

NUTRITION IN ANIMALS



KEY POINTS

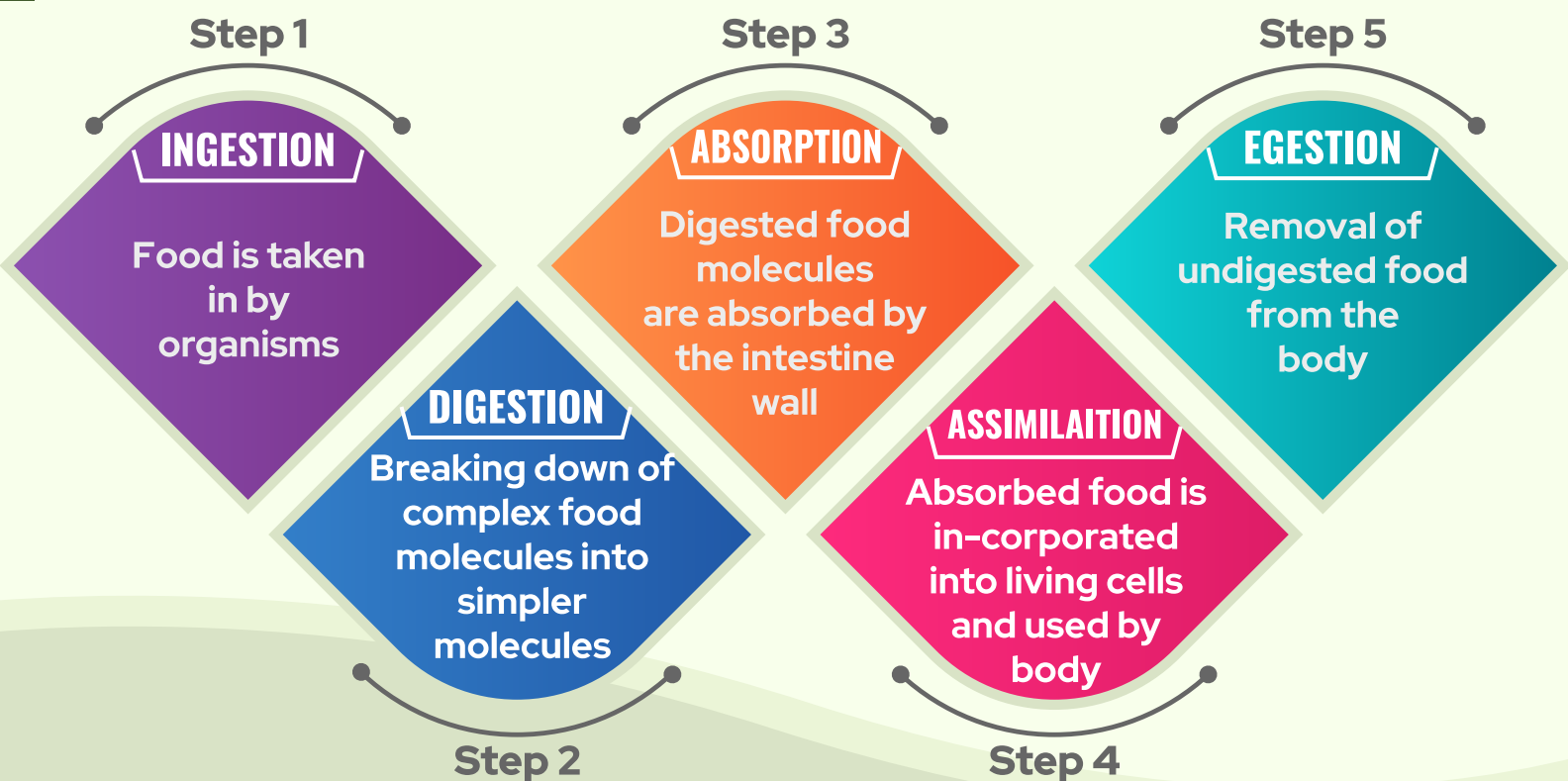
// Animal nutrition includes nutrient requirement, mode of intake of food and its utilization in the body. //

All organisms including humans require food for growth, repair and functioning of the body. Plants can prepare their own food, but animals cannot prepare their own food.

