



FLESH FOODS, MILK AND MILK PRODUCTS

Flesh foods are consumed since prehistoric times. Meat, poultry and fish are known as flesh foods. Flesh foods like meat, poultry, pork and fish provide the body with essential nutrients, minerals and vitamins for it to remain healthy. These foods contain good quality proteins with high biological value. Egg, milk and milk products are also good sources of animal proteins providing the body with essential amino acids which help to promote growth and maintenance of the human body.

In this lesson the students will be able to:

- learn the different types of meat and fish
- understand the nutritional significance of meat, fish, milk and eggs.
- understand the selection criteria of meat, fish and eggs.
- compare the characteristics of fresh and deteriorated egg



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- learntheimportanceofpasteurization
- > understand the role of milk and eggs in cookery

4.1 Meat

Meat refers to muscle of warm blooded four-legged animals. Meat is defined as skeletal muscle with naturally attached tissue. Red meat consists of mutton, pork, beef and rabbit meat (Fig.4.1). The flesh of birds (poultry), fish, crustaceans, flesh of salmon and lobsters are light coloured and are referred to as white meat.

4.1.1 Classes of meat and related products

- 1. Veal: It is the meat from cattle slaughtered 3 to 4 weeks after birth.
- 2. Beef: Meat of cattle over 1 year old.
- 3. Mutton: Flesh of young ovine

animals of both sexes whose age is 12 months or under.

- 4. Yearling Mutton: Carcasses of young sheep usually from 12 to about 20 months old are termed yearling mutton.
- 5. Mature mutton: Flesh of both the male and female of ovine species that are 20 months in age at the time of slaughter.
- 6. Pork: It is the meat of swine. Good quality pork is obtained from animals between the age of 3-12 months before the amount of fat becomes excessive.
- 7. Organ meats: Liver, kidney, heart, thymus, pancreas and brain.
- 8. Sausages: Made of ground or minced meat and are enclosed in casings.



Catttle(beef)



Pigs(pork)



Sheep(lamb)



Fig 4.1: Types of red meat

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4.1.2 Structure of meat

Animal flesh consists of muscle tissue or fibres, connective tissue and fatty (adipose) tissue. Lean meat is the muscle tissue of animals.

Meat muscle is made up of bundles of muscle fibres held together by creamy white connective tissues. Tendons join muscles (made up of bundles of muscle fibres, surrounded by connective tissue) to the bones of animals.

Muscle cells comprises of

- 1. Water
- 2. Minerals
- 3. Fat
- 4. Proteins
- 5. Vitamins
- 6. The red pigment called myoglobin

Fat: Fat is distributed throughout meat in small particles or in large masses. The pattern formed by the uniform distribution of fat in small "lakes" throughout the muscle or lean flesh is called "**marbling**" and is considered an important factor in contributing tenderness and flavour to muscle tissue

The colour of meat

The colour of meat is due to the red pigment called **'myoglobin'**.



Visible fat

Fig 4.2: Marbling in meat

A large amount of the iron found in meat is in the liver, an organ constituting only a small portion of the carcass.

Offals (Organ meats)

Offal also called as organ meats, refers to the internal organs and entrails of a butchered animal. The name offal means "off fall", in other words, the bits which fall from an animal when it is butchered. The term offals generally covers organs such as the heart, liver and lungs (collectively known as the pluck) and other organs like the kidneys, brains, head, feet, tongue, intestines and tails. Offal from birds is generally referred to as giblets.

Offals are a highly nutritious food and an excellent source of protein. The liver, kidney and heart are a good source of iron and vitamins A, and D.



Fig 4.3: Organ meats- Liver, Brain, Heart and Kidney

Table 4.1 Nutritive value of meat (per 100 g)					
Flesh food	Energy (Kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)
Beef	86	19.4	0.9	3	-
Mutton	194	18.5	13.3	150	2.5

4.1.3 Composition and Nutritive value of meat

Meat has an outstanding nutritive value, contributing substantial amount of high quality proteins and essential minerals and vitamins to the diet. Meat contains 15-20 percent protein of high biological value. The proteins of meat are well utilized by the body, thus ensuring a supply of essential amino acids necessary for growth and maintenance. Meat contains enough iron, phosphorus, zinc and copper to rate as an important source of these minerals.

