Meat and meat products processing

Level III

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Module Title: - Applying Basic Methods of Meat Cookery and Storage

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LG #60	LO #1- Select and use cooking equipment and technology

Instruction sheet

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

- Selecting appropriate cooking equipment and technology
- Using equipment instructions

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:

- Select appropriate cooking equipment and technology
- Use equipment instructions

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, ask your trainer for further instructions or go back to “Operation sheets”.

Information Sheet 1- Selecting appropriate cooking equipment and technology

1.1 Selecting appropriate cooking equipment and technology

Equipment **design** can play a key role in minimizing microbial problems in a food processing plant. Recently, more emphasis has been given to designs that reduce cross-contamination by eliminating microbial growth niches and avoiding potential transfer points (e.g., product contact surfaces). The former refers to niches that are not easily accessible to cleaning and sanitation and can harbor microorganisms. The exterior of non-product contact surfaces (floors, walls) should also be arranged to prevent harboring bacteria, pests, etc.

1.2 Meat Processing Technology

Meat processing technology comprises the steps and procedures in the manufacture of processed meat products. Processed meat products, which include various different types and local/regional variations, are food of animal origin, which contribute valuable animal proteins to human diets. Animal tissues, in the first-place muscle meat and fat, are the main ingredients, besides occasionally used other tissues such as internal organs, skins and blood or ingredients of plant origin. All processed meat products have been in one way or another physically and/or chemically treated. These treatments go beyond the simple cutting of meat into meat cuts or meat pieces with subsequent cooking for meat dishes in order to make the meat palatable. Meat processing involves a wide range of physical and chemical treatment methods, normally combining a variety of methods. Meat processing technologies include:

- Cutting/chopping/comminuting (size reduction)
- Mixing/tumbling
- Salting/curing
- Utilization of spices/non-meat additives
- Stuffing/filling into casings or other containers
- Fermentation and drying
- Heat treatment
- Smoking

1.3 Appropriate cooking equipments

a) Microwave ovens

In these ovens, special tubes generate microwave radiation, which creates heat inside the food. Use a thermometer to check internal cooking temperatures. Microwave cooking Cover and cook food to ≥165ºF (stir or rotate the food during the cooking process), then let the food stand with cover on for 2 minutes.

Figure: 1. Micro wave oven

b) Grills

Grills are used for the same smoking operations as broilers, except the heat source is below the gird that holds the rather than above it. Many people like grilled foods because of their charcoal taste, which is created smoke from meat fats that drip into the heat sources. Although smoke from meat fats creates the taste people associate with grilled foods, actual wood-smoke flavors such as hickory or mesquite can be added to foods if those woodsare burned in the grill under the food. In order to do this, you must use a grill designed to burn such fuels.

I. Types

Many grill models are in use. The major differences in operation among them are due to the difference in heat source-gas, electricity, or charcoal. To operate, set areas of the grill to different temperatures and place foods in the areas with the appropriate cooking temperature. Keep grills clean, as the high temperatures can easily start grease fires.

- **Griddles**

Griddles are flat, smooth, heated surfaces on which food is cooked directly. Pancakes, French toast, hamburgers and other meats, eggs, and potato items are the foods most frequently cooked on a griddle. Condition griddles after each cleaning or before each use to create a non-stick surface and to prevent rusting. Procedure: Spread a thin film of oil over the surface and heat to 400°F (200°C). Wipe clean and repeat until griddle has a smooth, non-stick finish.

Figure: 2 griddle

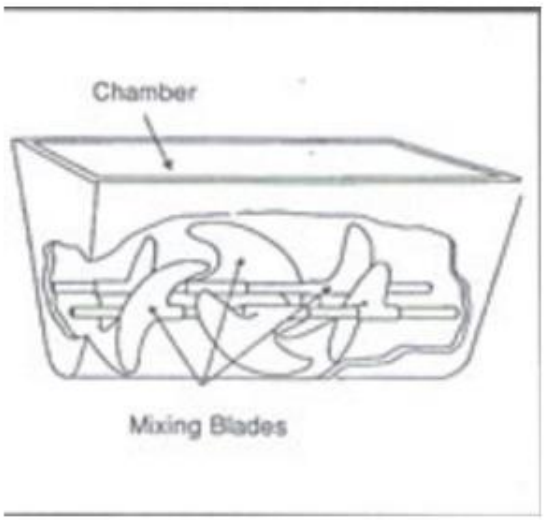
- **Tilting Skillet**

The tilting skillet, also known as the tilting brazier and tilting fry pan, is a versatile and efficient piece of equipment. It can be used as a griddle, fry pan, brazier, stew pot, stockpot, steamer, and bain-marie or steam table. The tilting skillet is a large, shallow, flat-bottomed pot. To look at it another way, it is a griddle with sides 6 inches (24 cm) high, plus a cover. It has a tilting mechanism that enables liquids to be poured out of it. Power may be gas or electric. Clean the skillet immediately after each use, before food has time to dry on. Add water, turn on the skillet to heat it, and scrub thoroughly.

- **Meat Mixers** /blender

Mixers are used to blend meat and spices, or coarse and finely chopped meat. The machine generally consists of a rectangular or round bottom vessel through which two parallel shafts operate. Various paddles are mounted on those shafts to mix the meat.

The mixer is discharged through tilting by 90 degrees. Some mixers are designed as vacuum mixers, as the mixing under vacuum (exclusion of oxygen) has advantages for the development of desirable product colour and texture. The meat mixers are suitable for manufactures with many features like easy to clean, dismantle or re-assemble. It is very useful to make cooking easy.



Mixer

Blender

Figure: 3 mixer and blender

c) Slicer

The slicer is a valuable machine because it slices foods more evenly and uniformly than can be done by hand. This makes it valuable for portion control and for reducing cutting loss.

Figure: 4 food processer

d) **Food Processor**

Food processors were used in commercial kitchens long before home models were introduced. Professional models are 2–4 times larger than the largest home models. They consist of a motor in a heavy base topped by a cylindrical work bowl containing an S-shaped blade.

Processors are used to chop or purée foods, including raw or cooked meats, and to mix or emulsify such items as sauces and flavoured butters. With special disk attachments in place of the standard blade, they can also slice, shred, and julienne solid foods such as vegetables. In basic design, a food processor is similar to a vertical cutter/mixer. The same do have and don'ts should be observed.

e) Blender

A blender consists of a motor in a base, topped by a container with a spinning blade. However, because for chopping solid foods. In the commercial kitchen, the blender is used to mix, purée, and emulsify liquids such as soups, sauces, and batters. It is also used in bars and coffeehouses to prepare certain drinks.

