Chapter – 2nd

Nutrition

In

Animals

Nutrition

The process of taking in food by an animal and its utilisation in the body is called animal nutrition.

Nutrition in animals takes place in five steps: Ingestion, Digestion, Absorption, Assimilation and Egestion.

1. **The process of taking food into the body is called ingestion.**

2. **The process in which the food containing large, insoluble substances is broken down into small, water soluble substances (which can be absorbed by the body) is called digestion.**

3. **The process in which the digested food passes through the intestinal wall into blood stream is called absorption.**

4. **The process in which the absorbed food is taken in by body cells and used for energy, growth and repair, is called assimilation.**

5. **The process in which the undigested food is removed from the body is called egestion.**

Animals Take in Food by Different Methods

1. Ingestion

First step in the process of nutrition in animals is 'ingestion' which means 'taking food into the body' (or eating of food). Different animals use different modes (or methods) of taking food into their body.

Every animal has some special structures (or organs) for taking food inside its body.

2. Digestion

The process in which the food containing large, insoluble substances is broken down into small, water soluble substances which can be absorbed by our body, is called digestion.

There are 2 types of method: physical and chemical methods for digesting (breaking up) the large substances present in food.

Physical methods include chewing and grinding the food in mouth.

Chemical methods include the addition of digestive juices to food by the body itself.

During the process of digestion, the complex starch carbohydrate present in our food is broken down into a simple sugar called glucose.

Fats are broken into simpler substances called fatty acids and glycerol.

And proteins are broken down into simple substances called amino acids.

Alimentary Canal

A long tube running from mouth to anus of a human being (or other animals) in which digestion and absorption of food takes place is called alimentary canal.

The alimentary canal is a continuous canal which has many parts such as mouth (buccal cavity), oesophagus (food pipe), stomach, small intestine, large intestine, rectum and anus.

Three glands are also associated with alimentary canal. These are salivary glands, liver and pancreas.

The food enters the alimentary canal at the mouth (or buccal cavity). As the food travels through the various parts of alimentary canal, it gradually gets digested.

During the passage of food through alimentary canal, the various glands (salivary glands, liver, pancreas) and inner walls of stomach and small intestine, secrete digestive juices.

These digestive juices convert the complex substances of food into simpler substances which can be absorbed by the body. The undigested part of food

is defecated (thrown out) through the last part of alimentary canal called anus.

Human Digestive System

The human digestive system consists of the alimentary canal and its associated glands.

The various organs of the human digestive system in sequence are: Mouth (Buccal cavity), Oesophagus (or Food pipe), Stomach, Small intestine, Large intestine, Rectum and Anus.

The glands which are associated with human digestive system and form a part of human digestive system are: Salivary glands, Liver and Pancreas.

Salivary glands are located in our mouth (or buccal cavity).

Liver is a reddish-brown gland situated in the upper part of abdomen on the right side. Liver is the largest gland in the body.

Pancreas is a large, cream coloured gland located just below the stomach.

The ducts (or pipes) of various glands open into the alimentary canal and pour the secretions of their digestive juices into the alimentary canal

Mouth (or Buccal Cavity)

- In the Mouth (or Buccal Cavity) Food is taken into the body (or ingested) through the mouth.
- The mouth (or buccal cavity) contains teeth, tongue and salivary glands.
- The teeth cut the food into small pieces, chew and grind it. The salivary glands secrete a watery liquid called saliva.
- The tongue helps in mixing saliva with food. Saliva is a digestive juice which helps to digest the starch present in the food partially.

- **The slightly digested food is swallowed by the tongue and goes down into oesophagus (or food pipe)**

Oesophagus (or Food Pipe)

- **The oesophagus is a tube (or pipe) which connects the mouth (or buccal cavity) to stomach.**
- **Oesophagus is commonly known as food pipe. It runs along the neck and chest.**
- **Oesophagus carries the slightly digested food from the mouth to the stomach.**

When the food enters oesophagus at the top end, the muscles in the walls of oesophagus start alternate contractions and relaxations producing a wave-like movement which pushes the food downwards towards the stomach.

Small Intestine

- **The small intestine is a very long tube. The small intestine is arranged in the form of a coil in our belly.**

Complete Digestion of Food in Small Intestine.

The partially digested food from stomach comes into small intestine. The small intestine receives secretions of digestive juices from the liver, pancreas and its own walls.

- **All these digestive juices carry out the complete digestion of food as follows: Liver secretes a liquid called. The bile plays an important part**

in the digestion of fats. The starch carbohydrate completely into the simplest sugar called glucose, and the proteins into amino acid.

Absorption of Digested Food in Small Intestine

The digested food can now pass into the blood vessels in the walls of the small intestine. This process is called absorption.

- The inner surface of the small intestine has millions of tiny, finger-like outgrowths called villi. The presence of villi gives the inner walls of the small intestine a very large surface area for rapid absorption of food.
- The surface of villi absorbs the digested food materials into blood flowing through them. Blood carries the absorbed food materials to the cells, food is used for energy, growth and repair. This is called assimilation.

- Glucose breaks down in the cells with the help of oxygen to form carbon dioxide and water, and releases energy. Fatty acids and glycerol build components of cells and form fats to be stored in the body as food reserves.
- Amino acids are used to make proteins required for the growth and repair of the body. A part of the food which we eat cannot be digested by our body.
- This undigested food cannot be absorbed in the small intestine. The food that remains undigested and unabsorbed passes from the small intestine into large intestine to all the parts of the body.