As far as vitamins are concerned, vitamin A, thiamine and riboflavin are present in liver, kidneys, heart and sweetbreads (the pancreas or the thymus). All lean meats contain thiamine, riboflavin and niacin. Meat is also relatively high in energy value. Meat fats are rich in saturated fatty acids.

4.1.4 Post mortem changes in meat

The changes taking place in meat after slaughter may be grouped under two heads:

- 1) Onset of rigor mortis
- 2) Development of tenderness in muscles

Onset of rigor mortis:

After slaughtering, the lean tissues undergo a series of complex physical and chemical changes. As a result, muscles lose their soft pliable nature and become rigid, stiff and inflexible. This is termed as **"rigor mortis"**.

Stiff muscle starts to soften and becomes tender when it is held in a cold room temperature between 0°C to 20°C for 1–4 weeks. This is known as **"ripening"** or **"ageing"**. During ageing the humidity of the room is to be controlled.

Development of tenderness:

Meat can be made tender by using mechanical methods like pounding, cutting and grinding which break muscle fibre. Addition of salt, vinegar, lime juice and enzymes like papain (raw papaya), bromelin (pineapple) and ficin (figs) also help in tenderizing meat.

4.1.5 Meat Cookery

In the process of cooking, many chemical changes occur affecting the appearance, taste and texture of meat. Cooking meat-

Develops or improve flavour, colour, aroma.



Fig 4.4: Cooked and raw meat

- Makes it delicious and appetizing to eat.
- Makes it more tender.
- ➤ Makes it easier to digest.
- Makes it safe to eat kill any harmful bacteria it may have picked up during handling.

4.1.6 Changes that occur during cooking:

- On cooking, the red pigment of meat turns brown due to the denaturation of protein pigment.
- Cooking (heat treatment) also brings about inactivation of enzymes and denaturation of proteins, which makes the meat tougher
- When meat is cooked volatile compounds from both fat and lean meat are released which contributes to the flavour and taste of cooked meat.
- Cooking melts the meat fat which increases palatability of meat when eaten hot.
- There is loss of water on cooking meat which does not change the nutritive value but may affect the juiciness and brings about shrinkage in volume and weight.

4.2 Poultry

The term poultry is applied to all domesticated birds used as food and includes chicken, ducks, geese, turkeys and pigeons. Of these, chicken and turkey are most commonly used for their meat.



Fig 4.5: Broiler chicken

4.2.1Classification

Poultry is classified based on age. Age influences tenderness and fat content of the poultry. According to Indian standards, the classification is as follows:

Broiler or fryer: Chicken of 8 to 10 weeks of age either sex, having tender meat with soft, pliable smooth textured skin and flexible breastbone cartilage.

Roaster: A young chicken, usually 3 to 5 months of age, of either sex, having tender meat with soft, pliable smooth textured skin and breastbone cartilage that may be somewhat less flexible that of the broiler or fryer.

Stag: A male chicken, usually under 10 months of age with coarse skin, somewhat toughened and darkened flesh and a considerable hardening of the breastbone cartilage.

Stewing chicken or fowl: A mature chicken, usually more than 10 months of age, with meat less tender than that of a roaster and inflexible breastbone tip.

Cock: A mature male chicken, usually over 10 months of age, with coarse skin, toughened and darkened meat and hardened breastbone tip.

4.2.2 Processing

Poultry is marketed in ready to cook form as dressed chicken after removing the head, feet and entrails. After the birds are killed, they are scalded, that is, dipped in hot water briefly. The temperature of the scald water may be 60 °C and the bird is kept in it for about 45 seconds or more. Scalding loosens the feathers on the chicken and thus helps defeathering.