Blender motors may have from 2 to 10 speeds, or even more. The containers are made of stainless steel, glass, or plastic. The blade assembly at the base of the container can be dis-assembled for e blender's container is tall and narrow; it is more suited for mixing and puréeing liquids the thorough cleaning.

Figure: 5 Professional blenders

Self-check 1	Written test

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

Test I Short Answer Questions

1 List appropriate cooking equipment's? (3pts)

Test II: choice the best answer from the given alternative

1. What is the main objective of meat processing technology? (3pts)

   A.To prevent/inhibit microbial decomposition B. to deliver unsatisfactory meat products C. to decrease the nutritional value D. all

2. Which of the following is not the function of meat mixer? (3pts)

   A.Mixing B. whipping C. beating D. slicing

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

Information Sheet 2- Using equipment hygienically

2.1 Concept of Hygiene

- The term "hygiene" is derived from hygeia, the Greek Godess of health, cleanliness and sanitation
- A concept related to medicine, personnel and professional practices related to most aspects of living.
- Good Hygienic Practices deal with safety and suitability requirements to be followed world-wide
- GHP include all practices regarding the conditions and measures necessary to ensure it

2.2 The Importance of GHP of food cooking.

Culinary hygiene pertains to the practices related to food management and cooking to prevent food contamination, prevent food poisoning and minimize the transmission of disease to other foods, humans or animals. Culinary hygiene practices specify safe ways to handle, store, prepare, serve and eat food**.**

Culinary practices include:

- Cleaning and sterilization of food-preparation areas and equipment (for example using designated cutting boards for preparing raw meats and vegetables).
- Proper storage of food so as to prevent contamination by vermin.
- Refrigeration of foods (and avoidance of specific foods in environments where refrigeration is or was not feasible).
- Labeling food to indicate when it was produced (or, as food manufacturers prefer, to indicate its "best before “date).
- Proper disposal of uneaten food and packaging

What hygienic practices should you follow when operating equipment and preparing food? The lack of proper sanitation procedures can cost plant operators a lot of money. Good housekeeping involves ensuring equipment, floors, benches and other areas are

properly cleaned so that no liquid or food remains to serve as a food source for pests and rodents. Improper handling of cooking/processing equipment exposes the employee for accidents and hazards. Therefore, use overall equipment's hygienically and safety handling instructions, which are listed below:

- Always wash hands before handling clean dishes.
- If wearing gloves, either wash them, or put on a clean pair.
- Do not stack wet dishes; they need to be exposed to air in order to dry properly.
- Do not let water pool up in the bottom of glasses, bowls or cups.
- Store glasses and cups upside-down so that they dry properly and dust does not accumulate inside.
- When handling dishes, be on the lookout for dried-on bits of food or lipstick stains.
- Do not let your fingers touch parts of the dishes that people will drink or eat out of.
- Hold cups by the outer surface, not by the rim.
- Do not put hands inside glasses.
- Do not dry off dishes with a towel -- let them air dry.
- Pick up silverware by the stems, not the parts that touch the food.
- Be particularly careful about coughing and sneezing while handling dishes.
- If you happen to accidentally cough or sneeze on the clean dishes, make sure they are re-washed.
- Keep your eye out for any signs of pest infestation around the clean dish storage area.

Food grade synthetic materials should be used for meat containers and other utensils. We have to give due emphasis to **good hygienic practices** to prevent and control foodborne diseases. Foodborne diseases result from eating foods that contain infectious or toxic substances. The food we eat should be free from contaminants such as microorganisms and chemicals. For your protection, follow these safety handling instructions.

Self-Check –2	Written test

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

Test I: Short Answer Questions

1. What is the importance of good hygienic practices of the equipment? (3pts)

Test II: Write true if the statement is correct and false if the statement is incorrect

1. Proper handling of equipment causes an accident. (3pts)
2. Equipment can be contaminated by handlers. (2pts)

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

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

Score = _____

Rating: _____

LG #61 LO #2-Use methods of meat cookery

Instruction sheet

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

- using various **meat cookery methods** correctly
- Calculating correct quantities and ratios of **commodities**
- Completing cooking process.
- Identifying problems with the cooking process and taking corrective actions
- Preparing dishes

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**:

- use various **meat cookery methods** correctly
- Calculate correct quantities and ratios of **commodities**
- Complete cooking process.
- Identify problems with the cooking process and taking corrective actions
- Prepare dishes

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Information Sheet 1- using various meat cookery methods

1.1 Introduction to Meat Cookery

Meat is animal flesh that is eaten as food. Humans are omnivorous and have hunted and killed animals for meat since prehistoric times. The advent of civilization allowed the domestication of animals such as chickens, sheep, fish, seafood, pigs and cattle, and eventually their use in meat production on an industrial scale. In cooking, there are some basic methods of cooking that are used. These commonly used basic cooking methods are divided into two general groups. The groups are:

The methods of cooking are divided into these two groups because of the way food is cooked and the type of heat that is used. Let us have a look at the Dry Heat cookery methods.

1.1 Dry heat Cookery Method

In dry heat cooking methods, the food being cooked does not use water to cook the food. The food is left dry and heat is applied to cook the food. Such methods of cooking are: roasting, and grilling. When heat is applied to the food, the food cooks in its own juice or the water added to the food during its preparation evaporates during the heating process and this cooks the food. Heat is applied directly to the food by way of convection thus making the food to get cooked. The action or movement of air around the food cooks it.

a) Roasting

Roasting With roasting, direct heat is applied to the food. The heat seals the outside part of the food and the juice inside the food cooks the food. Roasting is mainly used when cooking fleshy food like fish, meat or chicken. When heat is applied to the outer covering of the food, it seals it up thereby trapping all the juices inside the food. The action of direct heating, heats up the juices inside the food, which then cooks the food. Again there is very little nutrient lost and the flavour is not spoilt. Food is frequently rotated over the spit so that there is even heating applied to all parts of the food. This is so that heat is applied evenly to the food to make it get cooked properly. For roasting a

constant temperature of 250 º - 300 º F should be used till the internal temperature of the meat has reached 180 º F, as it makes meat palatable and enhances flavor and there is less shrinkage. After it is cooked, the meat should be browned by increasing the oven temperature. A meat thermometer helps in determining the degree

- Beef – 15 to 20 minutes per 455 gm. & 20 minutes over
- Mutton – 25 minutes per 455 gm. & 20 minutes over
- Lamb – 20 minutes per 455 gm. & 20 minutes over
- Veal – 25 minutes per 455 gm. & 20 minutes over
- Pork – 25 minutes per 455 gm. & 25 minutes over

Table 1- Internal temperature recommended for Roasting meat.

