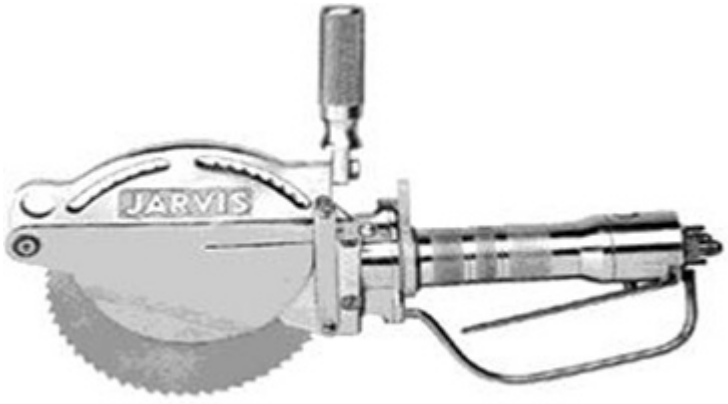


Figure 23. Hydraulic saw

Hydraulic saew HBS-3- Fast Walking across the chest pig/ beef. A single operator can handle more than 1000 pigs / hour. Total length short, light weight and adjustable handles for optimum handling. Robust design, made of stainless steel high-performance, cutting long and smooth. Controls anti-grip and instant stoppage disk for operator safety.

Figure 24. Hydraulic saew HBS-3

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: choose best answer (2 pts)

1. From the following one is used to cutting and deboning meat
   a. Cutting table
   b. Coning table
   c. Hand saw
2. From the material given below one is use electric power
   a. Hydraulic saw
   b. Hand saw
   c. Cone table
   d. Cutting table

Test I: Matching (5 pts)

A

1. knife sterilizer
2. Totes and bins
3. Boning aprons
4. Filleting Knife
5. Boning Knife

B

a. curved blade

b. used for storing meat
c. providing protection against cuts
d. Essential for the safety and hygiene of the knives.
e. Sharp tip

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

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

LG #43	LO #4 Operate deboning and filleting process operation

Instruction sheet

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

- Delivering carcasses or pieces to the boning area
- Inspecting carcasses or pieces to confirm quality specifications
- Remove bones and prepare fillets to specification
- Identifying and reporting variation in equipment operation
- Identify and rectify out-of-specification product or process outcomes.
- Cleaning and maintaining equipment
- Maintaining workplace records in required format

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:

- Deliver carcasses or pieces to the boning area
- Inspect carcasses or pieces to confirm quality specifications
- Remove bones and prepare fillets to specification
- Identify and reporting variation in equipment operation
- Identify and rectify out-of-specification product or process outcomes.
- Clean and maintaining equipment
- Maintain workplace records in required format

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- Delivering carcasses or pieces to the boning area

After proper post-mortem inspection of carcasses and found fit for human consumption, the carcasses are washed and sanitized with chlorine labeled “inspected and passed”. They are then kept in the chillers at 0-4°C for 24 hours. In chilling, the pH of the meat becomes acidic and comes below 6 where FMD virus is killed.

After chilling, the meat is taken in to the deboning hall where all the lymph glands and connective tissues are removed. The temperature of deboning hall is maintained at 12°C - 15°C.

After deboning the meat is packed in the cartons as per the requirement of the consumers. The cartons are then sealed with polyethylene and passed through the shrinkage machine. After sealing, the meat is passed through the metal detector and put in the freezer.

The transport of meat on a hook with the use of hanging systems exists many years. With hanging conveyors and systems, it is important that they are optimally hygienic and easy to maintain and have a long service life. Our various suspension systems can offer you these possibilities to varying degrees.

Figure 25. Delivering carcass to boning area.

Self-check 1	Written test

Name…… ID…… Date…….

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

Test I: choose best answer (2pts)

1. The temperature of deboning hall is maintained at----------.
    a. 12°C - 25°C.
    b. 20°C - 25°C.
    c. 12°C - 15°C.
    d. 15°C - 35°C.
2. In chilling, the pH of the meat becomes ------ where FMD virus is killed.
    a. 7
    b. Above 7
    c. Below 6
    d. none

Test II: True or False (2pts)

1. After freezing, the meat is taken in to the deboning hall.
2. It is possible to kill FMD virus by reducing PH of meat.

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

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

Information Sheet 2- Inspecting carcasses or pieces to confirm quality specifications

2.1. Quality specification

Measuring the product or process parameter is one of the quality control activities in the operational manufacturing process. The evaluation of meat quality plays major role for consumers' determining buying decision. Aside from intrinsic quality attributes as color, marbling and leanness extrinsic quality attributes such as origin or environmental aspects tend to become increasingly important for consumers.

Product characteristics as "those features of a product which are used as technical indicators for product quality and are measurable with standardized analytical method".

Four categories of product characteristics are recognized for meat quality: -

1. Characteristics indicating nutritional value: Protein, fat, carbohydrate content, ash content, digestibility etc.;
2. Characteristics indicating processing quality: Share-force, sarcomere, length, pH-value, color, fatness, water-binding capacity etc.
3. Characteristics indicating hygienic quality: Residues, contaminants, micro-bacterial status, additives etc.;
4. Characteristics indicating sensory quality: Texture, flavor /odor, color or appearance.

Table 11. Meat quality characteristics

Sensory aspect	Health aspect	Safety aspect	Freshness aspect
Color	Protein	Pathogenic microorganism	Shelf life
Firmness	Fat	Toxic compounds	
Water holding capacity	Carbohydrate content	Physical agents	
Ultimate pH	Ash content		
Marbling-intramuscular fat	Digestibility		
Tenderness			
Palatability traits			

Meat inspection assures the consumer that the meat and poultry products are clean, safe, and wholesome for human consumption at the time of purchase. This involves inspection of the live animal, carcass, internal organs, plant facilities, equipment, personnel, and transportation system.

Post-mortem inspection covers the inspection of the carcasses and parts of meat and poultry used for human food. It takes place after ante-mortem inspection and after the animal or poultry has been slaughtered thus the term “post-mortem,” meaning “after death” in Latin. Post-mortem inspection covers the steps in the slaughter process that begin at stunning and ends at the step where the carcass is placed in the cooler.

The purpose of post-mortem inspection is to protect the public health by ensuring that the carcasses and parts that enter commerce are wholesome, not adulterated, and properly marked, labeled, and packaged. This means that any carcasses or parts that are unwholesome or adulterated, and thereby unfit for human food, do not enter commerce. In performing inspection methods, making regulatory decisions, documenting findings, and taking enforcement actions when appropriate, in relation to post-mortem inspection.

Functions of meat inspection

- ✓ Detection and destruction of diseased meat and/or contaminated meat.
- ✓ Assurance of clean and sanitary handling and preparation
- ✓ Minimization of microbiological contamination of meat.
- ✓ Prevention of adulteration (the addition of harmful substances or products considered improper in certain specified quantities) and the presence of chemical or drug residues.
- ✓ Prevention of false labeling.