Fig 4.6: Cuts of Chicken

After defeathering, evisceration of the bird takes place. The eviscerated birds are thoroughly washed and chilled. Chicken can be purchased whole, cut into parts or in packs of similar individual parts, such as breasts, drum sticks or thighs.

4.2.3 Composition and nutritive value

Poultry meat has high protein content (about 25 percent) and is comparable in quality and nutritive value to other meats. It contains all the essential amino acids required for building body tissues. There is a little fat on the meat of young birds, but the fat content is influenced by age and species of poultry.

ACTIVITY - 1

Conduct a 10-minute review relay. Divide the class into three or four teams of up to 10 students. Give each team a different coloured marker and ask them to name their team. One student at a time from each team must write one thing they have learned about meat and poultry. The student then returns to the team and hands the pen to another member. Each student must write something different than the previous learning facts. The winning team is the one with the most new facts.

Chicken fat is more unsaturated than the fat of red meat and this has nutritional advantage. Because of its high protein to fat ratio, poultry meat is advantageous to persons who must restrict the intake of fats. Like other animal tissues, poultry flesh is a good source of B Vitamins and minerals.

4.2.4 Selection of poultry

When purchasing fresh poultry, look for firm birds with plump flesh the skin should not look wrinkled. If buying frozen chicken, check that the package is well sealed.

4.3 Fish

India has a coast line of 5,100 km. Over 200 edible fish varieties are known to be commercially important. Marine fishes are sardines, mackerel, tuna, catfish, brown duck, ribbon fish, prawns and cuttle. Fresh

Table 4.2 Nutritive value of Poultry (per 100 g)					
Food	Energy (Kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)
Chicken	109	25.9	0.6	25	-

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water fish are carps, catla, rohu, murrels and hilsa. Fish contains complete proteins and can be an alternative for meat in the diet, but unfortunately fish consumption per capita is far lower than that of meat.

4.3.1 Classification of Fish

Edible fish are categorized as either fin fish of shell fish. The term fin fish refers to the fishes that have bony skeleton. Shell fish is used to designate both mollusks and crustaceans. Shellfish are highly perishable.

Crustaceans have legs with partly joined outer shells. They include crabs, lobsters, prawns and shrimps. Molluscs have harder outer shells and no legs. They have hinged shells like oysters, scallops and mussels.

4.3.2 Composition and nutritive value

Commonly consumed fish are carp, rohu, sardine, mackerel pomfrets, seer fish,

prawns, ribbons fish, sole, Bombay duck, catfish and crab.

The composition of fish varies. Fish are not good source of energy because they are not good sources of carbohydrate and fat.

Carbohydrate: The shell fish has less fat and more carbohydrate than fin fish. Like meat, fish contain some glycogen in muscle tissues. In the live fish, glycogen is the source of stored energy. Oysters are notable for their high content of glycogen.

Protein : Fish is an excellent source of protein due to its quality and quantity. They contain around 20 percent protein. The biological value of fish protein is 80. Fish is rich in lysine and methionine hence it has supplementary value with cereals and pulses.

Fat : Fish contains less amount of fat compared to meat and poultry. Fresh



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Table 4.3 Nutritive value of Fish (per 100 g)						
Food item	Energy (Kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)	
Pomfret -black (Vavalu)	111	20.3	2.6	286	2.3	
Prawn (Yera)	89	19.1	1.0	323	5.3	
Sardine (Mathi)	101	21.0	1.9	90	2.5	
Seer (Vanjaram)	126	22.5	4.0	71	5.4	

water fish contains eicosapentaenoic acid and docosahexaenoic acid which are ω -3 polyunsaturated fatty acids.