Beef	Mutton
Rare 60 º C (140 º F)	Rare 60 º C (140 º F)
Medium 71 º C (160 º F)	Medium 71 º C (160 º F)

Figure-6 Roasting

- **Roasting methods**
  - ✓ Placing prepared foods (meat, poultry) on a roosting spit over/in front of radiating heat;
  - ✓ Placing prepared foods in an oven with:
    - dry heat
    - forced air convected heat
    - convected heat combined with microwave energy

- **Advantages**
  - ✓ Good quality meat and poultry is tender when roasted
  - ✓ Meat juices from the joint are used for gravy
  - ✓ Use of energy and oven temperature can be controlled
  - ✓ Cooking can be observed (transparent oven doors)
  - ✓ Straight forward access, adjustment or removal of items
  - ✓ Continual basting with meat juices adds to a distinctive flavour

- **Disadvantages**
  - ✓ Requires regular attention
  - ✓ Expensive energy

- Examples of foods which might be cooked by roasting:
  - ✓ meat (lamb, beef, pork)
  - ✓ poultry (chicken)

b) Grilling

There are two methods of grilling that are used these days.

- One type of grilling is the one that is commonly used by the people in the village. This is when food is cooked over hot charcoal on an open fire. The food is placed on top of the burning charcoal. Sometimes people improvise by using wire mesh and place it over the open fire to grill fish or vegetables.
- The other method is using grills that are inbuilt in stoves. In this method, the griller, which has a tray, is heated up and the food is placed on the grill tray to

cook. The heat can be gas-generated or electric-generated depending on the type of stove used. The food is again left to cook on the grill with the doors of the grill open. People who can afford to buy a stove would use the grilling part to grill their food. What happens in this type of cooking is the heat seals the outside part of the food and the juice inside the food cooks it

Figure: 7- Grilling

- **Grilling method**

  Grilled foods can be cooked

  ✓ over heat (charcoal, barbecues, gas or electric grills)

  ✓ under heat (gas or electric grills, gas or electric salamanders over fired grills)

  ✓ between heat (electrically heated grill bars or plates)

- **Advantages**

  ✓ Food can be quickly cooked to order

  ✓ Charring foods gives them a pleasing appearance and better flavour

  ✓ Better control as food is visible during cooking

- **Disadvantages**

  ✓ More suitable for expensive cuts of meat

  ✓ Requires skill

- Examples of foods which might be cooked by grilling:
  - ✓ fish (cod, herring, mackerel, plaice)
  - ✓ meat (chops, steak)

1.2 Moist Heat Cookery Methods

In moist heat cookery methods, liquid is used as a medium to cook the food. Such medium could be water, coconut cream or oil. These liquids are added to the food before heat is applied to it or sometimes heat is applied to the liquid before the food is added into the cooking utensils to be cooked. The moist heat cookery methods include: boiling, stewing, shallow frying, and braising. All these moist heat cooking methods use liquid to cook the food in.

I. Boiling or simmering

This is the most common method of cooking and is also the simplest. With this method of cooking, enough water is added to food and it is then cooked over the fire. The action of the heated water makes the food to get cooked.

The liquid is usually thrown away after the food is cooked. In the case of cooking rice, all the water is absorbed by the rice grains to make it get cooked. During the heating process, the nutrients can get lost or destroyed and the flavour can be reduced with this method of cooking. If you overcooked cabbage, all the nutrients can get lost. **Simmering:** When a liquid rises gently and just begins to break the surface. To simmer foods, we generally bring water to a boil and then reduce the heat so that food will simmer. More foods can be simmered than boiled.

Figure 8- Boiling

- **Boiling Methods**

  Food is boiled in two ways:

  ✓ food is placed into boiling liquid, re boiled, then the heat is reduced, so that the liquid boils gently – simmering;

  ✓ Food is covered with cold liquid, brought to the boil, then the heat is reduced, so that the food simmers.

- **Advantages**

  ✓ older, tougher joints of meat can be made palatable and digestible

  ✓ appropriate for large-scale cookery

  ✓ economic on fuel

  ✓ nutritious, well flavored stock is produced

  ✓ labor saving, requires little attention

  ✓ safe and simple

  ✓ Maximum colour and nutritive value are retained.

  But the boiling time must be kept to the minimum

- **Disadvantages**

  ✓ foods can look unattractive

  ✓ it can be slow

  ✓ loss of soluble vitamins in the water

- Examples of foods which might be cooked by boiling

  ✓ stocks (beef, mutton, chicken, fish)

  ✓ sauces (brown, white, curry)

  ✓ glazes (fish, meat)

  ✓ fish (cod, salmon)

  ✓ meat (beef, leg of mutton)

II. Stewing:

Large pieces of tough cuts are cooked in water until tender. The meat is placed in a kettle or vessel with sufficient quantity of water to cover the meat. The vessel is then covered and allows the water to simmers.

Figure-9 stewing

- **Stewing Methods**

  All stews have a thickened consistency. Stewed foods may be cooked

  - ✓ in a covered pan on the stove;
  - ✓ In a covered pan in the oven.

- **Advantages**
  - ✓ Meat juices are retained as part of the stew
  - ✓ Correct slow cooking results and very little evaporation
  - ✓ Economic on fuel
  - ✓ Nutrients are conserved
  - ✓ Tough foods are tenderized
  - ✓ Economical in labour because the foods can be bulk cooked.

- **Disadvantages**

Stewing is a slow cooking method. Examples of foods which might be cooked by stewing:

- ✓ fish (e.g. bouillabaisse – French fish soup / stew)
- ✓ meat (goulash, minced beef, Irish stew, white stew of veal)

- ✓ poultry (chicken fricassee, curried chicken)

III. Shallow Frying

In shallow frying, food is cooked in a frying pan with a little amount of oil or fat. The oil or fat is heated to the correct amount and the food is put into the heated oil. The food is turned over a few minutes or is stirred around a couple of times before it is cooked and dished out. If patties, potato chips or coated foods are fried, it is best to put a piece of brown paper or paper napkin inside the tray to soak up any oil from the food before serving it.

Figure: 10 shallow frying

- **Shallow frying methods**
  - ✓ Shallow fry: cooking food in a small amount of fat or oil in a frying pan or sauté pan. The food is first fried on the presentation side, then turned, so that both sides are cooked and coloured.
  - ✓ Sauté:
    - Cooking tender cuts of meat and poultry in a saute or frying pan. After cooking the fat is discarded and the pan is deglazed with stock or wine as a part of the finished sauce.
    - Cooking potatoes or onions which are cut into slices and tossed into hot shallow fat or oil in a frying pan till golden brown.
  - ✓ Griddle: Hamburgers, sausages, sliced onions are placed on a lightly oiled, pre-heated griddle (solid metal plate) and turned frequently during cooking.
  - ✓ Stir Fry: fast frying in a wok or a frying pan in a little fat or oil (vegetables, strips of beef or chicken).