The basic steps include:

1. visual examination of the whole carcass and all organs should always be conducted first, because the inspector should not endanger his/her own health or that of other people by unnecessary handling of an animal with obvious signs of a transmissible

disease. Visual inspection implies that the inspector is familiar with the normal appearance of tissues and organs, so that abnormalities can be assessed; the focus is on the size, shape and color.

2. Palpation of the organs is routinely used, as specified for different organs/tissues in different species, to get a feeling of the 'texture' of the tissue: stickiness, softness, dryness, wetness, etc. Palpation is useful for organs or tissues with conditions that do not always produce a visible difference, e.g. arthritis.

3. Incision of organs/tissues is routinely used, but not for all organs and tissues.

4. Any additional examinations are conducted when the meat inspector considers it necessary, including taking samples for rapid (on-site) laboratory tests if needed. Further investigation is needed when any abnormalities are found, to assess their nature and extent. At this stage, incisions may be applied more extensively, to obtain the necessary information, and samples may be taken for laboratory investigation as necessary. Further investigation, over that required for routine inspection, can be costly, but this is a secondary consideration when extra assurance for protection of public health is required.

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 best answer (2pts)

1. From the following one is not safety aspect of meat quality.
   a. Toxic compounds
   b. Physical agents
   c. Water holding capacity
   d. Carbohydrate content
   e. C and D
2. From the following which is functions of meat inspection

a. Prevention of false labeling.
b. Detection and destruction of diseased meat.
c. Assurance of clean and sanitary
d. Minimization of microbiological contamination
e. All

Test I: Matching (5 pts)

A	**B**
1. Sensory aspect	a. Color
2. Health aspect	b. Protein
3. Safety	c. Pathogenic microorganism
4. Freshness	d. Shelf life
5. Post-mortem	e. After death
	f. Before death

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

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

Information Sheet 3- Removing bones and preparing fillets to specification

3.1. Introduction

Deboning or separation of muscle from bone is an essential process to produce boneless meat from animal and poultry carcasses. After deboning, varying amounts of tissues are left on the surface of separated bone (or more precisely periosteum), which can affect yield and ultimately result in economic loss. Periosteum is a connective tissue sheath that surrounds the bone.

Deboning can take place by different method **fully manual, semi-automated and fully automated(robotic)** methods.

Manual method which is labor intensive and consuming time carried out by different types knife. But the automated method is highly efficient a small number of personnel are required for carrying the task.

3.2. Manual deboning

The correct way to debone types of meat

Once the right knife has been selected, it is time to learn the art of separating flesh from bones. As each protein type has a different bone structure and shape, there are a few different deboning techniques to develop as detailed further below. However, some general guidelines can be followed.

A few starting tips

- ✓ Ensure the knife is razor sharp
- ✓ Do not rush the process when starting out deboning (this ensures the right cuts are made and accidental slips and injuries are avoided)
- ✓ Use the non-cutting hand to stabilize the protein at all times
- ✓ Ensure the non-cutting hand is positioned well away from the knife when making cuts
- ✓ Use a sawing motion when making cuts in large meat and poultry pieces
- ✓ Use a gliding/sweeping long cut when filleting fish
- ✓ Gently pull meat away from bone to help with the separating process

3.2.2. Debone Chicken

There are multiple methods of deboning a full chicken but the most common is not actually 'deboning' – it is more a breaking down of the bird so one has multiple pieces to work with. Again, it is much more cost-effective to buy a whole bird and break it down, then purchase individual pieces.

Deboning full chicken (breaking it down)

- ✓ Ensure the chicken cavity is free of gizzards and organs
- ✓ Begin by focusing on one part/bone at a time
- ✓ Place chicken on cutting board breast side up
- ✓ Remove the wings first by locating the joint and feeling for where it connects to the body cavity and then slice through
- ✓ Move to the legs and thighs. Pull one leg away from the chicken and slice through the taut skin. This helps to identify where the joint is.
- ✓ Slice through a little further and then bend the whole leg back until the joint pops. It should now be quite easy to cut and remove the full leg and thigh piece. Turn the chicken as needed to achieve the cut.
- ✓ Remove the breasts next by making a smooth cut down between the two breasts until the knife hits the keel bone.
- ✓ Slip knife against the rib cage and make small, even sliding cuts in a horizontal direction to free the breast.

3.2.3. Deboning Fish

As fish has very tender, delicate flesh it is important to use a specialty filleting knife that is curved and very flexible. Once again, there are many different fish varieties thus shapes, so deboning or filleting techniques need to adjust to account for this. The following method is for medium-sized fish.

Filleting medium-sized fish

- ✓ Scale and gut the fish first if this has not already been done

- ✓ Make an incision at the fish neck following the groove of the gills until the knife hits bone (alternatively, chop the fish head off at this same point)
- ✓ Placing the guiding hand on top of the fish, with the backbone closest to you
- ✓ Make a small cut -at the top of the backbone where the first incision was made
- ✓ Slide the knife into this cut and then glide it down the full length of the fish in a smooth, almost horizontal motion to the end of the tail and slice through it. The knife should be held as close as possible to the backbone
- ✓ Turn the fish over and repeat the same process
- ✓ Feel for pin bones in the fillets and if any, remove them

3.3. Semi-automated deboning

Table deboning- is the classic layout of a cutting room, whereby the deboner's carry out their work at a table. Skilled employees are employed for table deboning. These employees can be managed flexibly and produce a wide range of cuts. Table deboning is a good solution when carcasses or cuts are not uniform or less uniform. It offers a high degree of flexibility.

Cutting and deboning is the second meat processing phase in which the primal cuts from the primal cutting phase are delivered to workstations by the main conveyor belt for deboner's to manually debone and portion the meat for further processing or packaging. The meat cuts are sorted into their designated Euro stacking containers or plastic crates and conveyed to the weighing station, while the bones are collected and transported separately.

Cutting and deboning lines are manufactured in custom lengths and versions, depending on the production capacity, meat type and customer requirements. They consist of the main conveyor belt, single or group workstations with cutting and deboning tables, a bone transport belt with a compact chute for easier meat handling, a belt for transporting full euro crates to the weighing station and a belt for transporting empty euro crates.

Ranging from 400 to 1200 mm in width or being fully customized, speed-adjustable main conveyor belt provides a smooth material flow while maintaining the highest quality of processing, proper work tempo and high productivity.

Figure 26. Deboning table

Cone deboning table – is where whole birds or front halves are held by specially engineered cones that are uniformly spaced and timed according to production requirements. The product is placed on cones then precisely cut by operators until the optimum yield of meat is attained. Cone deboning is the most efficient method of obtaining more boneless meat for less cost. This production method ensures one person being proficient at one motion, resulting in consistent product volume, uniformity, and reduced inspection.

The system's unique cone design allows for half- or whole-bird deboning of broilers, roasters and turkeys. We can also custom-design for any operation plus provide you with other conveyors to create a complete system.

Figure 27. Cone deboning

3.4. Modern cutting and deboning method

Boning Hall Intake Software. Carcass stock from the chiller, primal or carcasses are transferred to the boning hall room via an overhead track scale. Carcasses and primal pieces are individually weighed.