Minerals: Fish is rich in calcium particularly small fish when eaten with bones. Marine fishes are good sources of iodine, selenium and fluoride. Selenium is a powerful antioxidant. Oysters are good source of copper and iron. Sodium content of freshwater fish is slightly less than meat. Shell fish such as oysters are nature's richest source of zinc. The bioavailability of iron and zinc is higher in fish than plant foods. **Vitamins:** Sea foods contain significant amount of vitamin B_{12} especially shell fishes. Fish liver oils are excellent source of fat-soluble vitamins. Shark liver oil contains 10,000-24,000 IU of vitamin A per gram of oil. Rohu contains vitamin C. Fishes are good source of niacin and vitamin D. Sea foods contain significant amounts of vitamin B_{12} especially shell fishes.

Fish and health

Eskimos living in Greenland and the fishing community in Japan, enjoy complete freedom from cardiovascular diseases. Their

Table 4.4 Selection of Fish				
Characteristics	Fresh fish	Stale fish		
Skin	Bright, moist and shiny	Skin shows signs of wrinkling and shrinking away from the flesh		
Scales	Firmly attached to the skin	Falls off easily		
Eyes	Eyes should be convex, the pupil black and the cornea translucent. The eyes should be bright, clear and bulging.	Sunken eyes		
Bones	Bones stick firmly to the flesh	The bone separates easily from the flesh		
Flesh	Firm to touch	Should not leave a depression when touched		
Gills	Bright red in colour	Brown		

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daily consumption of fish is 250-400 g. The beneficial effect of dietary fish is attributed to the fatty acid composition of the fish.

4.3.3 Selection of Fish

Fish that are fresh can be easily identified by the following qualities:

Prawns : Fresh and firm, strong colour, no unpleasant smell.

Scallops : Pinkish white or pale yellow, feel firm, give-off clear liquid.

Clams, oysters and mussels : Tightly closed and heavy for their size, shells should not be cracked.

 ω -3 fatty acids protect against cardiovascular disease and are essential for the development and function of brain and prevent inflammation and pain of arthritis.

ACTIVITY - 2

Make a list of the ways in which fish can be used in the menu.

4.4 EGG

4.4.1 Structure and composition of egg

An egg is designed to give protection and food for a developing chick. It is therefore a very nutritious food. There are three main parts: the shell, the white and the yolk.

The shell consists of two parts

- 1. An outer shell composed mainly of calcium carbonate
- 2. Two thin inner membranes composed mainly of phosphates



Fig 4.8: Structure of an Egg

The outer shell protects the egg, or the developing chick in a fertilized egg. The shell is porous and contains numerous tiny holes, which enables a chick to breathe. The colour of the shell varies from white to deep brown depending on the breed of the hen.

The two inner membranes lining the shell act as chemical filters to obstruct bacteria which may enter through the porous shell. The two membranes separate to form a small air pocket between them at the rounded end.

The egg white has two distinctly visible layers. The egg white immediately surrounding the yolk is thick and viscous. This is surrounded by a thinner more transparent white.

The egg yolk is anchored to the membranes inside the egg shell by two ropelike structures known as the **chalazae**. These hold the yolk centrally in position. The yolk is separated from the white by a membrane known as the **vitelline membrane**.

The white of the egg (albumin) consists of largely water with no fat or carbohydrate but contains 8-12 percent protein. Different types of proteins are present in egg white like ovalbumin, conalbumin, ovamucoid, ovomucin and avidin. The protein ovomucin is responsible for the jelly-like character of egg white and thickness of the albumin. Avidin binds with biotin and makes the vitamin unavailable. But avidin is denatured by heat and thus cooked egg does not affect the availability of biotin.

Egg yolk comprises mostly 25-33 percent of fat and 15-17 percent protein and the remaining water. The major proteins in egg yolk are lipoproteins which include lipovitellins and lipovitellinin. These lipoproteins are responsible for the excellent emulsifying properties of egg yolk, when it is used in products such as mayonnaise.

4.4.2 The value of eggs in the diet

Eggs are an excellent and relatively cheap source of high biological value protein. Egg proteins have an excellent supplementary value to all other plant protein foods. Hence a combination of eggs with any of the cereal or cereal pulse mixture will enhance the protein quality of food. They also provide vitamins A, D, E and riboflavin. Egg yolk is a good source of carotene and iron. Egg is one of the richest sources of lecithin- a phospholipid which forms a part of the structure of every cell wall in the body. Egg also provides essential fatty acids like linoleic acid and arachidonic acid.