IV. **Braising:** Braising is cooking in steam trapped and held in a covered container or foil wrap. The source of the steam may be water or other liquid added to the meat, or it may be meat juices.

Figure: 11 Braising

- **Braising Methods**
  - ✓ Brown braising: joints and portion cuts of meat are marinades and may be larded and then sealed quickly by browning on all sides in a hot oven or in a pan on the stove. Sealing the joints helps retain flavour and nutritive value and gives a nice brown colour. Joints are then placed on a bed of root vegetables in a braising pan, with the liquid and other flavourings, covered with a lid and cooked slowly in the oven.
  - ✓ White braising: vegetables and sweetbreads are blanched, refreshed and cooked on a bed of root vegetables with white stock in a covered container in the oven.

- **Advantages**
  - ✓ Older, tougher joints of meat and poultry can be used
  - ✓ maximum flavour and nutritive value are retained
  - ✓ variety of presentation and flavour is given to the menu

- Examples of foods which might be cooked by braising:
  - ✓ meat (lamb, beef)

Cooking temperature affects both the taste and safety of food. Hotter temperatures at the core of the meat make it safer. Safe cooking temperatures at the core of meats are:

- 71^{o}C for ground meats (beef, pork, and lamb)
- 63^{o}C for fresh, whole meats, and meat should be allowed to rest for at least three minutes before eating
- 74^{o}C for poultry, whole or ground
- 63 ^{o}C for fin fish or until the flesh is opaque and separates easily. Resting time for cooking whole meats is important. Resting the food gives heat more time to kill any bacteria.

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. What are the effects of cooking? (2pts)

2. Write types of cooking methods? (2pts)

Test II: choice the best answer from the given alternative

1. Which one of the following is the simplest method of cooking? (3pts)

A. roasting B. grilling C. boiling D. braising

2. Which of the following cooking method does not requires water? (3pts)

A. moist cook method B. dry heat method c. shallow frying D. stewing

Information Sheet 2- Calculating correct quantities and ratios of commodities

2.1 Non-Meat Ingredients

2.1.1. Categories of non-meat ingredients or commodities includes:

Along with the main components meat and animal fat, a wide range of substances of nonmeat origin are used as ingredients in processed meat products. Some of them are absolutely necessary, such as **salt** and **spices**. Others are used for specific products. General food items such as oils, sauces, condiments and flavourings, garnishes, coatings and batters, herbs and spices, meat and poultry which may be fresh, frozen, preserved or pre-prepared, and may also include meat products such as standard cuts, sausages, hams, salamis and other meat products.

Ingredients which are solely functional without any other effect such as filling or extending the volume of the product, are normally used in small amounts (e.g. common salt 1.5-3%, nitrite 0.01-0.02%, phosphates 0.05-0.5%, ascorbic acid 0.03%, isolated soy protein or non-fat dried milk proteins 2%). Categories of nonmeat ingredients are:-

a) Chemical substances used as ingredients

There are various chemical substances approved for the different kinds of food processing, but in the specific case of meat processing the number of approved chemical substances is rather limited in most countries. The following are of significance:

- Salt(for taste, impact on meat proteins, shelf-life)
- Nitrite(for curing colour, flavour, shelf-life)
- Ascorbic acid(to accelerate curing reaction)
- Phosphates(for protein structuring and water binding)
- Chemical preservatives(for shelf-life)
- Antioxidants(for flavour and shelf-life)
- Monosodium glutamate MSG (for enhancement of flavour)
- Food colouring substances(synthetic and of plant origin)

Chemical additives have exclusively functional properties, they are used in small amounts usually below 1% (with nitrate as low as 0.05%). Only salt is in the range of 2% (with up to 4% in some fermented dried products).

b) Ingredients of plant origin

All spices are of plant origin. They are predominantly

Functional and used in small quantities to provide or add flavour and taste to meat products. Seasonings are normally parts of plants which flavour food. The trade in and the processing of spices has developed into an important support industry for food processing enterprises in order to meet consumer preferences. Mixtures of seasonings were developed in order to serve as flavouring agents for various meat products. Natural spices, herbs and vegetable bulbs are the main groups of seasonings and are described hereunder.

I. Natural spices

The term “natural spices” includes dried rootstocks, barks, flowers or their parts and fruits or seeds of different plants. The most important natural spices used in processed meat products are pepper, paprika, nutmeg, mace, cloves, ginger, cinnamon, cardamom, chilli, coriander, cumin and pimento. The most common natural spice in sausage making is pepper. Spices are mainly used in the ground form with particle sizes from 0.1 to 1 mm.

II. Herbs

Herbs are dried leaves of plants grown in temperate climates. The major herbs used in processed meat products are basil, celery, marjoram, oregano, rosemary and thyme

III. Vegetable bulbs

The main natural seasonings originating from vegetable bulbs and used in processed meat products are onions and garlic. Vegetable oil can be used to replace animal fat, in particular pork fat for Halal products. Vegetable oil can be considered a meat extender as it replaces part of the animal tissue. It also assumes the function of the animal fat to make the meat mix soft and juicy after heat treatment.

c) Non-meat ingredients of animal origin

Ingredients of animal origin are not commonly applied but may be useful for specific meat preparations. They all have functional properties (except whole milk), in particular improvement of water binding and prevention of fat separation during heat treatment. Apart from their functional properties, some of them can also be considered meat extenders, as mentioned below.

- Milk caseinate (90% protein; used in small quantities (2%); have functional water and fat binding properties)
- Whole milk or non-fat dried milk (=skim milk) (sometimes used in indigenous meat preparations as a protein extender)

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. Write the function of nonmeat ingredients? (3pts)

Test II: Write true if the statement is correct and false if the statement is incorrect

1. Herbs and spices are nonmeat commodities. (2pts)
2. The correct ratio of salt and nitrate in the commodities are 1.5%-3% to 0.03% (2pts)

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

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

Information Sheet 3- Completing cooking process

3.1 Completing cooking process

Meat is a basic portion of sound and all-round balanced diet due to its nutritional richness. Meat is a valuable wellspring of high natural quality protein and also other B complex vitamins, zinc, selenium, iron, vitamin B12 and phosphorus. Offal meats like liver are also vital sources of vitamin A and folic acid. Meat is a complex food with a structured nutritional composition.

Meat and meat-based products are cooked before being eaten. Cooking step is critical for destroying foodborne pathogens, assuring microbial safety and achieving meat quality. Cooking also has an important effect on the nutritional properties and same time on its possible toxicity. With cooking meat become edible and more digestible. Generally, consumer chooses a cooking method that produces high-quality meat products having favourable texture and taste.