Large Intestine

- The large intestine is about 1.5m long. It is called large intestine because it is a quite wide tube.

- **The undigested and unabsorbed food from the small intestine enters into large intestine. The large intestine absorbs most of the water from the undigested food material.**
- **Due to the removal of water, the undigested food becomes semi-solid. This undigested food (or waste material) is stored in the last part of the large intestine called rectum for some time.**
- **When we go to toilet, the undigested, semi-solid waste is passed out from our body through anus in the form of faeces. This is called egestion**

Teeth & Tongue

There are four types of teeth in our mouth. These are:

(i) Incisors,

(ii) Canines,

(iii) Premolars,

(iv) Molars.

The upper part of a tooth is called crown, the middle part of a tooth (which is inside the gums) is called neck whereas the lower part of a tooth (which is embedded in the jaw bone) is called root

Different types of teeth differ in appearance and perform different functions.

(i) Incisors are the chisel shaped teeth at the front of the mouth. The incisors are for biting and cutting the food. There are four incisors in the center of each jaw.

(ii) Canines are the large, pointed teeth just behind the incisors. The canines are for piercing and tearing the food. There are 2 canines in each jaw, one behind the left incisor and the other behind right incisor.

(ii) Premolars are the large teeth just behind the canines on each side. Premolars have large, flat surfaces. The premolars are for chewing and grinding the food. There are four premolars in a jaw, two on each side.

(iv) Molars are very large teeth which are present just behind the premolars, towards the back of our mouth. The function of molars is the same as that of premolars. That is, molars are for chewing and grinding the food. There are six molars in each jaw, three on each side.

Milk Teeth and Permanent Teeth

Milk Teeth

The first set of teeth which grow during infancy babyhood) are called milk teeth.

Milk teeth are a temporary set of teeth. The milk teeth loosen and begin to fall off at the between 6 and 8 years.

Permanent Teeth

The second set of teeth is called permanent teeth. The permanent teeth grow in place of milk teeth. The permanent set of teeth remains till the old age

Tooth Decay

Tooth decay is a process in which the tooth becomes rotten due to the formation of cavities (holes) inside it leading to toothache.

Tooth decay occurs as follows. If we do not clean our teeth and mouth after eating food, then many harmful bacteria begin to grow and live on the teeth.

These bacteria act on the sugar present in the left-over food particles sticking to the teeth to form acid. The acid thus formed eats up the enamel

and dentine of the tooth gradually and ultimately makes a cavity (or hole) in the tooth

TONGUE

The tongue is a fleshy muscular organ in the mouth which is attached at the back to the floor of the buccal cavity (mouth cavity). It is free at the front and can be moved in all directions. Tongue helps in getting the taste of food

The taste buds for tastes are located in different parts of the tongue. Thus, all the parts of the tongue do not sense all the four tastes. Different parts of the tongue are sensitive to different tastes.

(i) Most taste buds at the front of the tongue detect sweet and salty tastes.

(ii) Most of the taste buds on the sides of the tongue detect sour taste.

(iii) Most of the taste buds at the back of the tongue detect bitter taste

DIGESTION IN GRASS-EATING ANIMALS

The herbivorous animals such as cattle (cows, buffaloes), goat, sheep, deer, antelope and giraffe, etc., eat mainly grass and other plant leaves as food.

Grass is rich in a carbohydrate called cellulose. Cellulose carbohydrate is a quite tough material so 'more times' it is chewed by the animal, the better.

The cellulose carbohydrate present in grass can be digested by the action of certain bacteria which are present only in the stomach of animals called ruminants.

DIGESTION IN GRASS-EATING ANIMALS

- **The stomach of a cow is large and consists of four compartments (or four chambers).**
- **The first compartment of a cow's stomach is the biggest and it is called 'rumen'. When cow eats grass as food while grazing, it does not**

chew it completely (because it has no time for it). The cow swallows the grass quickly with little chewing and stores it in the rumen (which is the first compartment of stomach).

- The rumen contains cellulose digesting bacteria. The bacteria present in the rumen of a cow start to digest cellulose carbohydrate present in grass food. Thus, the grass is partially digested in the rumen.
- The partially digested food (or partially digested grass) in the rumen of a cow is called cud.
- After some time, when the cow is resting, the cud from rumen is brought back to the mouth of cow in small amounts at a time. The cow now chews the cud thoroughly.
- The process by which the cud (partially digested food) is brought back from the stomach to the mouth of the animal and chewed again is called rumination (or chewing the cud). All the animals which chew the cud are called ruminants.
- When the cud is thoroughly chewed in the mouth of the cow, it is swallowed again. But this chewed cud does not go back to rumen.
- The thoroughly chewed cud now goes into the other compartments of the cow's stomach and then into the small intestine for complete digestion and absorption.

FEEDING AND DIGESTION IN AMOEBA

Amoeba is a microscopic single-celled organism found in pond water. Amoeba has a cell membrane, a rounded, dense nucleus and many small bubble-like vacuoles in its cytoplasm.

Amoeba constantly changes its shape and position. It pushes out one, or more finger-like projections, called pseudopodia or false feet for movement and capture of food.

Amoeba feeds on some microscopic organisms. When it senses food, it pushes out pseudopodia around the food particle and engulfs it. The food becomes trapped in a food vacuole. Digestive juices are secreted into the

food vacuole. They act on the food and break it down into simpler substances.

Gradually the digested food is absorbed. The absorbed substances are used for growth, maintenance and multiplication. The undigested residue of the food is expelled outside by the vacuole.