4.4.3 Evaluation of egg quality

Egg is an excellent food and hence its quality is of very great importance. Fresh eggs have the best quality. Quality of eggs can be determined by candling where the egg is held against a source of strong light. Candling will reveal

- a) a crack in the shell.
- b) the size of the air cell.
- c) the firmness of the white.
- d) the position of the yolk.
- e) the presence of foreign substances.

Table 4.5 Nutritive value of Egg (per 100 g)					
Food	Energy (Kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)
Egg (hen)	173	13.3	13.3	60	2.1

Table 4.6 Characteristics of fresh and deteriorated eggs				
Characteristics	Fresh egg	Deteriorated egg		
Consistency of Egg white	Firm and viscous	Thin and runny		
Position of the yolk	Centre of the white	Yolk moves toward the shell		
Air cell	Small	large		
Chalazae	Strong	weakens		
Vitelline membrane	Intact and strong	Weak, Ruptures- white mixes with the yolk		

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ACTIVITY - 3

To compare quality characteristics of fresh and deteriorated raw eggs

Materials Needed:

1 fresh egg

2 deteriorated egg (held at room temperature for at least two weeks)

Procedure

- 1. Break one fresh egg out of the shell onto a flat plate. Be careful not to damage the egg.
- 2. Keep the shell. Inspect the air cell in the large blunt end of the egg shell.
- 3. Observe the thick and thin egg white: the height, diameter, and the color of the yolk; the position of the yolk in the white; the chalazae and record the observations.
- 4. Repeat steps 1-3 using a deteriorated egg.

4.4.4 The properties of egg

There are three main properties of proteins in eggs which enable them to be used in so many different ways in cookery.

- 1. Egg proteins coagulate on heating.
- 2. Egg proteins stretch when beaten and hold air in the structure.
- 3. Egg yolk proteins are good emulsifying agents.

4.4.5 Uses of egg in cookery

Eggs can be used in many ways in cookery. Eggs when used alone or in combination with other foods they become the major protein source of



In a good quality egg the white is thick and stands high. Yolk is firm, round and high.

In a poor quality egg the yolk is somewhat flattened and enlarged. The white appears watery.



When the egg sinks in water it is considered as fresh.

Poor quality eggs float due to increase in size of the air cell and due to loss of moisture.

a meal. Eggs can be used as boiled, scrambled, fried (omelettes) or poached for table use. Eggs are used as :

- Thickening Agent: Egg proteins coagulate on heating. Therefore, eggs can be used as thickening agents for making stirred and baked custards, soups and puddings.
- ➢ Binding Agent: Egg proteins coagulate between 65 and 70°C and



ACTIVITY - 4

Students brainstorm a list of 10 foods that use eggs. Ideas can be recorded on the "How Do We Use Eggs" worksheet.

> help to hold shape of the products in which it is used. They can be used for making cutlets, French toast or Bombay toast and banana fritters.

- Leavening Agent: Eggs when beaten, form elastic films which can trap air. This air expands during baking and gives a fluffy spongy product. Thus they can be used in cakes, foamy omelette, souffles and meringue.
- An Emulsifying Agent: Besides protein, egg contains phospholids such as lecithin which are known for

their emulsifying quality. Hence egg can be used an excellent emulsifying agent in products such as mayonnaise as it is able to stabilise the oil in water dispersion.

- As a Flavouring and Colouring Agent: Egg is used in food mixtures to contribute flavour and colour to products such as cakes and puddings.
- As a Clarifying Agent: Egg helps in the preparation of clear soups. When a small amount of egg white is added to the liquid soup and heated, the egg albumin coagulates and carries along with it suspended particles. On allowing it to settle, a clear soup is obtained.