The abattoir kill labels are scanned into the boning hall, against a production run, for deboning or cutting into multiple pieces. As the primal' weights are captured on a touchscreen at the entrance to the boning hall, a transaction is created to issue into production. In the case of boning forequarters, the weight will be taken off the carcass and updated with the expected weight. For hindquarters, they will be weighed and the transaction issued will detail the weight that has been paid for. Normally, this will be 2% if it's a higher percentage than this would indicate a problem that could impact profitability.

On the shop-floor, a boning hall intake screen shows operators what batches are going to be produced, including the type of animals and spec required for those batches. For instance, the boning hall operators need to ensure that the spec ID on the carcass matches the customer's requirements.

Innova explained software is used to Control, monitor, improve all process in the meat industry. Innova ensures reliable data collection, providing full traceability throughout the production process. It includes real-time monitoring of key performance indicators (KPIs) such as yield, throughput, quality, capacity and labor efficiency. These valuable insights enable processors to identify opportunities for improvements while ensuring that production conforms to the highest quality and food safety standards.
SI's boning hall intake software prevents carcasses from being issued if they aren't a match for the required specification. The production run options include the ability to group inputs and outputs for yielding.

The principle of Paceline deboning is based on a conveyor belt transporting carcass portions through the cutting room. The conveyor belt not only transports product, it also serves as the deboner's work surface. The speed of the belt determines the pace of the

work on the line. Each employee in the Paceline has a specific task in the deboning process, which must be completed within the time frame of that piece of meat passing by. The deboned meat is fed into crates, or onto a conveyor belt, and transported for storage, packing, or further processing. Carcasses from chill stock are weighed-in to the deboning hall. Upon entering the Streamline, the meat primal are distributed to workstations, based on operator availability.

At the workstation the meat is deboned, trimmed, and further processed according to individual product specifications and orders. When the meat arrives at an operator's workstation, real-time instructions become available at a deboning and trimming station terminal in front of the operator, showing the type and task to be performed. All cuts are traceable down to the specific carcass and operator.

Yield, throughput, quality and other key performance indicators (KPIs) are registered and monitored online with the Innova deboning and trimming software module, which supports the Streamline and all the processes before and following the line including; weighing, grading, portioning, quality assurance, inventory, and dispatch. Integrated quality control inspection procedures are configurable in the Streamline system for all products. Functions such as skinning, sawing, grading, meat harvesting, trim handling, and meat preparation perfectly integrate into the Streamline system set-up.

Robotic Automation system comprises a real-time X-ray system that images each carcass from two aspects to generate the necessary information of external and internal anatomy, and in particular the internal location of skeletal structure. It is this information that enables much of the subsequent automation.
Carcass primaling is then performed by two robotic cutting stations. The first uses circular disk knives to separate the forequarter from the carcass, with the robot being able to angle the cut in order to optimize meat yield in the higher value primal while accurately placing the cut with respect to the ribs and vertebrae.

The second robot uses a blade knife to separate the hindquarter from the middle primal using a variety of cut positions (chump on, chump off) while also angling the cut to clear

the pelvic bone and again optimize the meat yield in the more valuable loin area. These two robots are operational in meat plants in New Zealand and Australia.

The three primals are then handed off the three separate robotic stations. The hindquarter station uses a conventional robot, equipped with a conventional knife blade, to cut and separate the two legs from the pelvic bone. Robotic Technologies Limited (RTL) are also working on an automated knuckle tipping machine for the legs after removal form the pelvic bone.

The middle robotic station incorporates automatic spinal column material removal, saddle crosscut, flap and brisket trimming, and chine and feather bone removal. These cuts are all optional dependent on the required cut specification.
The forequarter robotic station uses a robot to grip and cut the forequarter using a conventional band saw. This system is able to implement cuts to the brisket, knuckle tips, and neck as well as splitting the forequarter, depending on the required cut specification.

Each robotic station is developed as a standalone module. In this way, they can be implemented separately or together, integrated with a carcass X-ray imaging system or independently integrated with other sensing systems installed adjacent to the robotic stations.

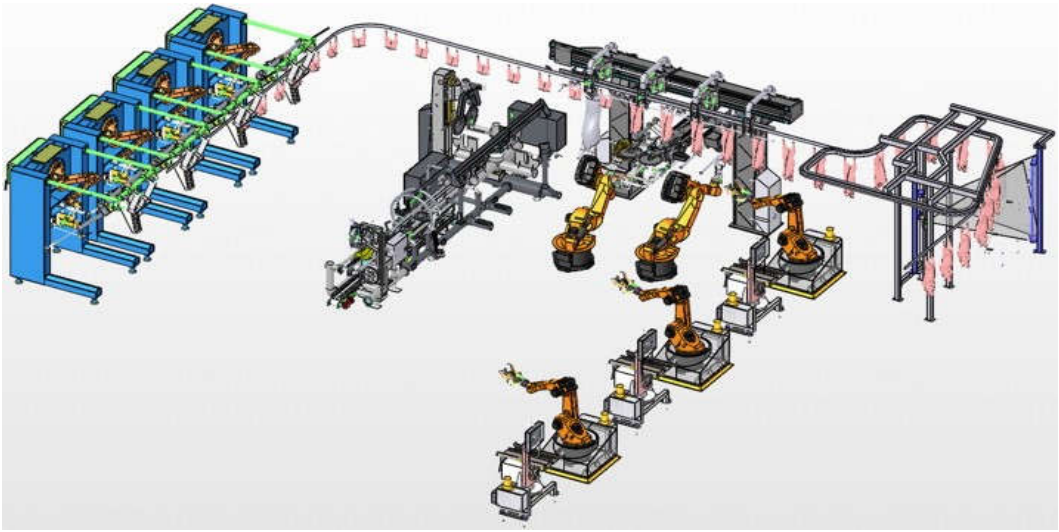


Figure 28. Full automated boning room https://www.scottautomation.com/products/automated-boning-room/.

(https://www.youtube.com/watch?v=za2dsB0qrMg.)
https://mayekawa.com/products/deboning_machines/.

3.5. Preparing fillet

Fish fillets comprise the flesh of the fish, which is the skeletal muscles and fat as opposed to the bones and viscera. Fillets are usually obtained by slicing the fish parallel to the spine, rather than perpendicular to the spine as is the case with steaks. The remaining bones with the attached flesh are called the "frame", and is often used to make fish stock. As opposed to whole fish or fish steaks, fillets do not contain the fish's backbone; they yield less flesh, but are easier to eat. Special cut fillets are taken from solid large blocks; these include a "natural" cut fillet, wedge, rhombus or tail shape. Fillets may be skinless or have skin on; pin-bones may or may not be removed. A fletch is a large boneless fillet of halibut, swordfish or tuna.

There are several ways to cut a fish fillet:

Cutlet: obtained by slicing from behind the head of the fish, round the belly and tapering towards the tail. The fish is then turned and the process repeated on the other side to produce a double fillet

Single: more complex than the cutlet, produces two separate fillets, one from each side of the fish.