The recommended the internal temperature for different meat such as 62.8 °C for steaks, roasts and fish, 71.1 °C for pork and ground beef, 76.7 °C for chicken breasts and 82 °C for whole chicken. Physical properties and eating quality of meat are affected by cooking temperature and time. During cooking, the distinctive meat proteins are denatured and this reasons structural changes in the meat textural profile. When meat is cooked, three types of changes contribute to increase tenderness;

- the melting of fat,
- dissolution of collagen in hot liquids to become soft gelatin and
- Tissue softening and muscle fiber separation.

These resulted in destruction of cell membranes, shrinkage of meat fibers, the aggregation and gel formation of myofibrillar and sarcoplasmic proteins, and shrinkage and solubilization of the connective tissue. Heat treatment can result to undesirable meat quality changes, such as nutritive value loss because of lipid oxidation and changes in a few segments of the protein fraction

3.2 Standard Operating Procedures (SOPs) during complete cooking methods

A Standard Operating Procedure is a method for carrying out a task. Food service establishments should have in place SOPs for personal hygiene, basic sanitation, and food storage and handling. Any time a new employee is hired, SOPs should be clearly demonstrated, and then followed up with a review. SOPs don't necessarily have to be written in a manual, but should be habits everyone routinely follows. **An example,** of an SOP is: "Use a clean, red colored cutting board to prepare hamburger patties. Do not prepare any other food on this cutting board until it is washed and sanitized." Facility and personnel cleanliness are probably the easiest topics for which to develop an SOP checklist. An example would be a checklist covering all the steps an employee should do before starting a work shift, like put on a clean apron or uniform, tie long hair away from your face, remove jewelry and fingernail polish, and wash your hands.

Other checklists could cover correct hand-washing procedures (how and when), ware-washing steps (including how much soap and sanitizing chemical to put in the sinks; how full to fill these sinks; what the water temperature should be; and how often the wash, rinse, and sanitizing sinks should have their water changed), plus how to handle garbage disposal. Employees don't need to actually check the steps off each time they work, but having the checklist posted near where the work is done helps remind everyone how to do the job properly.

3.3. Importance of cooking

Normal Cooking Procedures destroy most pathogens, but not necessarily their spores or toxins.

- Cook foods to proper internal temperature
  - ✓ Internal temp higher than 75 ºC
- Stir foods in deep pots frequently
- Regulate thickness of foods
  - ✓ Check thickest part of the food
- Always use sanitary cooking/serving utensils
- Never touch prepared foods with bare hands

3.4. General Considerations

- Ill or infected workers not allowed handling food.
- Generally, Keep Perishable and frozen food out of temperature danger zone (5°C to 60°C).
- For big or catered events, hold reference sample of all foods served for 72 hours.

Food safety is about producing, handling, storing and preparing food in a manner that prevents infections or diseases and retains enough nutrients for a healthy diet.

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 three types of changes that contribute to increase meat tenderness? (3pts)

Test II: Write true if the statement is correct and false if the statement is incorrect

1. A cooking method that produces high-quality meat products having favourable texture and taste. (2pts)
2. Cooking step is critical for destroying foodborne pathogens (2pts)

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

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

Score = _____

Rating: _____

Information Sheet 4- Identifying problems with the cooking process and taking corrective actions

4.1 Problems in the cooking Environment

The following aspects of the cooking environment have the potential for hazards:

- **Equipment** – knives, liquidizers, food processors, mixers, slicers and a range of other cooking equipment use incorrectly.
- **Substances** – cleaning chemicals, detergents, sanitisers, disinfectants, degreasers and other substances.
- **Work methods** – carrying knives and equipment incorrectly, not using equipment properly and not following workplace safety rules.
- **Work areas** – spillages not cleaned up, overcrowded work areas, insufficient work space, uncomfortable work conditions due to extreme heat, cold or insufficient ventilation.

Control measures must be applied to prevent or eliminate or reduce a food safety hazard to an acceptable level.

4.2 Control Measures

Determine control or prevention methods to eliminate or minimize identified hazards. To avoid endangering the safety of food, employees must:

- Keep themselves and their workplace clean. Use of personal protective equipment and clothing: Examples of PPE and clothing that may be necessary when using work equipment are: safety helmets, gloves, safety goggles, ear protectors, safety footwear, types of clothing – for instance high visibility garments.
- protect food from anything that could harm consumers
- Follow good habits, such as washing their hands before (starting work, handling any food and equipment's), during (regularly during food preparation tasks. When switching between:
  - ✓ handling raw and cooked or ready-to-eat food
  - ✓ handling raw and TCS food) and after (preparing raw food, visiting the restroom, coughing, sneezing or blowing your nose, touching your face, hair or

other parts of the body, cleaning and sanitizing, or handling containers of cleaning chemicals, wearing gloves (protective or disposable), dealing with garbage or trash, taking a meal or rest break, any other activity that could contaminate hands) cooking food.

4.3 How to wash your hands:

- Moisten hands, wrists and lower forearms with warm-to-hot water
- Apply soap
- Rub the soap into hands, wrists and forearms briskly for at least 10 to 15 seconds
- Don't forget to clean between fingers and under fingernails
- Rinse thoroughly with clean, warm, running water
- Dry hands thoroughly in the approved manner
- stay alert to food safety hazards
- follow the rules for food safety in their workplace

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: Short Answer Questions

1. List the protective measures of cooking problems? (4pts)

Test II: Write true if the statement is correct and false if the statement is incorrect

1. Cooking equipment's does not affected by cleaning chemicals or sanitizers. (2pts)
2. PPE minimizes employee safety hazards. (2pts)

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

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

Score = _____

Rating: _____

5.1 Preparing Meat Dishes

For the cooking of meat for meat dishes, two basic methods are of relevance:

Dry heat, in which the meat is surrounded by hot air, and Moist heat, in which the meat is surrounded by hot liquid.

5.2 Dry-heat methods are

- Broiling (meat is placed in an oven)
- Pan frying (browned on both sides in the pan)
- Stir frying (small meat pieces under constant stirring in a wok/ Asian frying pan)
- Deep fat frying (meat completely immersed in fat)
- Roasting (meat placed on a grill or in an open roasting pan with the fat side up, no water added)

5.3 Moist-heat methods are

- Braising (water and other ingredients such as milk or vegetable are added),
- Stewing (cooking in liquid of small meat pieces),
- Simmering (cooking in liquid of large meat pieces, normally low temperature and longtime).

5.4 Safety instructions

Personal hygiene is essential for food handlers. This includes:

- Protect food from contamination at all times.
- Wear suitable, clean outer clothing.
- Wash hands before working with food.
- Wash hands regularly during work with food.
- Avoid touching food with bare hands.
- Use clean and sanitized equipment and utensils for moving and containing food.
- Apply time and temperature principles to TCS foods.
- Use a fresh, clean, sanitized spoon each time you need to taste-test food.