- As a Garnishing Agent: Hard boiled eggs are diced and are used to garnish dishes like biryani.
- As an Enriching Agent: Eggs are used to enhance the nutritive value of various preparations.

4.5 Milk And Milk Products

The story of milk goes back to the beginning of civilization itself. Cattle were domesticated even in prehistoric times and milk was one of the most essential of all foods. Milk is one of the most complete single food available in nature for health and promotion of growth.

Milkisthenormalsecretion of mammary gland of mammals. Its purpose in nature is to provide good nourishment to the young of the species producing it. Man has learnt the art of using milk and milk products as a part of food for his well being. Man has increased the milk producing function of the animals best adapted as a source of milk for him. The cow is the principle source of milk for human consumption in many parts of the world; Other animals as a source of milk for human beings are the buffalo, goat, sheep, camel and mare. In India, more milk is obtained from the buffalo than the cow. Some amount of goat milk is also consumed.

4.5.1 Nutritive value of milk

Milk is a complex fluid containing protein, fat, carbohydrates, vitamins and minerals. The main protein in milk is casein and it constitutes 3.0-3.5 percent of milk. The fat content of milk varies from 3.5 percent in cow's milk to about 8.0 percent in buffalo's milk. Fat is present in the form of fine globules varying in diameter from 1

ACTIVITY - 5

- Learn how milk gets from the farm to fork
- Design a poster about the importance of drinking milk

to 10µm(micrometers).Milk also contains phospholipids and cholesterol.

Lactose is the sugar present in milk. The important minerals in milk are calcium, phosphorus, sodium and potassium. Milk is an excellent source of riboflavin and a good source of Vitamin A. However, milk is a poor source of iron and ascorbic acid. The small amount of iron present is bio available.

4.5.2 Types of processed milk

Raw milk is processed into the following types of milk.

1. Skimmed Milk

Skimmed milk is whole milk from which fat is removed by a cream separator. The quantity of fat is usually 0.05 to 0.1 percent. It contains all other milk nutrients, except Vitamin A and D but can be fortified by the addition of these vitamins.

2.Toned Milk

Toned milk is prepared by using milk reconstituted from skimmed milk powder. Skimmed milk is prepared by removing fat from milk in a cream separator. Skimmed milk is then mechanically dried to give skimmed milk powder. It is mixed with buffalo milk containing 7 percent fat. The fat content of toned milk should be around 3 percent.

3.Standardised Milk

In standardised milk, the fat content is maintained at 4.5 percent and solids non -fat

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Table 4.7 Nutritive value of milk and milk products (per 100 g)						
Food	Energy (Kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)	
Cow's milk	67	3.2	4.1	120	0.2	
Buffalo's milk	117	43	6.5	210	0.2	
Curd	60	3.1	4.0	149	0.2	
Paneer	265	18.3	20.8	208	-	

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is 8.5 percent. It is prepared from a mixture of buffalo milk and skimmed milk.

4. Homogenised Milk

Homogenisation is a mechanical process that reduces the size of fat globules by forcing milk through small apertures under pressure and velocity. When milk is homogenised, the average size of the globule will be 2 micrometers. The decrease in the size of fat globules increases their numbers and surface area. The newly formed fat droplets brings about stabilization of the milk emulsion and thus prevents rising of the cream. Homogenised milk has a creamier texture, bland flavour and whiter appearance.

5. Evaporated Milk

It is made by evaporating more than half the water from milk under vacuum, at a temperature of 74°C- 77°C. It is then fortified with vitamin D, homogenized and filled into cans.

4.5.3 Pasteurisation of milk

Milk is a favourable medium for bacterial growth. Pasteurisation destroys all pathogenic bacteria, including those causing typhoid, tuberculosis, diphtheria as well as yeasts and moulds. Pasteurization is a process which consists of heating milk to a certain temperature for a definite time to ensure destruction of harmful bacteria. There are three methods of pasteurisation.