"J" Cut: produced in the same way as a single fillet but the pin bones are removed by cutting a "J" shape from the fillet

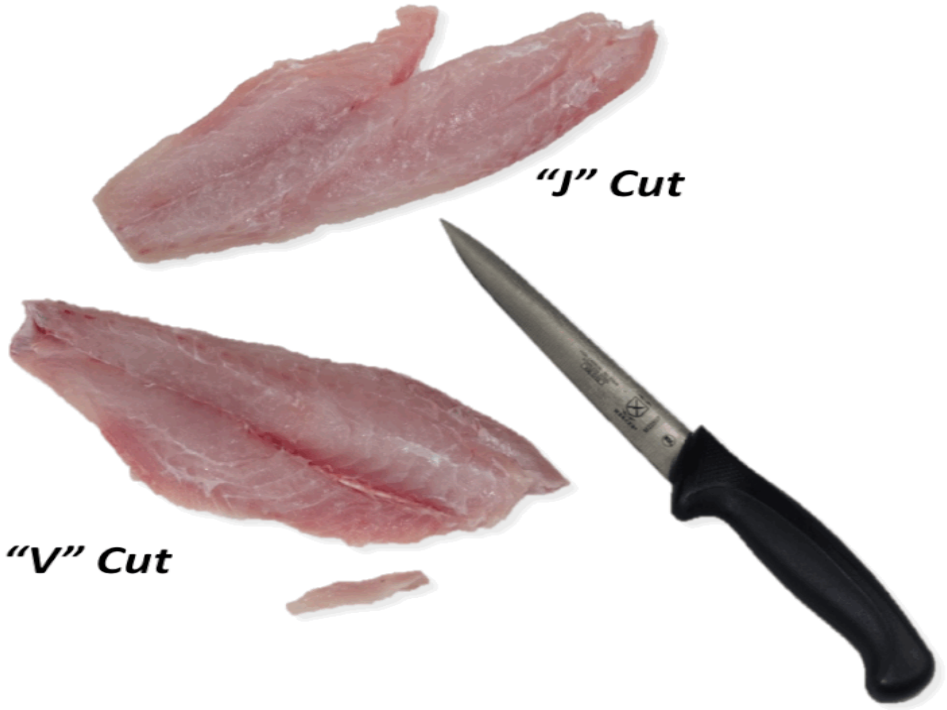


Figure 29. Fish cutting type

Beef fillet is considered the king of all the beef cuts. It is the most tender cut as it comes from the least worked part of the animal.

When buying beef, always buy the best quality possible. Grass-fed beef has superior flavor and is a more sustainable way of farming than cattle that has been fed solely on grain.

- ✓ Place the beef fillet flat on a large chopping board and dry off any blood or moisture with a clean tea towel
- ✓ Begin by running your fingers between the main part of the meat and the thick bit of connective tissue which is known as the chain. This will come away from the main part of the meat, which you will need to run your knife through to separate completely. The chain can be used for mince or to make a sauce
- ✓ Next, remove any membrane from the top of the fillet to expose the silver skin. This is the tough sinew that does not break down during cooking and is best removed. To

do this, insert a boning knife under the pointed end of the silver skin a few centimeters from the end and, pointing your knife upwards, free the tip of the sinew.

- ✓ Turn your knife around and place it under the flap you have just created. With your knife facing upwards away from the meat, run it all the way along the meat in one long slicing motion to the end until all of the silver skin is freed.
- ✓ Repeat this process until the meat is completely clear of the silver skin. It is important to face the knife upwards to avoid cutting into the fillet and losing any meat.
- ✓ There will also be a small piece of silver skin on the back of the fillet which should also be removed in the same way.
- ✓ Remove any excess or loose pieces of fat from the beef fillet, but don't be tempted to cut away all of the fat as this will render and give flavors to the meat as it cooks.
- ✓ Now that you have your trimmed fillet you can portion it. Cut off the pointed end of the fillet until the meat is of an even thickness (around 8–10 cm). This piece can be used for mince, stir-fries or skewers.
- ✓ The beef fillet can now be tied and roasted whole or cut into individual steaks

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 best answer (3 pts)

1. ----------separation of muscle from bone is an essential process to produce boneless meat from animal and poultry carcasses.
   a. Cutting
   b. Trimming
   c. Deboning
   d. None
2. **----------**explained software is used to Control, monitor, improve all process in the meat industry.
   a. Inova
   b. Lenovo
   c. Toshiba
   d. None
3. The principle of Paceline deboning is based on a ----------transporting carcass portions through the cutting room.
   a. conveyor belt
   b. deboning knife
   c. deboning table
   d. all

Test II: Matching (3 pts)

A	**B**
1. Table deboning	a. deboner's carry out their work at a table.
2. Cone deboning	b. deboner's carry out their work on cone shaped
3. Modern deboning	c. robotic deboning

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

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

Operation sheet-1	Making fish fillet

Steps:

1. Remove the head of the trout. Filleting should be done when you wish to serve only the finest cut of the fish, rather than cooking it whole. Start by cutting through the neck of the trout at the groove of the gills. Angle the blade of your knife so that you're cutting toward the head rather than the body to preserve the meat.

Always use a filleting knife or other sharp blade when preparing fish. This results in much neater, more economical cuts.

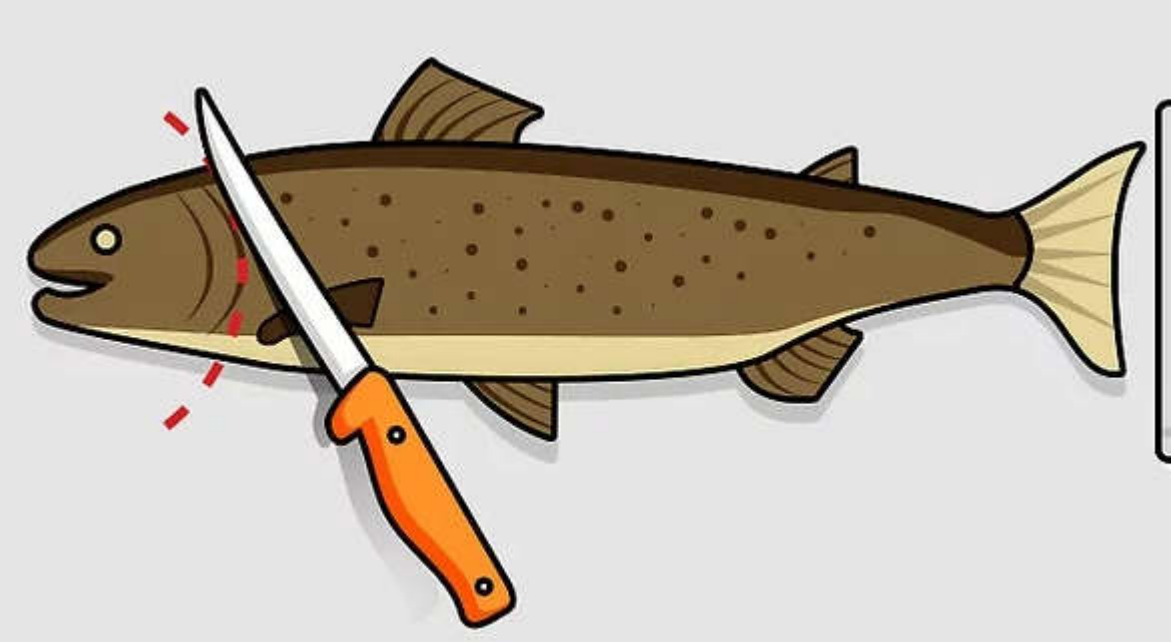


Figure 30. Remove the head.