Holozoic nutrition is the process in which complex food is taken into a specialized digestive system and broken down into small pieces to be absorbed.

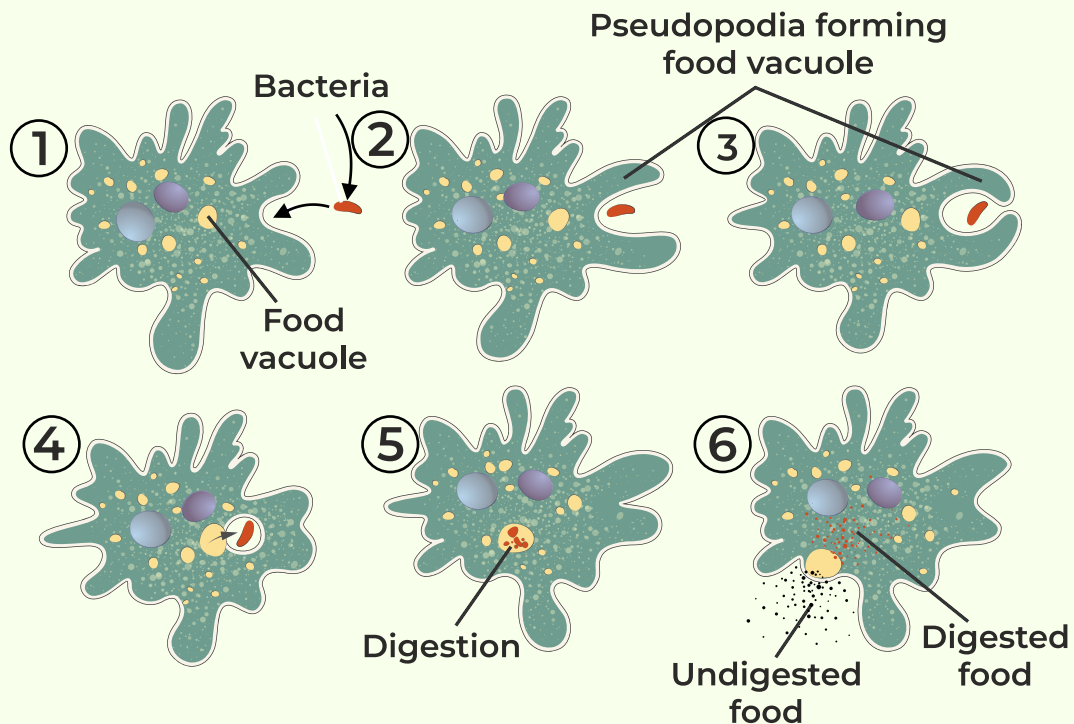
Animals show heterotrophic mode of nutrition.

