

NUTRITION IN ANIMALS

CONTENTS

- **Holozoic Nutrition**
- **Nutrition in human**
- **Nutrition in a Ruminant**

As animals do not have chlorophyll, they can't prepare their food own. They obtain their food directly or indirectly from plants. Animals may be herbivores, carnivores or omnivores.

▶ HOLOZOIC NUTRITION

In this type of nutrition, animals take in solid food such as fruits, vegetable & meat, etc.

Five steps in the process of holozoic nutrition in animals. are -

- (1) Ingestion
- (2) Digestion
- (3) Absorption
- (4) Assimilation
- (5) Egestion

◆ **Nutrition in Amoeba** : Amoeba is a unicellular animal. It eats microscopic plants & animals that float in water.

The complete process of nutrition in amoeba is as follows -

- **Ingestion** : An amoeba ingests food by using its pseudopodia. When a food particles comes near an amoeba, it ingests this food particle by surrounding it with its pseudopodia. The

pseudopodia close to form a small cavity called food vacuole.

- **Digestion** : The food is digested in the food vacuole by digestive enzymes.
- **Absorption** : The digested food present in the food vacuole is absorbed directly into the cytoplasm of amoeba by diffusion. The digested food just spreads out from the food vacuole into the cytoplasm of amoeba cell.
- **Assimilation** : Food absorbed by amoeba is used to obtain energy for maintaining life process.
- **Egestion** : When a sufficient amount of undigested food collects inside amoeba, then its cell membrane suddenly ruptures at any place & the undigested food is thrown of the cell.

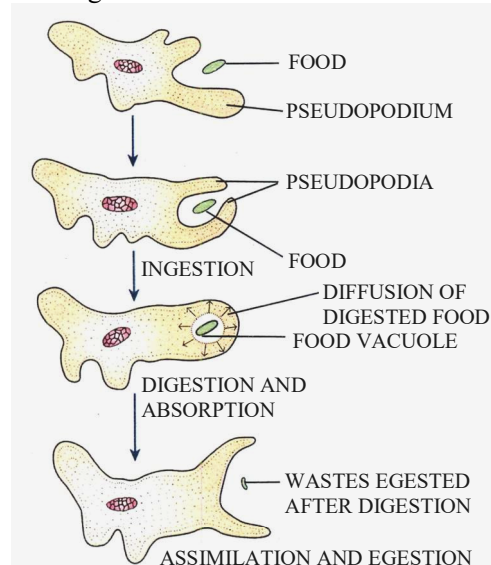


Figure : The process of nutrition in amoeba

NUTRITION IN HUMAN

- Nutrition in human is holozoic. The food ingested through the mouth passes through a number of organ in our body which constitute the alimentary canal.
- The alimentary canal along with digestive glands known as digestive system.
- The digestive system of human consists of following organs -

