

RUMINANT STOMACH

The ruminants swallow herbage without mastication. This habit enables timid herbivores to procure and swallow food at intervals that can be digested later in safer circumstances. In a typical ruminant, such as sheep, cow etc., the stomach is complicated by the presence of four chambers.

A typical ruminant stomach consists of 4 chambers-

1. Rumen
2. Reticulum
3. Omasum
4. Abomasum

The first 3 chambers (Rumen, Reticulum and Omasum), arise from the esophagus and only the fourth, abomasum is an actual derivative of the stomach.

MECHANISM OF RUMINANTS

1. In ruminants, the food is swallowed, saturated by copious salivation and passes into the rumen and reticulum, where it lies until having finished feeding, the animal begins ruminating or chewing the cud.
2. In the process, the food is returned in rounded boluses from the rumen of the mouth.
3. It now undergoes mastication.
4. When fully masticated it is swallowed again in a semifluid condition, and passes along the groove into the reticulum, or over the unmasticated food contained in the latter chamber, to strain between the leaves of the omasum and enter the abomasum.
5. In the rumen and reticulum there exists a dense population of protozoa and bacteria which attack and break down the enzyme resistant cellulose which forms the major part of the diet.
6. Fermentation produces acetic acid, butyric acid and propionic acid which are neutralized by sodium bicarbonate secreted in the saliva.

7. Absorption takes place in the rumen and liberated gases (Example- Methane and Carbon dioxide) are regurgitated.
8. Meanwhile food residues, fluid and microorganisms descend the alimentary tract. In the omasum fluid is absorbed.
9. In the omasum the protozoa and probably the bacteria are destroyed by secreted hydrochloric acid.
10. The abomasum also produces digestive enzymes, and further absorption takes place in the small intestine.

CELLULOSE DIGESTION- A MAJOR PROBLEM OF HERBIVORES

Cellulose, the structural carbohydrates of plants is potentially nutritious food stuffs composed of long chains of glucose units. Many herbivores depend on it as a major energy source, yet surprisingly no Vertebrates is able to manufacture cellulase, the enzyme that can digest cellulose.

Symbiotic microorganisms found in the rumen and reticulum of ruminant's breakdown cellulose for them which forms the major part of the diet. Fermentation produces acetic, butyric and propionic acids which are neutralized by sodium bicarbonate secreted in the saliva. Absorption takes place in the rumen and liberated gases(Example- Methane and Carbon dioxide) are regurgitated.

The process of breaking down cellulose is known as fermentation, which yields organic acids that are absorbed and utilized in oxidative metabolism. Methane and Carbon dioxide are unusable by-products released by belching. Methane gas produced constitutes a substantial by-product of foregut digestion. Worldwide, ruminants contribute up to 60 tons of methane per year, i.e., about 15% of the total atmospheric methane, making ruminants the second major source of atmospheric methane, after natural plant fermentation.

RUMINANT STOMACH IN MAMMALS

In the stomach of camel, **omasum is completely absent**. The inner wall of both rumen and reticulum gives rise to small sac like outgrowths, each sac has a small opening surrounded by sphincter muscles. These outgrowths are known as **water cells**. The metabolic water of the water cells helps in moistening the food and make the food soft.