2. **Cut the first fillet along the top of the backbone.** Place the trout on its side with the belly facing away from you. Start a small cut on the top side of the backbone at the opening where you removed the head. Insert your filleting knife into this groove and run the knife down the length of the fish, staying just above the backbone. Finish by slicing through the section at the base of the tail. You now have a clean, meaty fillet.

If you're staying close enough to the backbone, you should be able to hear an audible clicking as you slice through the rib bones.

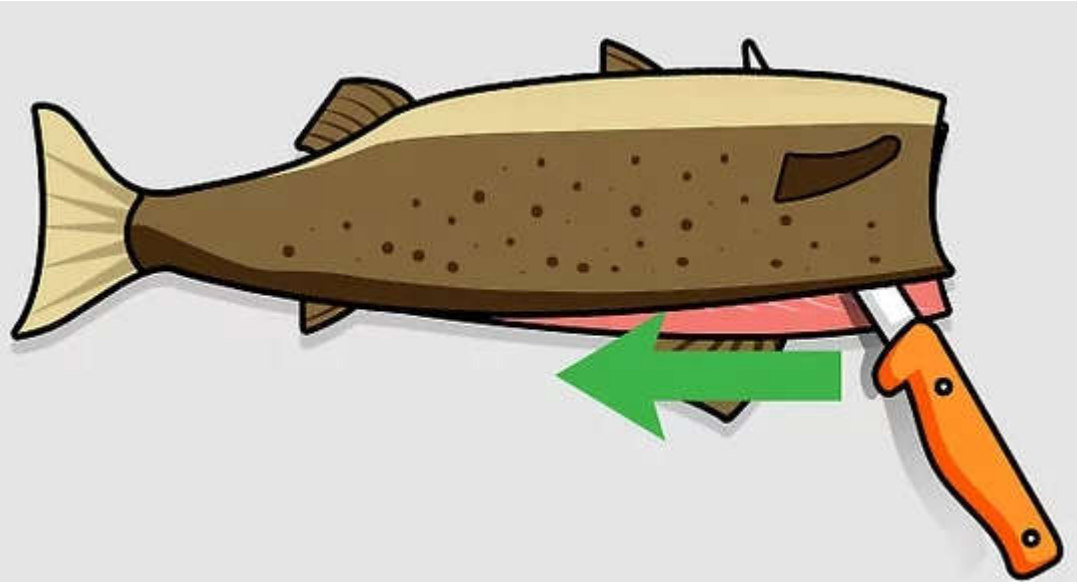


Figure 31. Cut the first fillet along the top of the backbone

3. **Flip the trout over and cut the second fillet.** Turn the trout over on its opposite side and repeat the filleting process. Start the cut at the head and slice smoothly along the upper edge of the backbone until the entire fillet has been cut away.

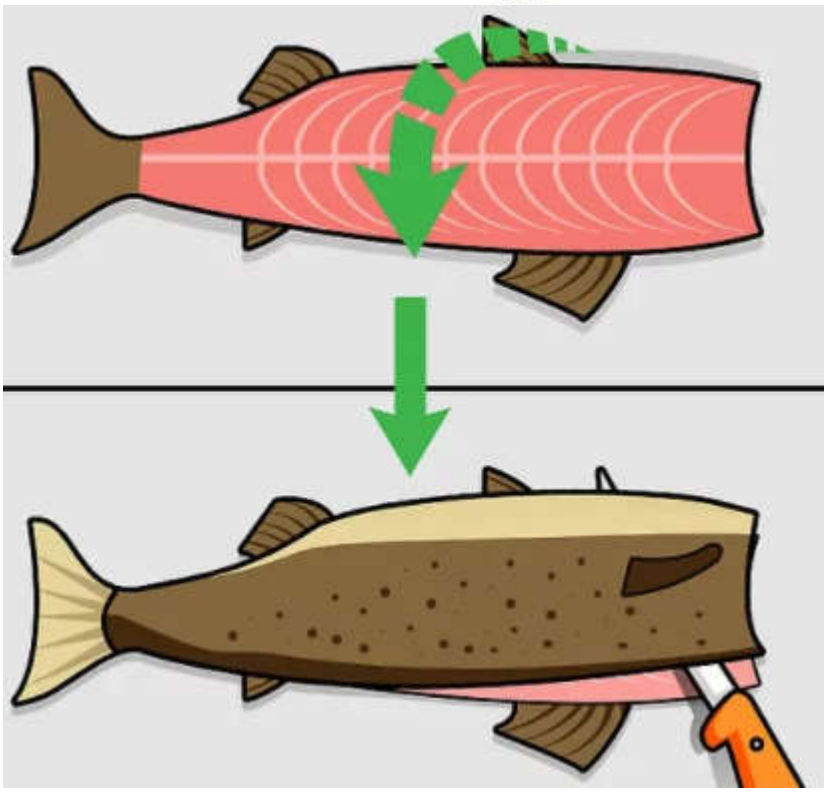


Figure 32. Flip the trout over and cut the second fillet.

4. **Remove the pin bones.** Place each fillet skin side down and pick out each and every pin bone you find. Scrape along the flesh with your knife or pick up each fillet and flex it to expose bones that are lodged deep. Nothing ruins a fresh fish dinner like a mouthful of crunchy bones!

It's alright if you don't get every last tiny bone-even professional chefs sometimes miss a few.

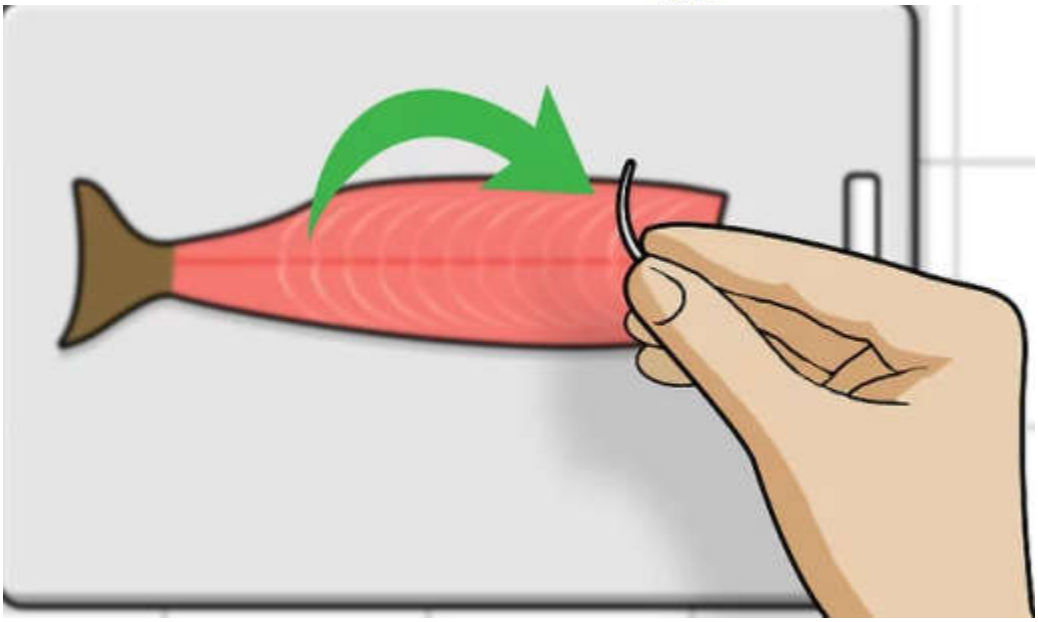


Figure 33. Remove the pin bones.

