



Lecture title: Digestive system in ruminant

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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.

Emesis(vomiting)

In ruminant vomiting does not occur, but ejection of abomasum content in to the omasum , reticulum and rumen occurs.

Control of Reticulorumen motility

Reticulorumen Motility Is Controlled by :

The Central Nervous System.

- In the dorsal vagal nucleus of the brainstem, there is a motility control center for the regulation of reticulorumenal motility.
- The consistency of ingesta also has an important influence on rumen motility
- Chemoreceptors in the walls of the rumen and reticulum monitor pH, VFA concentration, and ionic strength(osmolality).
- The normal rumen pH is in the range of 5.5 to 6.8, depending on the type of diet.

Plant Cell Walls Are Important Substrates for Fermentative Digestion and Significant Nutrient Sources for Many Species

Forages, or the foliage of plants, are both the major feedstuff of large herbivores and an important substrate for fermentative digestion. At the cellular level, a major difference between plants and animals is the existence of a cell wall in plants. The cell wall is a complex of various carbohydrate molecules(cellulose, hemicellulose, pectin, and lignin). This material gives the plants their rigid framework and protects



them from weather and other elements during growth. Cellulose is composed of non-branching chains of glucose monomers joined by $\beta[1-4]$ glycosidic linkages, in contrast to the $\alpha[1-4]$ linkages in starch.

one of the cell wall materials is subject to hydrolytic digestion by mammalian glandular digestive enzymes. However, cellulose, hemicellulose, and pectin are subject to the hydrolytic action of a complex of microbial enzymes known as cellulase.

The population of micro organism is affected by several factors :

- 1-pH changes.
- 2-Starvation or over feeding.
- 3-Administration of antibiotics.

Function of micro organisms

- 1-To convert poor quality diet into more utilizable nutrients.
- 2- To protect the gut from some diseases.
- 3- To synthesized B vitamins.

pH is buffered by:

- *Saliva containing large amounts of bicarbonate and phosphate.
- *Absorption of VFA.
- *Ammonia produced by fermentation.

Acidosis

Acidosis occurs when microbes in the rumen produce more acid than what can be used, and rumen pH falls below 5.6. Cattle are at greatest risk for acidosis when consuming feed that is high in fermentable carbohydrates such as grain (i.e. grain overload), however acidosis can also affect cattle grazing high quality pasture. Acidosis is an animal health and welfare concern, and also causes production and economic issues for the beef sector.

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Alkalosis

Alkalosis that occurs in rumen is caused by a decrease in hydrogen ion concentration, and an increase of pH in the rumen culture