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**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.

**Fermentation of carbohydrates in rumen**

Carbohydrate digestion in ruminant animals is through microbial fermentation in the rumen. Dietary carbohydrates are degraded (fermented) by rumen microbes (bacteria, fungi, protozoa). The purpose of rumen fermentation is to produce energy as ATP for the bacteria to use for protein synthesis and their own growth. VFAs, also known as short-chain fatty acids, are produced as a product of rumen fermentation and are absorbed through the rumen wall and are utilized by the animal as an energy source.

**Major Volatile Fatty Acids Produced in the Rumen**

- Acetic acid
- Propionic acid
- Butyric acid

**The end product of microbial digestion are:**

- 1-Organic acids is a volatile fatty acids (VFA),used as main source of energy for ruminants(they are acetic acid, propionic acid and butyric acid).
- 2-Amonia (NH<sub>3</sub>):as the main source of nitrogen for microorganism.
- 3-Carbene dioxide(CO<sub>2</sub>) .
- 4-Methan gases(CH<sub>4</sub>).

**Lipid hydrolysis in the rumen**



When dietary lipids enter the rumen, the initial step is the hydrolysis of the ester linkages in triglycerides, phospholipids, and glycolipids. Hydrolysis of dietary lipids is done by microbial lipases, which releases glycerol and fatty acids (free fatty acids) from the lipid backbone. Glycerol is fermentation to propionic acid.

### Protein digestion in rumen

Protein entering the rumen may be degraded by both bacteria and protozoa, which produce proteolytic enzymes. The rumen microbes provide proteases and peptidases to cleave peptide bonds in polypeptides to release the free amino acids from proteins. Several factors such as solubility and the physical structure of protein can affect rumen degradation. These rumen-degraded amino acids release  $\text{NH}_3$  and the C skeleton by a process called deamination. Along with volatile fatty acids (from carbohydrates), rumen microbes synthesize their own microbial protein, which serves as a primary source of protein to the host ruminant animals.