5. **Get rid of the skin.** Now that the trout has been filleted and deboned, you only need to make one more cut to remove the skin. Take hold of the fillet on the tail end and use your filleting knife to cut into the flesh at an angle until you reach the outer layer of skin. Run the knife edge along the bottom of the fillet while tugging the skin lightly in the opposite direction. The skin should come away clean. Repeat with the second fillet and you're ready to grill, bake or fry.

   ✓ Again, while it is not necessary to remove the skin prior to cooking, it is commonly done when filleting fish and makes it easier to eat.

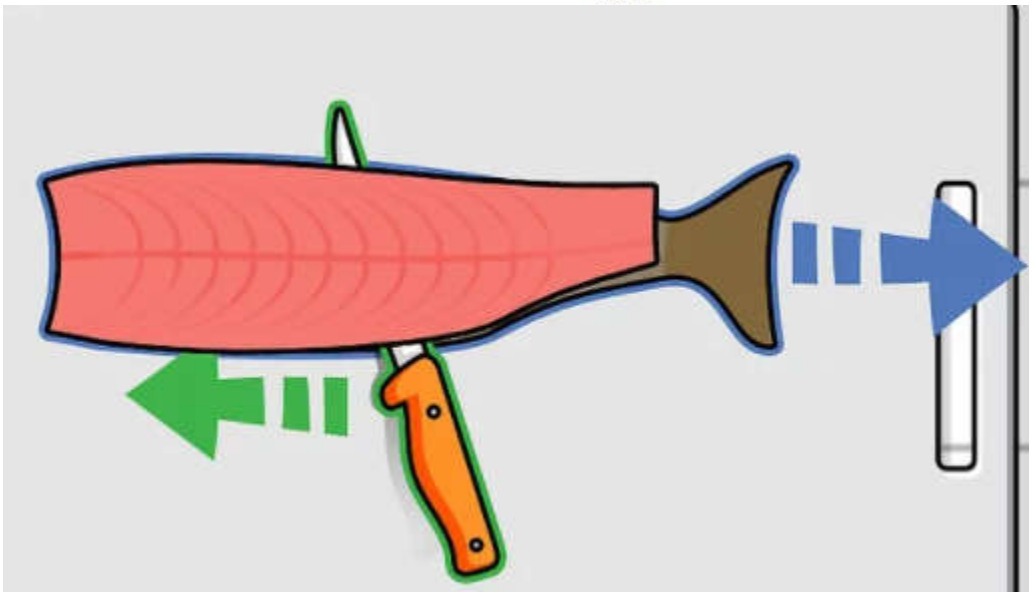


Figure 34. Get rid of the skin

Operation sheet-2	Debone a Chicken thigh

Prepare the thigh and knife! (https://www.youtube.com/watch?v=XaXR9F8ceIs.)

Figure 35. chicken thigh and knife

Step 1: Locate the Joint

Remove the drumstick from the thigh. Place your thumb over the joint and move the thigh bone back and forth with your other hand to find the articulation point. This is where you'll cut.

Step 2: Divide the Leg

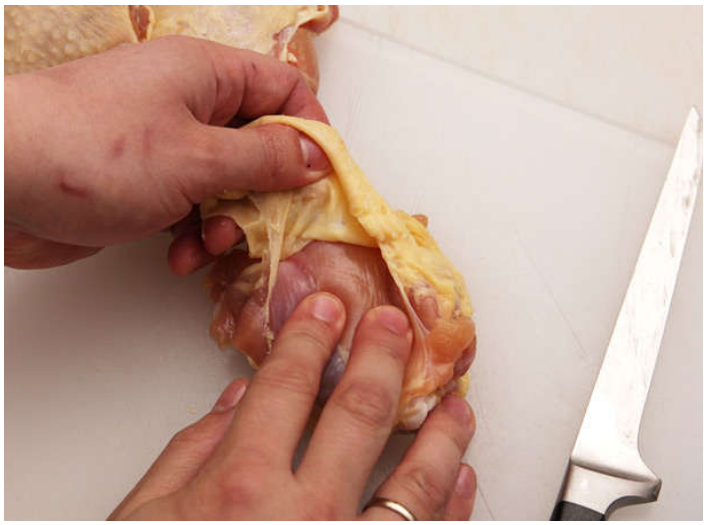
Insert a sharp boning or paring knife into the joint. It should slide right through. If there is resistance, move the blade around until you find the space between the joints.

Step 3: Set Aside Drumstick

Set aside the drumstick for another use (they go great on the grill, or in place of wings in Korean Fried Chicken).

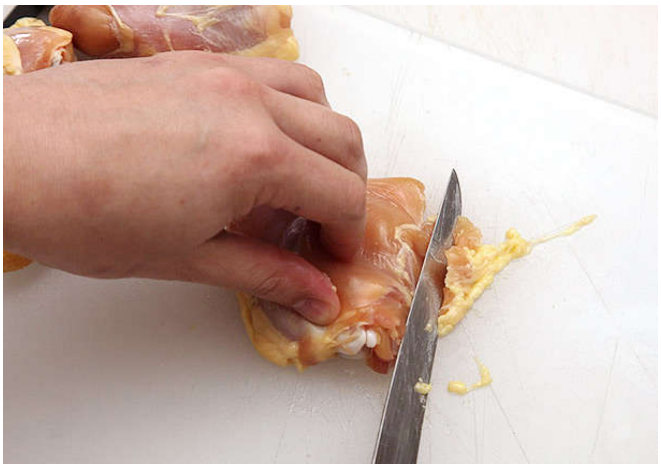
Step 4: Remove the Skin

Peel the skin off the chicken thigh using your hands.



Step 5: Trim Fat

trim off any excess fat with your knife and discard.



Step 6: Find the Bone

Flip over the thigh so that the rough side is up and locate the single bone that runs through it. Your goal is to remove this bone with minimal damage to the meat.

Step 7: Make the First Incision

Keeping the fingers of your non-knife hand curled for protection (raw chicken can be slippery) and using the tip of the knife, score a line through the meat along the length of the bone.

Step 8: Expose Bone

Expose the top of the bone by using the tip of your knife in short, flicking motions, making sure to keep your fingers well away from the blade.

Step 9: Scrape the Bone

Grasp one end of the bone with your non-knife hand (a little piece of paper towel can help if it's very slippery), then using the base of your knife, scrap the meat off of the bone in short, firm flicks. A boning knife should have a curved bolster designed for this task. If using a paring knife, just use the section of the knife closest to the handle.