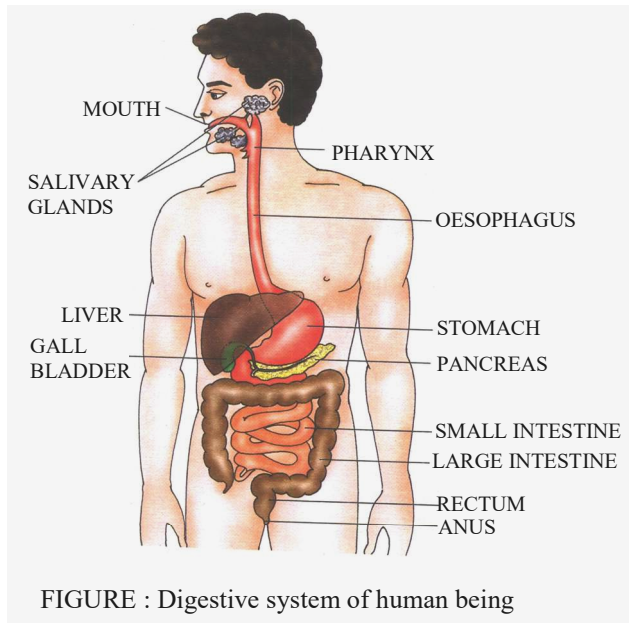


FIGURE : Digestive system of human being

- Mouth** : It is a transvers slit & also called opening of alimentary canal. Mouth opens into buccle cavity.
- Bucle cavity** : Mouth open into a cavity which contain teeth, tongue & salivary glands. Salivary glands secrete saliva which contain salivary amylase enzyme & convert the starch into simple sugar.
- Teeth** : Teeth are hard structures held in sockets of the jaws. Teeth cut, chew and break food into smaller pieces.
- Tongue** : Tongue is the organ used for taste. It contains taste buds to distinguish whether a type of food is sweet, sour, bitter or hot (figure). It also helps in rolling and pushing the food into the pharynx. It mixes the saliva with the food and also helps us in speaking.

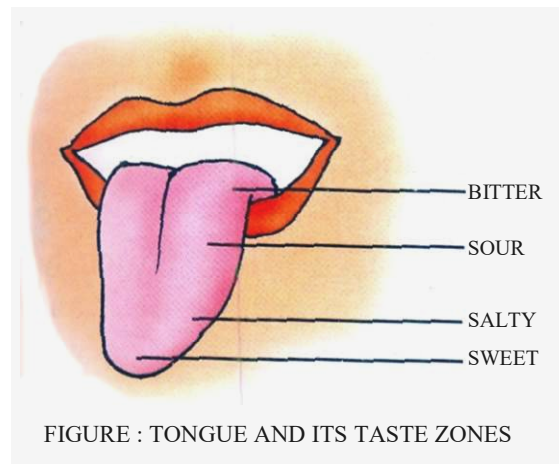


FIGURE : TONGUE AND ITS TASTE ZONES

- Oesophagus or Food Pipes** : It is a connecting tube between the mouth and stomach. The food is pushed down towards the stomach by the movement of the muscles of the food pipe.

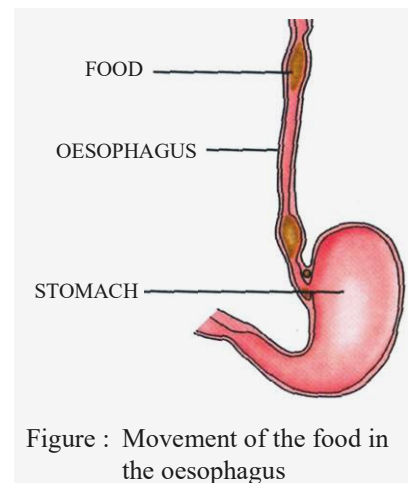


Figure : Movement of the food in the oesophagus

- Stomach** : Stomach is a J-shaped bag-like structure made of muscles. The stomach secretes gastric juice and hydrochloric acid. Hydrochloric acid kills microorganisms and provides an acidic medium for effective digestion.

In the stomach food is thoroughly mixed with the gastric juice secreted by the gastric glands present in the stomach. The gastric juice contains an enzyme called pepsin which helps to break down proteins into simpler substances.

(vii) Small Intestine : It is a coiled tube and is about 7 metres in length. It consists of three parts, namely duodenum, jejunum and ileum. In the small intestine the food is mixed with bile juice and pancreatic juice. These are secreted by the liver and the pancreas, respectively. Bile juice breaks down fats into fatty acids and glycerol. The pancreatic juice breaks down starch into simple sugar and proteins into amino acids. Digestion of all the components of food gets completed here and the end products are ready for absorption.

Absorption of food occurs through millions of small projections in the inner walls of the part of small intestine called ileum. These projections are known as villi. The incorporation of absorbed nutrients into the cell components is called assimilation.

The food that remains undigested and unabsorbed then enters the large intestine.

(viii) Large intestine : It is the last organ of the digestive system. It is about 1.5 m in length. It consists of three parts, namely caecum, colon and rectum. It helps in absorbing water and in removing undigested solid wastes from the body in the form of faeces through an opening called anus.

(ix) Anus : It is the last part of the alimentary canal. Its main function is to expel solid faeces out of the body.