- **Recommended minimum safe internal temperatures**
  - ✓ Poultry (dark meat) 80°C
  - ✓ Poultry (light meat) 71°C
  - ✓ Ground poultry 74-80°C
  - ✓ Ground beef and all types of pork 71°C
  - ✓ Beef/veal/lamb steaks and chops (medium-rare) 63°C

5.5 Heating parameters for meat products

For preparation of meat dishes in households or restaurants, exact temperature control is normally not needed and it is only differentiated between low, medium and high dry or moist heat. Meat dishes are usually consumed immediately after cooking, so the heat treatment is (besides basic food safety aspects- play also a role in heat treatment of meat dishes, such as elimination of potentially food poisoning microorganisms) mainly for sensory reasons. The achievement of a prolonged shelf life is not intended. Exception: For supplying canteens, supermarkets, etc. with pre-packed cooked and afterwards chilled ready-to-eat dishes, which have to be reheated before consumption, exact temperature control during cooking is necessary as the product will be stored

For processed meat products exact temperature control is indispensable, as the balance between two opposite requirements has to be found:

- Heat treatment temperatures should be raised high enough to accomplish adequate microbial reduction for shelf life extension.
- Heat treatment temperatures should be kept low enough to prevent deterioration of the eating quality.

Heat treatment of processed meat products will therefore always be a compromise between sensory and hygienic requirements. In case of difficult hygienic conditions (e.g. tropical environment, highly contaminated raw meat, risk of interrupted cold chain) more intensive heat treatment must be applied. However, this may result in a certain degradation of the eating quality and higher cooking losses. If meat production and meat handling conditions are good (e.g. moderate climate, fresh hygienic raw materials, excellent processing and storage conditions), the heat treatment can be less intensive, which results in better sensory quality, but in hygienically more sensitive products.

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: Short Answer Questions

1. Identify the two methods of meat dish preparations? (4pts)

Test II: Write true if the statement is correct and false if the statement is incorrect

2. Stewing is cooking in liquid of small meat pieces. (1pts)

3. Braising is the dry heat methods of meat heat preparation. (2pts)

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

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

Score = _____

Rating:_____

Operation sheet-1	Roasting meat products

Meat Roasting methods

Start at High Temp, Then Lower the Heat to Roast Low and Slow

Starts the roast at a high temperature to get browning for flavor, and then lowers the oven temp and cooks the beef "slow and low" for a couple hours.

This slow roasting method at low heat is good for tougher cuts of beef; the lower heat prevents gristle from getting too tough. Roast beef made this way is easy, relatively inexpensive (compared to other cuts of beef), and you get great leftovers for roast beef sandwiches.

Roast Beef

Preparation time
5 mins

Cooking time
3 hrs

Recipes Ingredients

BRING ROAST TO ROOM TEMP
90 mins

TOTAL TIME4 35 mins

- 3 to 3 1/2 pounds (1.3 to 1.6 kg) of Boneless Rump Roast (pick an end cut with a layer of fat if you can)
- 1 tablespoon extra-virgin olive oil

Roasting Methods

I. Salt the roast and let sit at room temp:
II. The beef should be brought to close to room temperature before you start to roast it so that it cooks more evenly. So, remove it from the refrigerator at least 1 hour, preferably 2 hours, before cooking. Open the wrapping, sprinkle all sides with salt, and wrap it up again.

III. Preheat your oven to 375°F (190°C).

IV. Insert slivers of garlic into the roast: Pat the roast dry with paper towels. Use the tip of a sharp knife to make 8 to 10 small incisions around the roast. Put a sliver of garlic into each cut.

V. Rub with olive oil, sprinkle with salt and pepper: Rub olive oil all over the roast. Sprinkle with salt and pepper.

VI. Place roast on rack, fat side up, with pan to catch drippings below:

Place the roast directly on the middle oven rack, fatty side up, with a roasting pan to catch the drippings on the rack beneath it. Placing the roast directly on the rack like this with a pan on the rack below creates a convection type environment in the oven, allowing the hot air to more easily circulate around the roast, so you don't have to turn the roast as it cooks.

Place the roast fat-side up so that as the fat melts it bathes the entire roast in flavor.

VII. Roast initially at 375°F, then lower the heat to 225°F:

Cook the roast initially at 375°F (190°C) for half an hour, to brown it. Then lower the heat to 225°F (107°C). The roast should take somewhere from 1 1/2 to 2 1/2 hours additionally to cook.

The shape of the roast will affect the cooking time. If your roast is long and narrow, rather than a more round shape, it may take less time to cook, so keep an eye on it.

VIII. Remove roast when internal temp reaches 135°F to 140°F: When juices start to drip from the roast, and it is browned on the outside, check the roast's internal temperature with a meat thermometer. Remove the roast from the

oven when the internal temperature of the roast is 135° to 140°F (57°C to 60°C).

IX. Tent with foil and let rest before cutting: Place the roast on a cutting board and tent it with aluminum foil to keep it warm. Let it rest for 20 to 30 minutes before cutting. (Resting the cooked roast is important. If you cut into it too soon, the roast will lose more of its juices.)

X. Thinly slice the roast to serve. (A sturdy long bread knife works well for slicing roasts.)

XI. **To make the gravy:** Remove the dripping pan from the oven and place on the stove top at medium heat. Note that if you are pulling the roast out early, for rare or a medium rare level of doneness, you may not have a lot of drippings. Hopefully you will have some. If not, you may want to leave the roast in a little longer at even lower heat, 175°F, to ease some more drippings out of it.

XII. Add some water, red wine, or beef stock to the drippings to deglaze (loosen the drippings from the pan). Dissolve a tablespoon of cornstarch in a little water and add to the drip pan. Stir quickly while the gravy thickens to avoid lumping.

- slivers of garlic (3 to 4 cloves, sliced in half or into thirds)
- Salt and pepper
- **For the gravy:**
- Red wine, water, and or beef stock
- Cornstarch

LAP TEST-1	Demonstration

Name…… ID……Date……

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **1** hour. The project is expected from each student to do it.

Task 1: Perform meat roasting

LG #62	LO #3- Provide information on storage handling and shelf life of fresh meat and cooked meat products

Instruction sheet

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

- Providing information on the storage and shelf life
  - ✓ fresh meat products
  - ✓ cooked meat products
- Providing Information on the safe and hygienic handling, storage and preparation of meat products

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

- Provide information on the storage and shelf life
- Providing Information on the safe and hygienic handling, storage and preparation of meat products

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

1.1 Providing information on the storage and shelf life

The shelf life of meat if the carcase is hygienically prepared, the following carcase storage life can be expected:

- Beef and veal up to 21 days
- Lamb up to 15 days
- Pigs up to 14 days
- Offal up to 7 days

For retail refrigerated display options, the shelf life of 1-2 days is normal.