- a) **Holding method or Batch process :** In this method, milk is held at 62.8°C for 30 minutes.
- b) **High temperature short time method or continuous process (HTST):** Milk is heated to 71.7°C for not less than 15 seconds.
- c) Ultra High temperature method : Milk is heated to a temperature of 93.4°C for 3 seconds.

Milk should be then rapidly cooled to prevent multiplication of surviving bacteria, after heat treatment. During pasteurization the nutritive value of milk is not altered. It does not produce an unpleasant cooked flavour. Harmful pathogens especially TB bacteria are destroyed. Shelf life of milk is increased due to a marked decrease in the total bacterial count.



Fig 4.9: Pasteurisation of milk

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4.5.4 Milk products

Khoa

Khoa is prepared by evaporating whole milk in an open cast iron pan with continuous stirring until it is semi-solid. It is used extensively in the preparation of Indian sweets.

Cream

Cream is the fat of milk and is used in the preparation of sweets. It is made by simmering large quantities of milk until a thick layer of milk fat and coagulated protein form on the surface. It can be consumed with or without the addition of sugar.

Butter

Butter is obtained from cream by churning. When cream is churned, the fat globules are destabilised and coalesce until the milk separates into two phases– viz., the butter and the aqueous phase. Butter is removed and washed.

Butter is used as a cooking medium in many Indian recipes. It is one of the main ingredients in cakes, biscuits, icing and bread.

Ghee

Ghee is butter oil. It is prepared by melting butter and separating the moisture from butter by heating. It is used in preparing Indian sweets, savouries, curries and variety rice like pulav and biriyani.

Paneer

Paneer is a soft cheese prepared by addition of lemon juice or citric acid to hot milk and precipitating the casein. The liquid released in this process is known as "whey" and the resultant curd is tied in a muslin cloth and hung for a day to squeeze any



Fig 4.10: Milk products

liquid present in it. The soft cheese (paneer) that is obtained is used in Indian gravies and pulavs. It is a very good source of protein

Cheese

It involves the curdling of milk with enzyme rennet under microbially controlled conditions. Milk is held at about 27°C in vats and a lactic acid culture is added. When the milk gets acidic, rennet is added to it and the milk is allowed to coagulate. The curd formed is cut and heated to about 37°C with constant stirring to remove the whey. Whey is drained. Salt is mixed with the curd and it is pressed to remove further amount of whey. The cheese formed is coated with paraffin to prevent loss of moisture. The paraffined cheese is allowed to ripen for three to six months at temperatures between 45°C to 60°C. Cheese is a concentrated source of protein.

Curd

Curd is prepared by heating milk to about 50°C. A teaspoon of curd (starter)

from an earlier batch of curd is added and is mixed thoroughly. The lactic acid bacteria present in the starter curdles the milk. The bacteria breaks down lactose to lactic acid thereby increasing the acidity of milk. When the pH reaches 4.6, the milk protein casein coagulates as curd. The optimum temperature for the formation of curd is 35°C - 40°C and the time needed for curd formation is 8–12 hours depending on the atmospheric temperature. Curd is used as a dressing on salads made from fresh vegetables and combines well with plain cooked rice.

Yoghurt

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This is a coagulated milk product with curd like consistency. It is made from partially skimmed or whole milk and it has a slightly acidic flavour. In the production of yoghurt, a mixed culture of Lactobacillus bulgaricus, Streptococcus thermophilus and Lactobacillus acidophilus is added to pasteurised milk and incubated at 42°C to 46°C.



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4.5. 5 Role of milk and milk products in cookery

Role of milk and milk products in cookery

- 1. It contributes to the nutritive value of the diet, eg. milkshakes, plain milk, flavoured milk, cheese toast.
- 2. Milk adds taste and flavour to the product eg. payasam,tea, coffee.
- 3. It acts as a thickening agent along with starch eg. whitesauce or cream soups.
- 4. Milk is also used in desserts, eg. icecream, puddings
- 5. Curd or buttermilk is used as a leavening agent and to improve texture, eg. dhokla.
- 6. Curd is used as a marinating agent, eg. marinating chicken and meat.
- 7. Curd is used as a souring agent, eg. ravadosa, dry curd chillies.
- 8. Khoa is used as a binding agent, eg. carrot halwa.
- 9. Cheese is used as garnishing agent.
- 10. Salted butter milk is used for quenching thirst.