(x) Digestive Glands :

(a) Salivary Glands : There are three pairs of salivary glands located in the mouth. Salivary glands secrete saliva which contains amylase enzyme. Amylase works on starch and converts it into simple sugar.

(b) Liver : It is reddish brown gland and is located in the upper part of the abdomen. It secretes bile juice that is stored in gallbladder. The bile helps in breaking down fat into simpler substances.

(c) Pancreas : It is a cream-coloured gland and is located just below the stomach. It secretes pancreatic juice into a small intestine. It acts on carbohydrates and protein and converts them into simpler substances.

➤ **NUTRITION IN A RUMINANT**

A ruminant is an herbivorous animal which regurgitates its food & digest it in step. For example- Cow, goats, sheep etc.

The 2 steps involved in digestion of ruminants are -

- (1) The ruminant first eats the foods & regurgitates a semi digested food called cud.
- (2) The ruminant then eats the cud when at rest. This process of eating the cud is called ruminating. Ruminants have a special stomach with 4 chambers, which are as follows -

- **Rumen :** This is the largest chamber of the stomach. It is namely used for storing food.
- **Reticulum :** It helps in moving the food back to the mouth when needed.
- **Omasum :** This is the smallest chamber of the stomach. Its main function is to absorb excess water.
- **Abomasum :** This is a true stomach where gastric juices are secreted to help digestion. Here the food is digested just like in the human stomach.

Disgestion of food in ruminants :

The ruminants mostly eat grasses and leaves which are rich in cellulose, The ruminants can digest cellulose because cellulose-digesting bacteria and protozoa are present in their stomach.

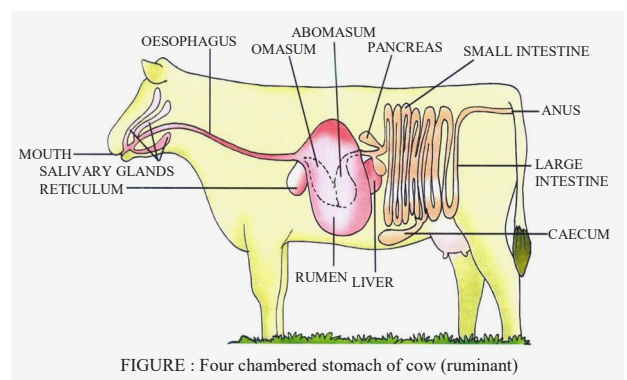


FIGURE : Four chambered stomach of cow (ruminant)

Half-chewed grass travels from the mouth to the first chamber of the stomach called rumen where it is acted upon by bacteria and microorganism. It then goes into the reticulum from where it is returned to the mouth as cud for through chewing called rumination. It enters a third chamber called omasum. Here it is broken down into still smaller pieces. Finally, it enters the fourth chamber called abomasum where enzymes act upon it and digestion is completed. It is finally sent to the small intestine where the absorption of the nutrients takes place.

EXERCISE # 1

A. Single Choice Type Questions

- Q.1** Digestion within a digestive tract is -
(A) incomplete
(B) extracellular
(C) the same as absorption
(D) an irreversible process
- Q.2** Which of the following regions of the alimentary canal of man does not secrete a digestive enzyme ?
(A) Oesophagus (B) Stomach
(C) Duodenum (D) Mouth
- Q.3** A digestive enzyme, salivary amylase, in the saliva begin digestion of -
(A) protein (B) nucleic acids
(C) fats (D) carbohydrates
- Q.4** If you chew on a piece of bread long enough, it will begin to taste sweet because -
(A) maltase is breaking down maltose
(B) lipases are forming fatty acids
(C) amylase is breaking down starches to disaccharides
(D) disaccharides are forming glucose
- Q.5** Saliva has the enzyme -
(A) pepsin (B) ptyalin
(C) trypsin (D) rennin
- Q.6** Pepsin digests -
(A) proteins in stomach
(B) carbohydrates in duodenum
(C) proteins in duodenum
(D) fats in ileum
- Q.7** Chief function of HCl is -
(A) to maintain a low pH to prevent growth of micro-organisms
(B) to facilitate absorption
(C) to maintain low pH to activate pepsinogen to form pepsin
(D) to dissolve enzyme secreted in stomach
- Q.8** If the stomach did not produce any hydrochloric acid, which enzyme will not function ?
(A) Ptyalin (B) Trypsin
(C) Pepsin (D) Collagenase
- Q.9** Chief function of bile is -
(A) to digest fat by enzymatic action
(B) to emulsify fat for digestion
(C) to eliminate waste product
(D) to regulate process of digestion
- Q.10** Where is bile produced ?
(A) In gall bladder (B) In blood
(C) In liver (D) In spleen