- Overwrapped – shelf life 1-2 days
- Modified atmosphere packs – shelf life 7-10 days
- Vacuum packed – shelf life of up to 10 days

The shelf life of meat; the length of time that a food will maintain its quality and be safe to eat is called its 'shelf life'. The shelf life of foods depends on:

- water
- acidity
- hygienic handling
- methods of preservation

1.2 Factors affecting the shelf-life of meat and meat products

Though meat handling, storage and consumption may differ from one place to another, the factors limiting the shelf-life of these products are the same. There are endogenous factors, such as:

- pH-value or the degree of acidity of the product
- aw value or the amount of moisture available in the product; and exogenous factors, such as:
  - ✓ oxygen (from the air);
  - ✓ micro-organisms;
  - ✓ temperature;
  - ✓ light; and
  - ✓ Evaporation and desiccation

1.3 Combined Effect of PH- and $_a$w-Value

Generally speaking the shelf-life of meat and meat products will be longer the lower the pH-value and/or aw-value. Both factors (either pH or aw alone or the two together) have a decisive influence on the growth of micro-organisms in food. However, there are limits for most meat products regarding decreased pH-value and aw-value, particularly for organoleptic reasons. Except for some special products, consumers do not want meat products to be excessively acidic or dry. Un canned meat products can be classified into three storage groups according to their pH and aw. Each group requires different storage conditions.

Highly perishable meat products have a pH-value above 5.2 and an aw-value above 0.95; refrigeration at or below +5°C is needed. These are raw fresh meat (without additives), cooked sausages and cooked ham. Perishable meat products have a pH-value below 5.2 or an aw-value below 0.95. Refrigeration at or below +10°C is needed to keep them stable. Products such as meat or poultry pieces in vinegar jelly (acid) and semi-dry sausages or hams belong to this group.

Shelf-stable products have a pH-value of or below 5.2 and an aw-value of or below 0.95, or only a pH-value below 5.0, or only an aw-value below 0.91. No refrigeration is required in these cases, the products remaining stable under ambient temperatures. The most common products in this group are the various kinds of dried meat.

Under the above conditions no microbial growth in meat and meat products will occur. However, this does not mean that the products remain stable for an undetermined period. Their shelf-life will be limited by chemical or physical deterioration, by rancidity and discoloration. In this situation the product quality will benefit from the application of suitable packaging materials, which reduce the physical and chemical influences on the product or protect the product completely. The following noxious influences may occur.

- **Oxygen**

The oxygen content in the air is about 20 percent. If oxygen affects meat and meat products during prolonged storage periods, it will change the red colour into grey or green and cause oxidation and rancidity of fats with undesirable off-flavours. The foils used for food packaging differ in their permeability to oxygen. The lower the oxygen permeability of the packaging material, the more efficient will be the protection of product quality. The best protection will be achieved using oxygen-proof packaging films together with vacuum packaging of the product. This ensures that practically no oxygen is left in the package and no oxygen will penetrate from the air into the product.

- **Light**

The prolonged exposure of meat and meat products to daylight or artificial light accelerates oxidation and rancidity because light provides the energy for these processes. Transparent packaging films give no protection against light influences. Therefore, for products under strong light exposure, coloured or opaque films should be preferred. Films laminated with aluminium foil are absolutely impermeable to light. Products in transparent packaging film are sufficiently protected when kept in the dark or under moderate illumination.

- **Evaporation**

Fresh foods with relatively high moisture content such as meat, fresh sausages, cooked ham, etc. will have considerable losses of weight and quality by evaporation during storage if they are not packed. The packaging material must therefore be sufficiently vapour-proof. Most plastic films used for food packaging comply with this requirement.

1.4 Storing Meat

Meat products are highly perishable, so temperature control is the most important thing to remember when storing meats. When you receive meats, check the temperature by inserting a thermometer between packages, but do not puncture the packaging. Meats should be received at or below 41°F (5°C). Any temperature fluctuations to which the meat has been subjected can result in drying or discoloration of the meat, Be sure to look for clean, intact packaging and evidence of leakage. You may even want to check

the temperature of the delivery truck as well. Under the best conditions and proper temperature, meat will keep for 3 to 5 days without noticeable loss of quality. However, variety meats, ground beef, and stew meat are highly perishable and should be used within 1 or 2 days. Fresh meats can be kept longer when held at 32°F (0°C). For longer storage, you can freeze meat. Meat freezes at 29°F (–2°C). Store it at 0°F (–18°C) or below in moisture- and vapor-resistant wrapping. To keep meats properly chilled and prevent cross-contamination.

1.4.1 Fresh meat products

Fresh meat is a perishable commodity and therefore should be treated with care. The shelf life of fresh meat, which is related to the growth of spoilage microorganisms, depends on many factors. Among the most important are the initial microbial load (contamination), storage time and temperature, the intrinsic properties of the meat (e.g., pH, nutrient content), and the degree of processing.

Fresh meats should be stored at temperatures of –1°C to +2°C (30°F–35°F). Vacuum-packed meats should be left in their packaging until they are needed. Under proper refrigeration, vacuum-packed meats with unbroken seals have a shelf life of three to four weeks. If the seal is broken, shelf life is reduced to only a few days. Meats that are not vacuum packed should be loosely wrapped or wrapped in air-permeable paper. Do not wrap meats tightly in plastic wrap, as this creates a good breeding ground for bacteria and will significantly shorten a meat's shelf life. Store meats on trays and away from other foods which to prevent cross-contamination. Meats freeze at about –2°C (28°F). When freezing meats, the faster the bet-ter. slow freezing produces large ice crystals that tend to rupture the muscle tissues, allowing water and nutrients to drip out when the meat is thawed.

According to Health line, 2016, meat can be stored in refrigerator as under:

- uncooked poultry: one to two days
- uncooked ground meat: one to two days
- uncooked steaks or chops: three to four days
- uncooked fish: one to two days
- cooked poultry, meat, or fish: three to four days

Meat can be stored in the freezer as under:

- uncooked ground beef: three to four months
- uncooked steaks or chops: four to 12 months, depending on the item
- uncooked fish: six months

1.4.2 cooked meat products

Most commercially packaged meats are frozen by blast freezing, which quickly cools by blasting –40°C (–40°F) air across the meat. The ideal temperature for maintaining frozen meat is –45°C (–50°F). Frozen meat should not be maintained at any temperature warmer than –18°C (0°F). Moisture- and vapour proof packaging will help prevent freezer burn. The length of frozen storage life varies with the species and type of meat. As a general rule, properly handled meats can be frozen for up to six months. Frozen meats should only be thawed at refrigerator temperatures, not at room temperature or in warm water.

