

Aspects and Asserts of Rumen Microbiology

Mugle K*

Department of Microbiology, Bhavan's Vivekananda College, Osmania University, Hyderabad, Telangana, India

Review Article

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*For Correspondence

Department of Microbiology,
Bhavan's Vivekananda College,
Osmania University, Hyderabad,
Telangana, India. Tel:
9492504308.

E-mail: kapilmugle@hotmail.com

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ABSTRACT

Glucose which is linked up with Beta Molecule is having single unit contains Monomer in Cellulose. Due to this cellulose having a structural bond of Liner chain. Most of the animal Gastro Intestinal tracts will not having the capacity to break down of cellulose in to particles. Effective Bacteria like Ruminococcus will only break down completely plant fibre to Monosaccharide Glucose Molecule. Later they will completely broke down and reformed in to Glycolysis. Interference, Combination of Genomes with Enzymes lead this break down activity in the most of Herbivorous animal Rumens.

INTRODUCTION

Most of the Organisms on the earth are not having ability, capacity to Digest the Cellulose, but some of the Herbivores animals and Termites are having capacity to digest the heavy amounts of Cellulose in them. Most of Vegetative animals (Horse, Cow, Buffalo, Sheep etc.) will digest cellulose simply in their digestive systems. But even these animals also can't digest it on their own ^[1-3], because they don't have enzymes that digest this material. So, for the digest of cellulose they depends on the different types of microbes, which are present in their stomach (rumen) ^[4]. Nearly half of the living organism inside of the rumen are make up with bacteria. However, they play major role in the digestion of cellulose ^[5].

Rumen is having the several group of life saving microbes in it, several Muscular Sacs are the main structure of Rumen, in the gaps between sacs the microbes will attack the cellulose and let it be digest in Intestinal Tract with Acid secretion combination. Papillae are the numerous minute finger like structure which acts as a wall of the Entire Rumen ^[6-10].

Rumen Diversity of Microbes

The ruminant stomach is composed of 4 separate compartments, named by Rumen, Reticulum, Omasum, and Abomasum ^[11-13]. Rumen is the largest compartment, where the billions of microbes living in a symbiotic manner.

Bacteria

In the rumen herbivores different types of bacteria are present, which are active in digestion of the cellulose, hemicellulose, starch, lignin, protein and very small amount of oils ^[14-25].

Common Features of Bacteria in the Rumen

1. Most of the bacteria present in the rumen are Gram positive cocci and rods ^[26].
2. Anaerobic or Obligate anaerobic bacteria are present in the rumen because there is very little amount of oxygen present in the rumen ^[27-29].
3. The optimum pH is lies between 6 – 6.9 ^[30].
4. For the growth of rumen bacteria suitable temperature is 39°C.

Ex: *Fibrobacter succinogenes*, *Ruminococcus albus*, *Butyrivibrio fibrisolvens*, *Ruminobacter amylophilus* and *Treponema saccharophilum*.

Protozoa

The second highest majority of microbes living in the rumen are protozoa. Protozoa is a first discovered microbe in rumen. These single celled animals called protozoans and bacteria done most of the digestive work. Most of the protozoa found in the rumen are Ciliates [31-37]. Depending upon their morphology characteristics ciliate protozoans classified into two groups - Holotrichs and Spirotrichs.

Ex: *Isotricha prostoma*, *Dasytricha ruminantium*, *Diplodinium indicum* and *Metadinium medium*.

Fungi

Fungi also present in the rumen, these was confirmed by the presence of chitin in its cell wall. These obligate anaerobic fungi have an active role in the fibre degradation [38-41].

Ex: *Neocallimastix frontalis*, *Sphaeromonas communis*, *Piromyces communis* and *Caecomyces equi*.

Archaea and Yeast

These microbes also help in the fibre degradation. Archaea is an ancient group, separated from other two domains of life, Bacteria and Eukaryotes [42-52]. These archaea in rumen use O₂ and CO₂ to produce methane. The methanogens play a vital role in the rumen fermentation. Yeast are stabilized the pH of rumen and enhance fibre degradation [53-61].

Ex: *Methanobacterium formicum*, *Methanobacterium bryanti*, *Methanobrevibacter ruminantium* and *Saccharomyces cerevisiae* (yeast)

Role of Microbes in Rumen

Reticular Rumen is having several types of Bacteria, Fungi, Archaea and viruses Combination of Protozoa with Bacteria is having a major assert up to 60% of the Microbial dominates in the Rumen Omasum is the big sac inside the stomach which is main site for Microbial processing of break down cellulose, there they will start their process with Fermentation inside the stomach [62-71]. Abomasum's pH level is 4 due to this reason it is transformed as a big carrier to kill Fauna, Flora which are flowing in it [72].

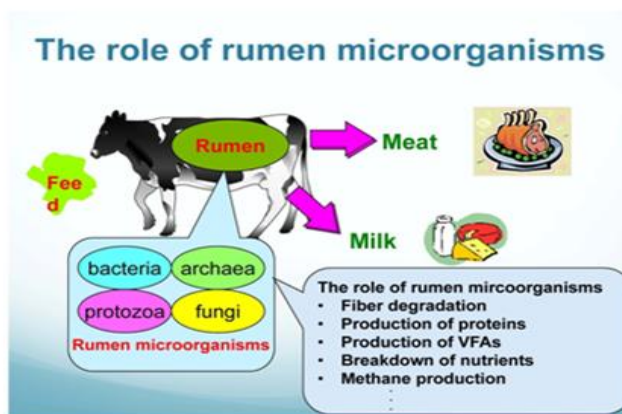


Figure 1. The role of rumen microorganisms.

Mechanism of Action of Digestion in Rumen

Digestion which takes place in the Rumen is very much Complexive process, Reticulo rumen is the only organ which is there to digest, engulf, break down the cellulose [73-75]. Carbohydrates which are having non-structural category will play a main role in cellulose digestion with the help of Microbial enzymes. Conversation of Monosaccharaides in to transforming of Microbes will leads to digest Cellulose in reticulo Rumen [76-79].

CONCLUSION

For the degradation and break down of the cellulose in the Ruminants digestive cavity, Ruminococcus bacteria plays major head role. Whatever the feed type given to Ruminant Microbial population will only effect the process, More about, apart from these Microbials present in the 70% of the Ruminanats Gastro Intestinal Tract are has to be identified yet by Scientific Researchers.

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