STEPS IN NUTRITION



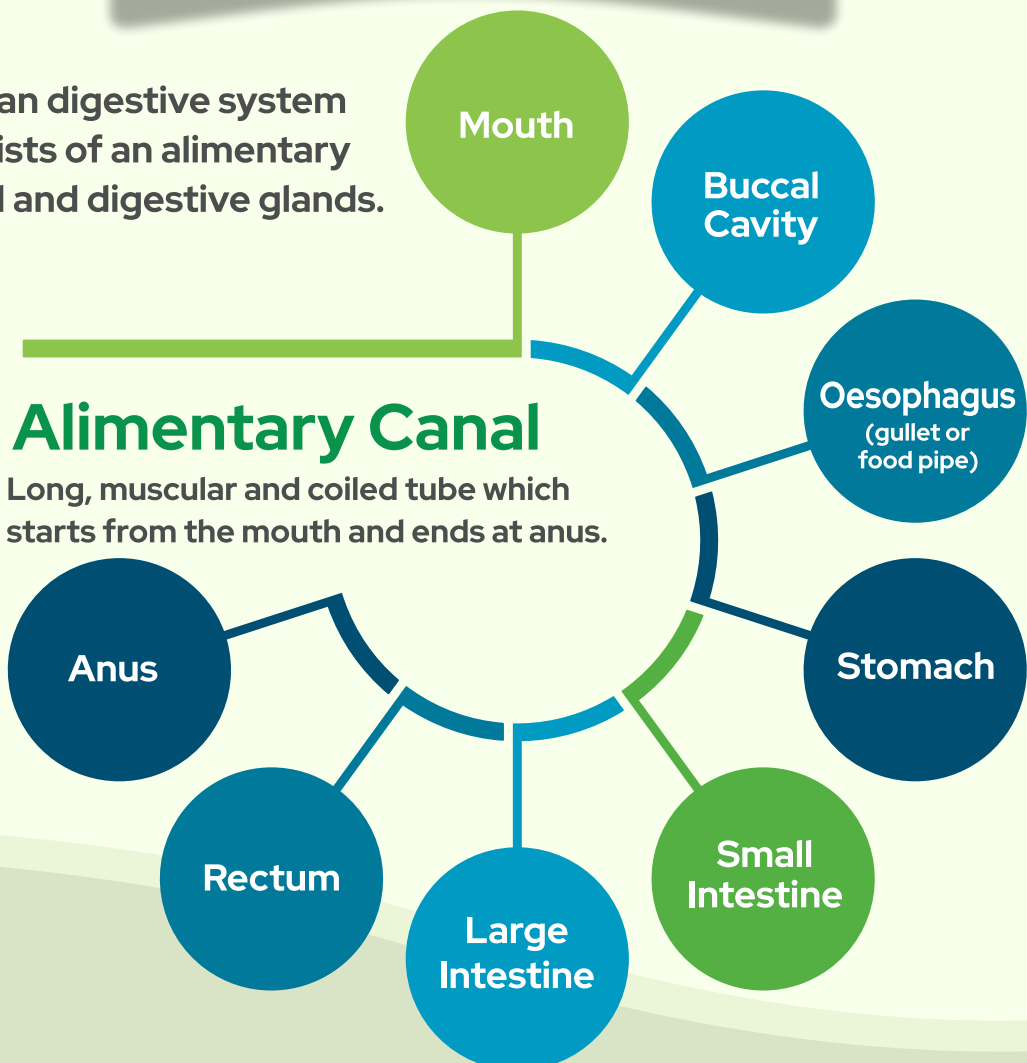
NUTRITION IN AMOEBA

Most of nutrition in amoeba is holozoic and it is an omnivorous.



HUMAN DIGESTIVE SYSTEM

Human digestive system consists of an alimentary canal and digestive glands.



Associated with the alimentary canal are three glands that secrete digestive juices.

