



Lecture title: Digestive system in ruminant

**Lecturer Affiliation: : University of Mosul / College of Veterinary Medicine /
Department of Physiology, Biochemistry and Pharmacology**

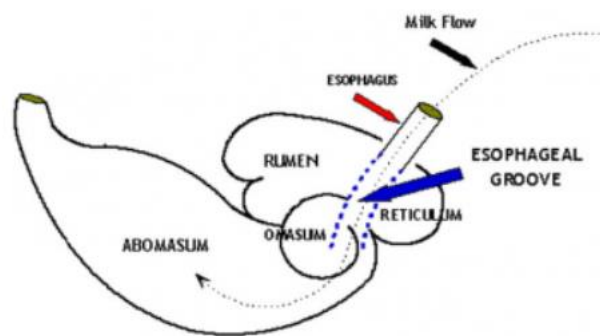
Summary: Ruminants stomach have four compartments, the rumen ,the reticulum, the omasum ,and the abomasum .each parts have special function for digestion of feeds, Rumen microbes ferment feed and produce volatile fatty acid and gases. Which is the cows main source of energy.

Esophageal groove

Muscular folds at the lower end of the esophagus that come together to bypass the rumen, reticulum and omasum through to the abomasum when the calf drinks milk.

This prevents milk from being fermented or soured by the ruminal microorganisms.

If a calf drinks from a bucket or if the groove doesn't form, occasionally some milk will end up in the rumen and cause bloating. These calves are known as “**rumen drinkers**”.



Fermentation

In fermentative digestion, molecular substrates are broken down by the action of bacteria and other microorganisms. Enzymatic hydrolysis of large molecules is an essential part of fermentative digestion, just as it is for glandular digestion.



The major difference between the two processes is that :

the enzymes of fermentative digestion are microbial in origin, rather than coming from the host animal. Other major differences between fermentative and glandular digestion involve the rate of reactions and the extent of alteration of the substrate molecules fermentative digestion is much slower than glandular digestion, and the substrates are altered to a much greater degree.

The Sites of Fermentative Digestion

Fermentative digestion occurs in specialized compartments that are positioned either before or after the stomach and small intestine. Fermentative compartments positioned before the stomach are called **forestomachs** and are most highly developed in the ruminants and camelids. The size and development of the fore stomach fermentation compartments vary greatly among species. Fermentation compartments positioned distal to the small intestine are the cecum and colon, often collectively called the **hindgut**.

The forestomach and hindgut can support fermentative digestion because their pH, moisture, ionic strength, and oxidationreduction conditions are maintained in a range compatible for the growth of suitable microbes. In addition, the flow of ingesta through these areas is comparatively slow, allowing microbes time to maintain their population size.

The Microbes Responsible for Fermentative Digestion

- Bacteria
- Fungi
- Protozoa

Rumination

is the act of remasticating rumen ingesta. The initial act of rumination is regurgitation, which occurs just before the initiation of a primary rumen contraction.



When regurgitation occurs:

- there is an extra contraction of the reticulum,
- Simultaneous with the extra reticular contraction, the cardia relaxes, and there is an inspiratory excursion of the ribs with the glottis closed.
- The latter action creates a negative pressure within the thorax, favoring the movement of food into the esophagus.
- When food enters the esophagus, a reverse peristaltic wave propels the material cranially into the mouth.

As soon as the food bolus reaches the mouth, excess water is expressed by action of the tongue, the water is swallowed, and remastication of the material begins.

The duration of remastication depends on the character of the diet, with coarse material requiring more time for remastication than finely ground or highly digestible feeds.

Regurgitated material comes from the dorsal portion of the reticulum, where particle size and functional specific gravity are intermediate.

is initiated with a reticular contraction distinct from the primary contraction. This contraction, in conjunction with relaxation of the distal esophageal sphincter, allows a bolus of ingesta to enter the esophagus. The bolus is carried into the mouth by reverse peristalsis. The fluid in the bolus is squeezed out with the tongue and reswallowed, and the bolus itself is remasticated, then reswallowed

Rumination occurs when the animal is not actively eating, usually during ✓
times of rest, but not during deep sleep

in cattle rumination is about eight hours of day .one rumination cycle ✓
required about one minutes ,few seconds are utilized for both regurgitation and reswallowing.

Eructation (belching)

Gas is expelled through the esophagus and mouth duo to contraction of rumen and abdominal muscles. -These gases must be removed to prevent distension of the

University of Mosul
Lecture No.: 2
College of Veterinary Medicine
Date:
Unit of Scientific Affairs
Website:



rumen that could interfere with the ability of the diaphragm to expand the thoracic.

- The eructation reflex is initiated by vagal afferents that sense distension of the dorsal rumen by gas cavity.