Meat can be stored in the freezer as under:

- cooked meat, poultry, or fish: two to six months

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

1. list the exogenous factors that can affect the shelf life of products?(3)

Test II Write true if the statement is correct and false if the statement is incorrect

1. The shelf life of a meat product is limited by chemical or physical deterioration.(2pts)
2. Meat products are highly perishable. (2pts)
3. Fresh meat should be stored at temperature -15^{O}C to 10^{O}C. (2pts)

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

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

Score = _____

Rating: _____

Information Sheet 2- Providing Information on the safe and hygienic handling, storage and preparation of meat products

2.1 Meat Handling and Storage Procedures

Proper handling and storage are two of the most vital processes undertaken by staff once meat orders arrive at their point of sale. Because foodborne illnesses have not been fully eradicated yet, and food storage is often subject to human error, rigid procedures need to be followed to ensure that all products arriving for sale are checked, refrigerated immediately, and stored correctly. Poor food-handling and storage procedures can prove to be disastrous to a food service company and to customers alike.

2.2 Receiving Procedures

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

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

2.3 Storage Procedures

Meat should be packaged appropriately to prevent drying out, spoilage, or **freezer burn**, which means Greyish-brown leather spots on frozen food that occurs when air reaches the food's surface and dries out the product. Whole sub-primal are often vacuum packed as soon as they are removed from the carcass and will have a long shelf life when kept in the original vacuum packaging. Cut meat products for retail use should be wrapped in permeable film on trays or vacuum packaged after portioning. Cut meat products for food service use may be vacuum packed after cutting or stored in food-grade containers, wrapped appropriately, and stored according to food safety standards. Products for frozen storage should be vacuum packed or wrapped tightly in freezer paper to prevent freezer burn.

Coolers should be maintained at 0°C to 2°C (32°F to 35.6°F). This is considered the safest temperature to hold meats and maintain flavour and moisture. Water freezes at 0°C (32°F); however, meat freezes at about -2°C (29°F).

Today the most common cooling units are the blower coil type, in which cool air is circulated via coils and fans from a ceiling-mounted unit that draws air from the floor up through the cold coils and then drives air back into the cooler area. Floor areas of the cooler must be free of containers that may impede the airflow. This means that all food containers and boxes must be elevated above floor level.

For most modern coolers the humidity measure of moisture content of the air. When air is completely saturated with moisture, the humidity is 100%. Meat coolers have a present humidity of 75% to 80% to ensure that carcass meats retain moisture.) Levels are built into the system and are maintained automatically. For example, lean beef is made up of approximately 70% moisture to optimize its flavour, sales appeal, and value. Moisture content in the air is expressed as relative humidity and is measured as a percentage. To maintain the moisture in meats, coolers need to maintain a humidity level of approximately 75% to 80%. If the moisture level drops below 70%, shrinkage will occur. However, if the humidity level is too high, moisture will condense onto the

meat and appear on the walls of the cooler, creating an excellent medium for bacteria growth and sooner-than-normal meat spoilage.

Modern meat coolers and freezers also have a built in defrost cycle, which is usually timed to activate in the early morning hours when there is less traffic in and out of the units. This important cycle is designed to melt away ice build-up on the blower coils (as they operate at below freezing temperatures) into a drain system. This part of the cycle takes about 20 to 60 minutes. Meat freezer temperatures should be maintained at approximately -23°C to -29°C (-10°F to -20°F).

2.4 Handling Procedures

Once processing begins, the following steps must be taken to reduce any additional contamination of the product:

- Do not allow product in any kind of box or container to come into contact with any cutting or work surface or the floors.
- Ensure that all processing tables and cutting boards are already cleaned and sanitized.
- Ensure surfaces are dry with no residue of any **sanitizers**(Cleaning agents used in the final stage of a food-processing cleaning program, after scrubbing with soap and water and rinsing has been completed, to kill microorganisms. Sanitizers can be iodine, ammonia, chlorine, or sodium hypochlorite. The most common ones used today are quaternary ammonia and hydrogen peroxide diluted to so many parts per million and regulated by local health departments.) on them (remember that most sanitizers are toxic while wet).
- Maintain separate cutting and processing boards for different species, especially fish, chicken, and pork.
- Clean and sanitize boards immediately after use and elevate to air dry as quickly as possible.
- Have separate cutting boards for cooked meat slicing.
- Thoroughly clean and sanitize meat slicers and tenderizers between uses for different species and between cooked and raw products. These slicing tools and machines pose a very real risk for **cross-contamination (**Pathogens being

transferred from a source to food, work surfaces, or people through contact**.)** and are always subject to scrutiny by health inspectors.

- If possible, process different species and cooked and raw products on different days. This helps minimize risk of cross-contamination in processing areas, tools, and machines that are used for a variety of products.

2.5 Preparation of Meat Product

- Cutting it into large thin slices (separating the fat). Sometimes the meat is partially frozen so as to cut it more easily.
- Salt is added and meat is dried slowly. Now a day instead of being dried by the sun, ovens are used. The optimum temperature is 120 -130 °C. A well dried meat can be maintained in a hermetic box for 1 or 2 months.

2.5.1 Good personal hygiene practices during food preparations

Personal hygiene practices for food handlers include the following.

- Arrive at work clean (daily bath or shower) and with clean hair.
- Wear clean kitchen clothing used only in the kitchen. This should completely cover any personal clothing. (For more information on protective clothing, see below.)
- Keep hair well contained in a suitable hat/net.
- Keep nails short and clean, not bitten – do not wear nail varnish or false nails.
- Do not wear jewellery or a watch when handling food. A plain wedding band is allowed, but could still trap bacteria. Jewellery can also fall into food.
- Avoid wearing cosmetics and strong perfumes.
- Smoking must not be allowed in food preparation areas (bacteria from touching the mouth area could get into food, as could ash or smoke, and smoking can cause coughing). At break times food handlers must not smoke while wearing kitchen clothing.
- Do not eat food, sweets or chew gum when handling food. Avoid scratching the skin and spitting should never occur in a food area. All of these practices may transfer bacteria to food.

- Wash, dry and then cover any cuts, burns or grazes with a blue waterproof dressing, then wash hands.
- Report any illness to the supervisor as soon as possible and before going near any food.

2.5.2 Protective Clothing

Personal Protective Equipment (PPE) may include: - coats and aprons, head-wear, protective boot covers, protective hand and arm covering, protective head and hair covering, uniforms, and work, safety or waterproof foot wear.

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

1. List down at list four Personal hygiene practices for food handlers?(4)

Test II Write true if the statement is correct and false if the statement is incorrect

1. Good food-handling and storage procedures can prove to be disastrous to a food service company and to customers alike. (2pts)
2. cooler and freezer doors are kept closed at all times.(2pts)

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

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Answer key