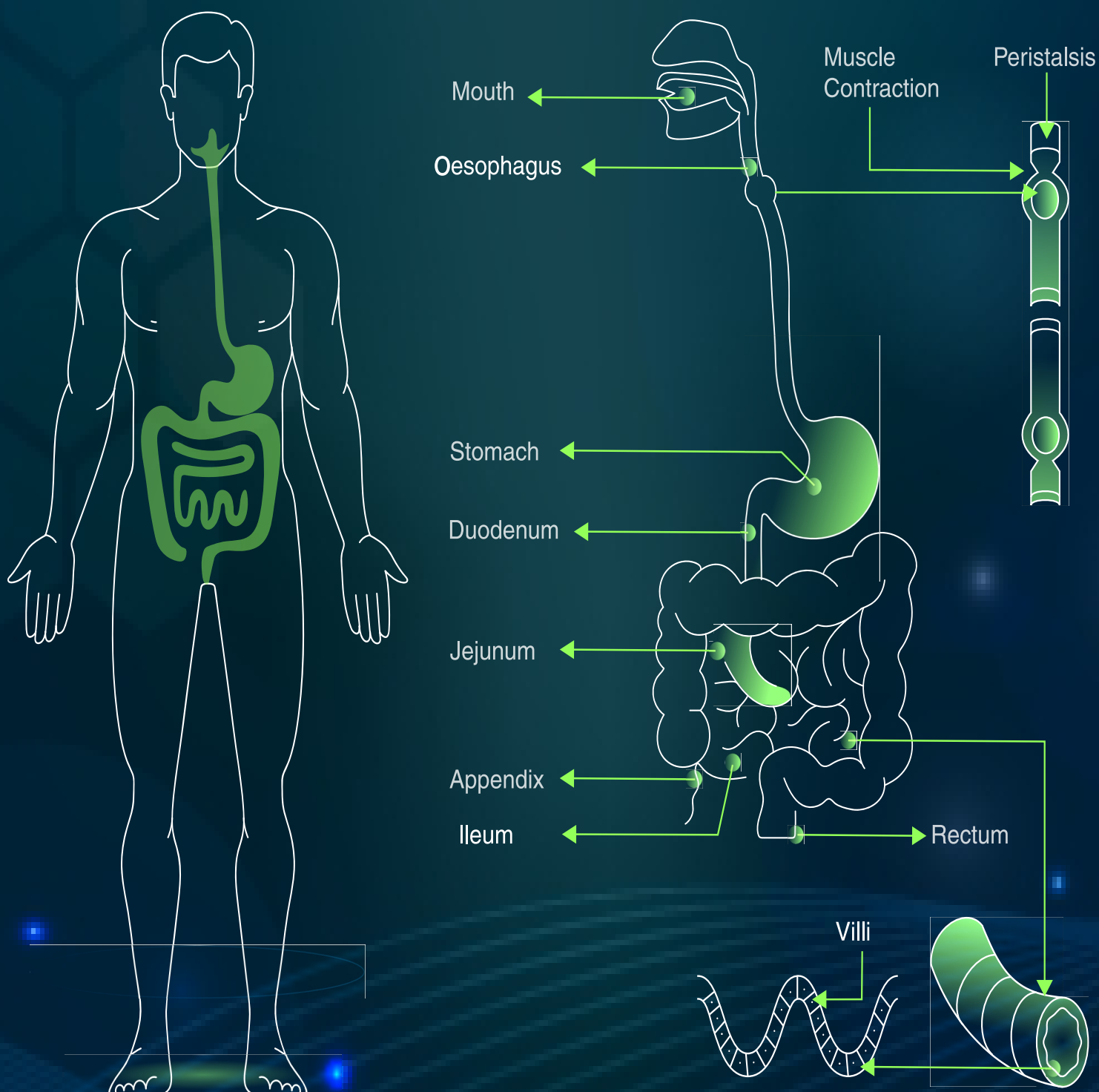
These glands are

(1) Salivary glands

(2) Liver

(3) Pancreas

Structure of Human Digestive System



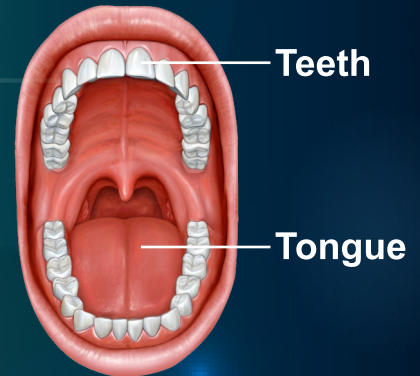


Mouth

Food is taken into the body through the mouth.

Buccal Cavity

Digestion starts in the buccal cavity. It contains the teeth, tongue and salivary glands.



Teeth

	Type of Teeth	Number in each jaw	Function
	Incisors	4	Biting food
	Canines	2	Tearing food
	Premolars	4	Grinding and crushing food
	Molars	6	Grinding and crushing food