- Q.11** Ileum is -
(A) First part of the small intestine
(B) Middle part of the small intestine
(C) Last part of the small intestine
(D) Not a part of the small intestine
- Q.12** Largest gland in human body is -
(A) liver (B) pancreas
(C) pituitary (D) thyroid
- Q.13** Which of the following organs produces bile ?
(A) liver (B) pancreas
(C) gallbladder (D) gastric gland
- Q.14** Which of the following is not a part of nutrition-
(A) digestion (B) absorption
(C) excretion (D) assimilation
- Q.15** Which of the organs produces bile ?
(A) liver (B) pancreas
(C) gallbladder (D) gastric gland
- Q.16** An amoeba ingests food by -
(A) cilia (B) tentacles
(C) pseudopodia (D) feeding tube
- Q.17** The walls of the large intestine absorb -
(A) cellulose (B) water
(C) digested food (D) digested proteins
- Q.18** Small intestine have this to increase the surface area for absorption -
(A) villi (B) glands
(C) liver (D) pancreas
- Q.19** Juice secreted by liver is -
(A) bile (B) gastric
(C) pancreatic (D) acid
- Q.20** Number of chambers in the stomach of ruminants is -
(A) 4 (B) 3 (C) 2 (D) 1
- Q.21** The part of digestive system which helps in mixing food with saliva is -
(A) teeth (B) oesophagus
(C) tongue (D) lips

B. Fill in the blank

- Q.22** Salivary amylase works on
- Q.23** Incisor teeth help in the food.
- Q.24** The liver and are used for procuring food.
- Q.25** In amoeba are used for procuring food.
- Q.26** There are number of teeth in a temporary set of teeth.

EXERCISE # 2

A. Very Short Answer Types Questions

- Q.1 Name the organs that make the alimentary canal.
- Q.2 Mention the various steps involved in the process of nutrition.
- Q.3 Which type of carbohydrate cannot be digested by humans ?
- Q.4 What is the role of hydrochloric acid in the stomach ?
- Q.5 Why do we call animals heterotrophs ?
- Q.6 Name the type of nutrition in amoeba.
- Q.7 Which organs help to sense the different taste ?
- Q.8 Differentiate between ingestion and egestion.
- Q.9 What is the function of villi ?

B. Short Answer Types Questions

- Q.10 What happens to digested food after absorption ?
- Q.11 How does an amoeba capture its food ?
- Q.12 What are villi ? What is their location and function ?
- Q.13 Which is the largest chamber of the ruminant stomach ? What is its role ?
- Q.14 What is the juice secreted by the liver called ? What does it do ?
- Q.15 What happens to food in the small intestine ?
- Q.16 What is pancreas and where is it located ?
- Q.17 Define intracellular digestion. Give two examples of animals where this type of digestion takes place.

C. Long Answer Types Questions

- Q.18 Draw a diagram of the tongue to show the location of various taste buds.
- Q.19 Give an account of the various modes in which animals obtain food.
- Q.20 Explain the process of digestion in ruminants.
- Q.21 Which digestive juice is secreted in the mouth ? What enzyme does it contain and what is its function ?
- Q.22 Draw a labelled diagram of the alimentary canal of humans.
- Q.23 What are digestive glands ? Name three such glands that are present in the human body. What are their secretions called ?
- Q.24 What is the role of stomach in the digestion process ?
- Q.25 What happens to the food in the small intestine ?