Step 10: Separate Meat from Bone

When the meat has been mostly scraped off the bone, separate the end of the bone completely from the meat. Trim away any gristle or bits of bone or cartilage that may have remained on the meat. Save bones for stock and use the meat for recipes as

desired, such as these Grilled Turmeric Chicken Skewers, or Mario Batali's Chicken Thighs with Garlicky Crumbs, or this Real Deal Kung Pao Chicken.

LAP Test	Practical Demonstration

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. Make fish fillet

Task 2. Debone fish thigh

Information Sheet 4- Identifying and reporting variation in equipment operation

Variation is present in meat industry and other manufacturing process. Part of this variability is due to a set of causes known as common causes or chance causes. Common causes are those that are inherent in a process. Common causes of variability can be reduced but never completely eliminated. Variability due to common causes is due to several sources that are inherent to the process, and it impacts all items processed.

Some examples of common causes of variation are as follows: poor product design, poor process design, unfit operation, unsuitable machine, untrained operators, inherent variability in incoming materials from vendor, lack of adequate supervision skills, poor lighting, poor temperature and humidity, vibration of machinery, inadequate maintenance of equipment, and inadequate environmental conditions due to noise and/or dust.

Hidden variation is what increases your costs. Permanently eliminating the causes of variation is the only way to truly reduce costs in manufacturing. The goal of management is to achieve certain objectives. The way of smart managers is to intelligently manage risk. The means of intelligently managing risk is through reduction in variation in the processes in your control.

The greater the variation of the worker's time, the fewer parts will be produced at the end of the shift. The closer the worker's "cycle time" matches that of the machine, the greater the number of parts at the end of the shift.

Variation affects more than just direct costs. Variation in yield can affect order patterns and, thus, scheduling. Variation in scheduling affects lead-times, causing order quantities and frequencies to vary.

Variability in quality, yield, scheduling and releases all cause more variability. Those, in turn, cause an increase in risk to all parties. Eliminating variability is the key to reducing risk and reducing the complexity of all the issues we have to manage in our businesses.

Here are two tips for reducing variability in your operations:

1) Standardize materials and sourcing

2) Standardize work to reduce in-process variation.

Careful experiments can be an important way to discover better processes. But, reckless adoption of unproven inputs will assure increased variation, increased costs and missed deliveries. “Variation” is a synonym for risk, increased cost, missed deliveries and loss of customer confidence.

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 pts)

1. Common causes of variability can be reduced but never completely eliminated.
2. Hidden variation is what increases your costs.

Test II: short answer (3 pts)

1. Write at least three common causes of variation.
   a. ----------
   b. ----------
   c. ----------
2. What are two tips for reducing variability in your operations?
   a. ----------
   b. ----------

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

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Information Sheet 5- Identify and rectify out-of-specification product or process outcomes.

The term out of specifications, are defined as those results of in process or finished meat product testing, which falling out of specified limits. The OOS, may arise due to deviations in product manufacturing process, errors in testing procedure, or due to malfunctioning of analytical equipment. When an OOS has arrived, a root cause analysis has to be performed to investigate the cause for OOS. The reasons for OOS can be classified as assignable and non-assignable. When the limits are not in specified limits, called out of specifications. When OOS has occurred, the analyst should inform to quality control (QC) manager. Then the senior manager will ask quality assurance (QA) for issuing OOS form to analyst. The designated personnel will classify the OOS as either assignable cause or non-assignable cause. Each out of specification will be identified with a unique identification number.

Table 12. Investigation of out of specification

Cause	Check for	Yes	No
Personnel	1. Was the person properly trained? 2. Does he know the job properly? 3. Was he wearing the necessary personnel protective? 4. Were the critical operations supervised by a supervisor?		
Equipment	Was correct equipment used? 2. Was condition of the equipment is good? 3. Were the equipment inspected by QA before use? 4. Was the equipment provided with required utilities? 5. Was the equipment calibrated? 6. Was the preventive maintenance carried as per the schedule?		

Root cause and corrective action of out of specification

Supplier corrective action request is a systematic approach to request investigation of a problem that already happened and request root cause analysis and resolution from supplier to prevent recurrence.

Corrective Action Request Key Elements are:-

Step 1: Problem Verification

Problem verification is the first step of problem investigation. There are 3 main activities:

- ✓ Verify the problem
- ✓ Collect information
- ✓ Describe the problem

Step 2: Containment Action

Containment action is to limit a problem extent while continue normal operation until the root cause is defined and permanent corrective action is implemented

The containment area should cover:

- ✓ Production process
- ✓ Finished product
- ✓ Customer
- ✓ Incoming material/animal
- ✓ Ware house/production area/work area

Notes: Affected date code/ serial number should be clearly identified and stated.

Step 3: Failure Analysis

Failure analysis is the process of collecting and analyzing data to determine the cause of a failure. Failure Analysis can be carrying out by various methods including visual inspection, laboratory testing and physical testing.

Step 4: Root Cause

Root cause identification is the most important step. The problem will be solved only if the corrective action implemented is addressing the real root cause accurately. Root Cause Analysis is a systematic approach to identify the actual root causes of a problem.

Step 5: Corrective Action

Corrective action is to remove the root cause and prevent a problem from ever happening again.

The corrective action should correspond to the root cause identified earlier in order to eliminate the real root cause and prevent recurrence of the problem. Method such as brainstorming is recommended as it can help to select appropriate corrective action for identified root cause.

Step 6: Preventive Action

Preventive Action are proactive and focused on a potential problem in the future. Corrective actions are only a temporary solution that keeps the system running, but a permanent solution is needed to avoid similar problems from occurring into the system again.

Examples:

- ✓ Changing the process parameter
- ✓ Changing procedure
- ✓ Changing documentation or specification
- ✓ Changing of process or tools

Step 7: Effectiveness Verification

After the corrective and preventive actions are implemented, the effectiveness should be validated. The key to verification is evidence. This evidence usually takes the form of data, records or first-hand observations. It is recommended the verification made by monitoring the quality of next deliveries.

Examples:

- ✓ Product acceptance rate
- ✓ Test or control results showing improvement

For example.

To earn the Certified **Angus Beef ®** brand name, cattle must first be Angus-influenced, with a predominantly solid black coat. Then, beef must pass our 10 quality standards: if the products out of this standard while production it is said to be **out of specification**.

Marbling and maturity

1. Modest or higher marbling – for the taste that ensures consumer satisfaction
2. Medium to fine marbling texture – the white “flecks of flavor” in the beef that ensure consistent flavor and juiciness in every bite
3. Only cattle harvested less than 30 months of age by dentition and only a-maturity lean – for superior color, texture and tenderness.

Consistent sizing

4. 10- to 16-square-inch ribeye area
5. 1,050-pound hot carcass weight or less
6. 1-inch or less fat thickness

Quality appearance and tenderness

7. Superior muscling – limits light-muscled cattle
8. Practically free of capillary rupture – ensures the most visually appealing steak
9. No dark cutters – ensures the most visually appealing steak
10. No neck hump exceeding 2 inches – safeguards against cattle with more variability in tenderness

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: True or false (2 pts)

1. Out of specifications are those results of in process or finished product testing, which falling out of specified limits.
2. Supplier corrective action request is a systematic approach to request investigation of a problem that already happened.