Milk Teeth

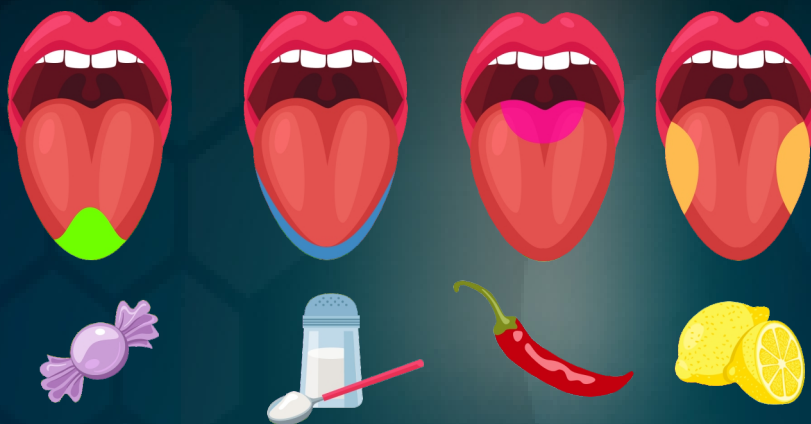
- ✓ The first set of teeth grows during infancy and they fall off at the age between six to eight years.

Permanent Teeth

- ✓ The permanent teeth may last throughout life or fall off during old age or due to some dental disease.

Tongue

fleshy muscular organ attached at the back to the floor of the buccal cavity.



Sweet

Salty

Spicy

Sour

Location of taste buds on the tongue

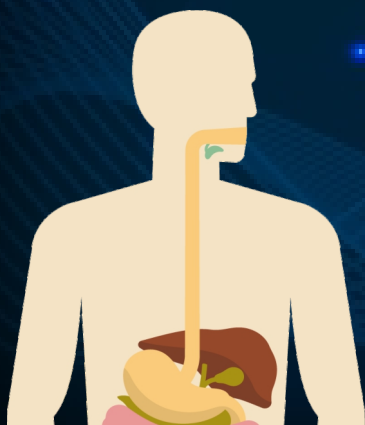
Function of Tongue

- Helps in mixing the chewed food with saliva.
- Helps us to speak.
- Helps in swallowing the food.
- Gives us a sense of taste.

Salivary Glands

- Three pairs of salivary glands around our buccal cavity.
- Saliva makes the food soft, slippery and also helps in its digestion.
- Contains amylase (Ptyalin) enzyme which acts on starch and changes it into sugar called maltose.
- Act as antiseptic because it kills germs and bacteria due to presence of an enzyme called lysozyme.

Oesophagus (Gullet)



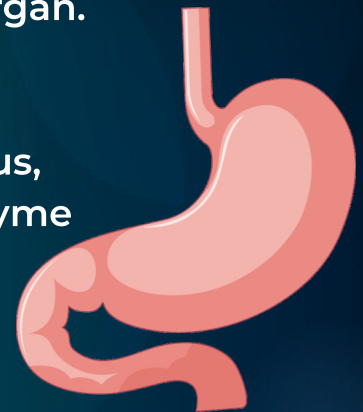
- Connects the mouth cavity with the stomach.
- No digestion takes place in oesophagus.
- The rhythmic contraction and expansion of muscles that takes place all along the alimentary canal is referred to as peristaltic movements.
- These movements help to push the food forward.

Stomach

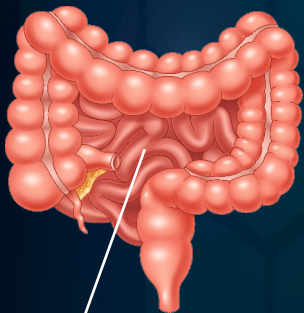
- ▶ Flattened J shape and thick-walled bag like organ.
- ▶ Widest part of the alimentary canal.
- ▶ Located on the left side of the body.
- ▶ The inner lining of the stomach secretes mucus, hydrochloric acid and a protein digesting enzyme (pepsin).

Functions of Stomach

- ▶ Mucus protects the lining of the stomach.
- ▶ Hydrochloric acid kills many bacteria that enter along with the food and makes the medium in the stomach acidic so that enzymes may act on food.
- ▶ The protein digesting enzyme breaks down the proteins into simpler substances.



Small Intestine



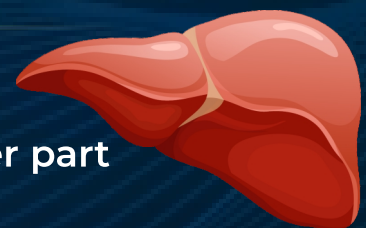
Small intestine

- ▶ Long coiled tube
- ▶ Receives secretions from the liver and the pancreas.
- ▶ Its wall also secretes digestive juices.
- ▶ Small intestine is longer in length (about 7.5 metres) than the large intestine (about 1.5 metres).
- ▶ Herbivores eating grass need a longer small intestine to allow the cellulose to be digested, meat is easier to digest hence carnivore like tiger have a shorter small intestine.