Summary

Meat, poultry and fish are known as flesh foods and they provide the body with essential nutrients, minerals and vitamins.

- Meat also includes the glands and organs of animals.
- Marbling is an important factor in contributing to tenderness and flavor to muscle tissue
- In the process of cooking many chemical changes occur, affecting the appearance, taste and texture of meat.
- The term poultry is applied to all domesticated birds used as food and includes chickens, ducks, geese, turkeys and pigeons.
- Poultry meat has high protein content and contains all the essential amino acids required for building body tissues.
- Edible fish are categorized as either fin fish of shell fish .
- Fish has ω-3 fatty acids, which protect against cardiovascular disease and are essential for the development and function of brain and prevent inflammation and pain of arthritis.
- Egg is a very nutritious food and has three main parts: the shell, the white and the yolk.
- The different types of processed milk are skim milk, toned milk, standardised milk, homogenised milk and evaporated milk.
- Pasteurisation of mik destroys all pathogenic bacteria and increases the self life of milk.

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Glossary

Terms	Meaning
Biological Value	A measure of the efficiency of the protein in a foodstuff.
Sweet breads	A culinary term referring to the thymus gland.
Scalding	Immerse (something) briefly in boiling water for various purposes, such as to facilitate the removal of skin from fruit or to preserve meat.
Eicosapentaenoic acid	A polyunsaturated fatty acid found especially in fish oils
Souffle	A souffle is a baked egg-based dish.
Meringue	Meringue is a type of dessert.

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Questions

Part-A

Choose the correct answer (1 mark)

- 1. _____ is prepared by evaporating whole milk in an open cast iron pan with continuous stirring until it is semi-solid.
 - a) Khoa
 - b) Paneer
 - c) Cheese
 - d) Ghee
- 2. Egg yolk proteins are good . agents
 - a) Oxidizing
 - b) Emulsifying
 - c) Colouring
 - d) Flouring
- 3. Organ meats are called as _____
 - a) Offals
 - b) Beef
 - c) Poultry
 - d) Chicken

- 4. _____ is the meat from cattle slaughtered 3 to 4 weeks after birth
 - a) Beef
 - b) Veal
 - c) Poultry
 - d) Chicken
- 5. _____protect against cardiovascular disease
 - a) ω -3 fatty acids
 - b) Saturated fatty acids
 - c) Trans fatty acids
 - d) UnSaturated fatty acids

Part - B

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Write short answer (2 marks)

- 1. Name the proteins present in egg.
- 2. Explain any one method of evaluating egg quality
- 3. What is rigor mortis?
- 4. What is the fat content of toned milk?
- 5. Which is the pigment that gives red colour to meat?

Flesh foods, Milk and Milk products



- 6. What is rennet?
- 7. What is homogenization?
- 8. What is ageing of meat?
- 9. How can meat be tenderized?
- 10. Give any two uses of eggs in cookery.

Part - C

Answer in brief (3 marks)

- 1. Draw the structure of an egg and name the parts
- 2. Compare the characteristics of fresh and deteriorated eggs
- 3. Explain post mortem changes in meat.
- 4. Explain how fish is classified.
- 5. Write short notes on nutritive value of milk.

Part - D

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Answers in detailed (5 marks)

- 1. Explain the nutritional importance of fish and meat in the diet.
- 2. Discuss selection of fish.
- 3. What is pasteurization? Explain the different methods of pasteurizing milk.
- 4. Describe the different kinds of milk.
- 5. Explain the role of eggs and milk in cookery.
- 6. List the objectives of cooking meat. What are the changes that take place when meat is cooked?

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