Test I: Matching (5 pts)

A.	**B**
1. Problem Verification	a. Collect information
2. Failure Analysis	b. evidence.
3. Corrective Action	c. Changing procedure
4. Preventive Action	d. remove the root cause and prevent
5. Effectiveness Verification	e. visual inspection, electrical testing

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

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

Information Sheet 6- Cleaning and maintaining equipment

6.1. Cleaning and Sanitation

Meat plant premises and equipment shall be maintained in an appropriate state of repair and cleanliness in order to function as intended, facilitate all sanitation procedures and prevent contamination of meat.

Cleaning and disinfection chemicals shall be approved for use in meat industry wherever chances of it may come in direct or indirect contact through equipment or plant surfaces, handled and used carefully and in accordance with manufacturers' instructions.

Master cleaning and sanitation schedule shall be maintained for overall facility which includes:

- ✓ Areas (storage area, refrigerated spaces, freezing cabinets, changing facilities, toilets, inspection area) equipment (scalder, defeathering machine, eviscerator, chiller, metal detector, trolleys), utensils and implements (like knives, saws, mechanical instruments, trays, weighing machines, pallets, etc.) to be cleaned;
- ✓ Cleaning method and frequency of cleaning
- ✓ Monitoring arrangements for checking effectiveness of cleaning
- ✓ Person responsible for cleaning and
- ✓ Persons responsible for monitoring and verification of effectiveness of cleaning.

In case of any deviation, correction and corrective actions taken shall be recorded.

Preventive maintenance of equipment and machinery in meat plant shall be carried out regularly as per the instructions of the manufacturer.

- ✓ Preventive maintenance of equipment and machinery shall be carried out regularly as per the instructions of the manufacturer.
- ✓ A preventive maintenance programmed must include all devices used to monitor and/or control food safety hazards and cover the maintenance procedure, frequency and identification of the person (and/ or external agency) responsible for maintenance activity.

- ✓ Internal and external calibration schedule for critical meat safety equipment's should be maintained.
- ✓ Corrective maintenance shall be carried out in such a way that production on adjoining lines or equipment is not at risk of contamination and post maintenance verification to be get verified.
- ✓ It is recommended as best practice to maintain meat plant equipment's breakdown records.
- ✓ Loose items control policy (bolts, nails broken pieces or smaller parts of machines) should be followed to prevent any contamination with meat product or packaging material.

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: true or false (3pts)

1. Preventive maintenance of equipment and machinery shall be carried out regularly
2. Cleaning and disinfection of chemicals shall be approved for use in meat industry
3. Internal and external calibration schedule for critical meat safety equipment's should be maintained.

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

Information Sheet 7- Maintaining workplace records in required format

7.1. Introduction

Records are the source documents, both physical and electronic. Having a good process for holding and storing health and safety documentation is not only good practice but in some instances is a legal requirement.

Record keeping is not just 'paperwork', but has many purposes and benefits, including:

- ✓ demonstrating (to your workers, the regulator, investors, shareholders, customers and so on) that you're effectively managing work health and safety and complying with the laws demonstrating how you made your decisions about safety issues
- ✓ providing a starting point for future decision making or risk assessments
- ✓ helping you target training for your workers, managers and supervisors for the key hazards in your workplace
- ✓ helping you review risks following any changes to legislation or your business activities.

Collecting workplace information

Each workplace relies on the exchange of information to carry out its daily work. Information is passed from employee to employee, customer to employee, supervisor to team member, supplier to customer, and so on. Dealing effectively with information and records is necessary and important for all organizations. The quantity and variety of information kept by an organization can be huge. Information needs to be sorted into related groups so that it can be stored easily and found when needed. An organization's success depends largely on how well it manages its information.

You need to be familiar with the type of information used in your job and the way records are organized so you can collect, file, store and find information quickly and easily. Finding and using information is a large part of many jobs, so knowing how to deal with it is an important workplace skill. Being confident and efficient in this skill helps you and your organization succeed.

Maintaining information systems

For a working smoothly in meat plant, it must maintain and keep its records and other information up to date. Any information that is collected and processed within an organization must be accessible when it is required. This makes it easier for the organization to make decisions, and ensures it is projecting a professional image. Customers will be confident that the organization carries out its activities with confidence and efficiency.

A poorly managed information-handling system hinders an organization. It leads to inefficiency, mistakes and poor-quality work, and can mean loss of business.

Maintaining an information system means keeping records up to date. All information within the system should be current and easy to access. Updating records is a day-to-day task for any organization. The specific procedures for doing this may vary from place to place.

Keeping records up to date might include modifying particular records by changing information or adding information to them.

Records management has traditionally referred to an organization's policies and procedures for managing file systems and disposing of records once they are no longer needed. In recent years, attention has shifted to the need to create reliable records in electronic form, and 'records management' is understood more broadly to mean the overall management of records from their initial creation to final disposition. The term is now often used interchangeably with recordkeeping.

Table 13. Machine maintenance record

No	Name of machine	Date of purchased	Serial number	Maintenance type 1. Preventive 2. Corrective
Name ----------date----------signature				

Table 14. Meat product record

No	Spss of animal	Id no of animal	Date of slaughtered	Types of cuts	Amount of meat after deboning in kg
Name ----------date----------signature					

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: True or false (5 pts)

1. Each workplace relies on the exchange of information to carry out its daily work.
2. A poorly managed information-handling system hinders an organization.
3. Record keeping is not just 'paperwork', but has many purposes and benefits.
4. Updating records is a day-to-day task for any organization.
5. Records management has traditionally referred to an organization's policies and procedures.

Test II: choose best answer (2 pts)

1. ----------the source documents, both physical and electronic.

   a. Records
   b. Maintenance
   c. Schedule
   d. None

2. Keeping records up to date might include modifying particular records by----------.
   a. Changing information
   b. Adding information
   c. Missing information
   d. All

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

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

Reference Materials

Book:

1. *Odchuluun Damdingombo. 2014. Food quality standard application and quality performance of the Mongolian meat processing industry. Wageningen University & Research center.*
2. VARIABILITY DUE TO COMMON CAUSES. 2000. In: Swamidass P.M. (eds) Encyclopedia of Production and Manufacturing Management. Springer, Boston, MA. https://doi.org/10.1007/1-4020-0612-8_1030

WEB ADDRESSES

1. www.wisconsinrivermeats.com.
2. https://www.wikihow.com/Debone-a-Trout.
3. https://www.greatbritishchefs.com/how-to-cook/how-to-prepare-a-fillet-of-beef.
4. https://viebelles.com/blogs/taste/how-to-debone-meat-a-step-by-step-guide.
5. https://westcoastprimemeats.com/how-to-debone-a-leg-of-lamb-blog/
6. https://sitemate.com/us/resources/articles/safety/what-is-pre-start-check/.
7. https://www.certifiedangusbeef.com/brand/specs.php.

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 curriculum.

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

This learning guide was developed on September 2020 at Bishoftu, 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