ASSOCIATED GLANDS

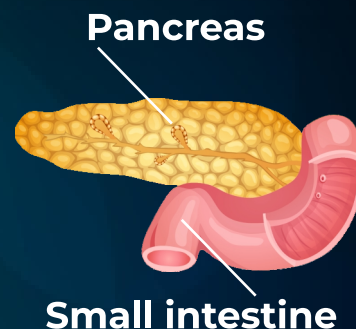
Liver

- ▶ Largest gland in the body
- ▶ A reddish brown gland situated in the upper part of the abdomen on the right side.
- ▶ It secretes bile juice that is stored in a sac called the gall bladder.
- ▶ The bile emulsify the fat globules and plays an important role in the digestion of fats.

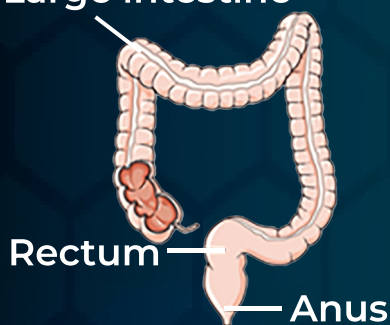


Pancreas

- ▶ large cream coloured gland located just below the stomach.
- ▶ The pancreatic juice acts on carbohydrates, proteins and fats and changes them into simpler forms.

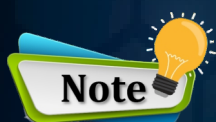


Large intestine



- ▶ The food that remains undigested and unabsorbed then enters into the large intestine.
- ▶ Wider and shorter than small intestine.
- ▶ Absorb water and some salts from the undigested food material.

Large Intestine



Absorbed substances are transported via the blood vessels to different organs of the body where they are used to build complex substances such as proteins required by the body. This is called assimilation.

Rectum

- ▶ Last part of large intestine.
- ▶ The remaining waste passes into the rectum and remains there as semi-solid faeces.

Anus

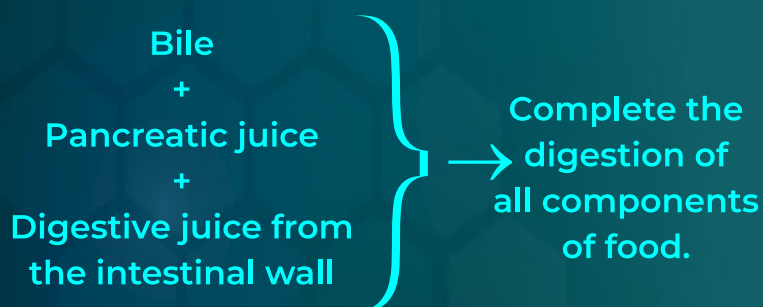
- ▶ Posterior opening of the alimentary canal through which the faecal matter is removed from time to time is called anus.
- ▶ Process of removal of faecal matter through anus is called egestion.

PROCESS OF DIGESTION

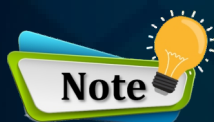
Part of the Digestive System	Enzymes/Digestive Juices	Food Acted upon (Substrate)	Products Formed
Mouth	Saliva (Amylase)	Starch	Sugars (Maltose)
Stomach	Digestive juice (Pepsin)	Proteins	Peptides
Pancreas	Pancreatic juice (Several enzymes)	Protein, starch, fats	Amino acids, maltose, fatty acids, glycerol
Small intestine	Intestinal juice (Several enzymes)	Partially digested proteins, carbohydrates and fats	Glucose and other simple sugars (from carbohydrates), amino acids (from proteins), fatty acids and glycerol (from fats)

Digestion in small intestine :

Bile, pancreatic juice and digestive juice from the intestinal wall helps in digestion of all components of food.



