

Examrace

Competitive Exams: Feeding

Get top class preparation for UGC right from your home: Get [detailed illustrated notes covering entire syllabus](#): point-by-point for high retention.

Feeding can be divided into 4 types:

1. **Saprophytic:** Saprophytic organisms such as fungi and some bacteria (called decomposers) that feed on dead decaying matter. Saprophytes are useful to the environment because they recycle nutrients.
2. **Parasitic:** When parasitic organisms feed on or in another organism harming it.
3. **Holozoic (heterotrophic):** Animals feed heterotrophically, because they must search for their food. Herbivores eat vegetable matter and have special bodily structures to help them digest cellulose. Carnivores eat meat and are usually predators. Omnivores, such as humans eat both meat and vegetable matter.
4. **Holophytic (autotrophic):** Plants feed with this type of feeding. They are able to make their own food by photosynthesis.

Holozoic Nutrition

The digestive system can be divided into various stages, but it is basically divided into 5 main stages:

1. **Ingestion:** Food is ate, chewed and mixed with saliva.
2. **Digestion:** Begins from the mouth by salivary amylase (starch-breaking enzyme) and continues till the duodenum (first part of the small intestine), were enzymes break down food into simpler soluble products (Glucose, amino acids, fatty acids and glycerol), stage by stage, and prepares nutrients for absorption.
3. **Absorption:** The blood absorbs soluble products in the ileum (second part of the small intestine).
4. **Assimilation:** The nutrients are then assimilated (taken to) various organs around the body.
5. **Defecation (Egestion):** Undigested matter such as fibre is egested (moved out) of the body.

Digestion

Saliva contains salivary amylase, mucus, water and lysozyme (which is also an enzyme) that kills bacteria. The food, after that it is chewed, forms into a bolus (a ball), of mixed food with saliva that goes down the oesophagus (or gullet). Between the mouth and the oesophagus there is the epiglottis. The epiglottis is a flap that closes so as to prevent food entering the windpipe (trachea). The oesophagus is made up of two layers of muscle cells. On layer is

circular while the other runs lengthwise. When they contract and relax, they push down food downwards in a movement called peristalsis. Therefore food does not go down by gravity (astronauts would NOT survive in space if it would!). The food is pushed down to the stomach.

The stomach is made up of layers of muscles that make it twist and squeeze so that food is mixed with gastric juices. There are about 35 million gastric glands that produce gastric juice. Gastric juice contains:

- Pepsinogen: An inactive form of pepsin that is then activated by the hydrochloric acid.
- Pepsin: Digestive enzyme, which breaks down proteins into smaller polypeptides.
- Mucus: Protects the stomach wall from being digested by the enzymes (prevention of self-digestion).

Hydrochloric acid (chemical formula HCl) kills bacteria and provides an acidic, optimum pH for pepsin to work.

After 3 to 4 hours of digestion, food becomes chyme. At intervals it is passed into the small intestine. The first part of the small intestine is called the duodenum. The duodenum receives digestive juices from 3 different places: Intestinal wall, pancreas and the liver.

From the intestinal wall, mainly 5 enzymes are produced:

1. Trypsin: Breaks down polypeptides into dipeptides.
2. Maltase: Breaks down maltose into glucose.
3. Lipase: Breaks down fats (lipids are liquid fats) into fatty acids and glycerol.
4. Peptidases: Breaks down dipeptides into amino acids
5. Sucrase: Breaks down sucrose into glucose

Enzymes from Pancreas

From the pancreas mainly 4 chemicals are produced:

1. Sodium hydrogen carbonate (NaHCO_3): Neutralizes acids from the stomach and provides alkaline pH in the duodenum.
2. Trypsin: Breaks down polypeptides into dipeptides.
3. Pancreatic amylase: Breaks down starch into maltose.
4. Lipase: Breaks down fats into fatty acids and glycerol.

Next Stages

From the liver, the duodenum receives no enzymes, but gets bile. Bile is a green chemical, which helps to break down large fat molecules for lipase to act on it: This process is called

emulsification. It has a detergent effect, and it is stored in the gall bladder and it is secreted from the gall bladder to the duodenum through the bile duct. Digestion ends here.

Food has been all broken down into their soluble products, glucose, amino acids, fatty acids and glycerol. They can be now absorbed into the blood stream from the ileum.

Liver

The liver is the largest internal organ in vertebrates. It does the following functions: Synthesis of proteins, immune and clotting factors, and oxygen and fat-carrying substances. Its chief digestive function is the secretion of bile, a solution critical to fat emulsion (emulsification) and absorption. The liver also removes excess glucose from circulation and stores it until it is needed. It converts excess amino acids into useful forms and filters drugs and poisons (alcohol, pills etc) from the bloodstream, neutralizing them and excreting them in bile. The liver has two main lobes located just under the diaphragm on the right side of the body.

The Ileum

The ileum is a very long part of the gut so that absorption takes places efficiently. Here, soluble products: Glucose, amino acids, fatty acids and enter glycerol enter the blood stream through millions of small finger-like structures called villi. The villi are tiny, to increase surface area for absorption. Each villus is covered with tiny 'hairs' called microvilli, that are actual villi but smaller, like root hairs on a root in plants. Villi have a thin lining and a good blood supply to allow blood to absorb the soluble nutrients. Food passes through the intestine with the help of muscular contraction (peristalsis) of the intestinal wall, which is also moist to allow food to pass well and to enhance the speed of absorption.

Glucose and amino acids are absorbed by the blood capillaries, which are very thin blood vessels. Fatty acids and glycerol, being large molecules are absorbed by the lacteal first before draining into the blood stream.

The Large Intestine

The large intestine is divided into the colon and rectum. The colon is the part where water is absorbed. In the rectum, faeces (undigested food such as fiber) are stored until it is egested out of the body through the anus, within 24 – 48 hours after eating. The rectum wall is covered with a layer of mucus to ease the passage of faeces. This process is called defeacation.

The Caecum and the Appendix

The caecum and the appendix are vestigial organs, i.e.. They do not have any known function in humans. In herbivores called ruminants (such as rabbits), the caecum and appendix contain cellulose-digesting bacteria that produce the enzyme cellulase to digest cellulose in plant cells.