Carbohydrates → Simple Sugars
Fats → Fatty acids and glycerol
Proteins → Amino acids

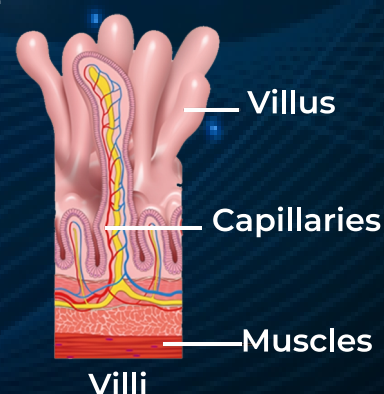


Note

Digestion of carbohydrates, like starch, begins in the buccal cavity. The digestion of protein starts in the stomach.

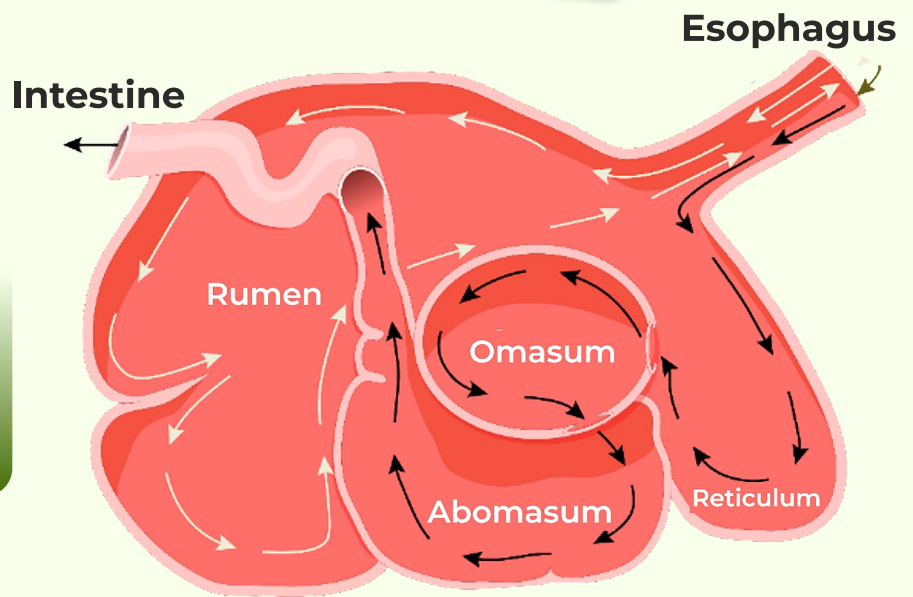
Absorption in the small intestine

- ▶ The inner walls of the small intestine have thousands of finger-like outgrowths. These are called villi. The villi increase the surface area for absorption of the digested food.
- ▶ Each villus has a network of thin and small blood vessels close to its surface.
- ▶ The surface of the villi absorbs the digested food materials.
- ▶ The digested food can now pass into the blood vessels in the wall of the intestine. This process is called absorption.



DIGESTIVE SYSTEM IN RUMINANTS

The stomach is divided into four chambers - the rumen, reticulum, omasum and abomasum.



Rumen

- › Largest part of the stomach.
- › Grass-eating animals like cow, ox, buffalo and sheep quickly swallow the grass and store it in a part of the stomach called Rumen. Food
- › The food gets partially digested and is called cud.
- › But later the cud returns to the mouth in small lumps and the animal chews it. This process is called rumination and these animals are called ruminants.

Abomasum

- › Known as "true stomach" which secretes acid and enzymes.
- › The grass is rich in cellulose, a type of carbohydrate. Many animals, including humans, cannot digest cellulose.
- › Micro-organisms present in the stomach of the ruminants help to digest the cellulose by secreting cellulase enzyme.

Note

- › Digestion in ruminants is a good example of symbiosis. Microorganisms present in the stomach of ruminants help in digesting cellulose and in turn obtain shelter and nourishment from the animal.

- › Fats present in goat's milk are much simpler than those found in cow's milk. It is for this reason that the goat's milk can be easily digested in comparison to cow's milk.