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# Study on Efficacy of Veterinary Medication for Effective Rumen Function - A Strategy to Minimize Greenhouse Gas Emission

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**ABSTRACT**

*The role of rumen physiology is paramount for proper digestion and for producing desirable animal output. Under this circumstances, the environmental concern of livestock as major factor in greenhouse gas emissions needs to be addressed. The greenhouse gas emissions are posing severe challenges for consumption of animal produce. The rumen pH is vital for the microenvironment of the ruminants. This study investigated the efficacy of a common indigenous veterinary medication for effective rumen function. It is paramount that balanced rumen microbes, protozoa have to be sustained for optimum digestion. This study had found that common medicinal herb ginger (Zingiberofficinale) had maintained the pH of the rumen environment and reduced the gas production. The research study had illustrated the importance of a medicinal herb used in indigenous veterinary system for overcoming greenhouse gas emissions as well as for proper rumen fermentation.*

**KEYWORDS : Rumen, Veterinary, Indigenous, Environment, Digestion**

## INTRODUCTION

Protecting environment and sustaining productivity will remain a challenge in future. The livestock contributes 12-17 percent of total greenhouse gas (GHG) emission (EU27) during the year 2007 (Bellarby et al., 2013). Programs were undertaken to minimize the emissions such as increase milk yield per cow (Cederberg et al., 2013). There needs to be decisive strategy to minimize the emission of GHG and to implement in cost effective way. Nutritional scientists are working out techniques that can augment effective rumen function, which is primary digestive activity among farm animals. Franzolin and Dehority (2010) confirmed that low rumen pH were more harmful to ciliate protozoa than other factors. During 24 hour cycle, approximately 500 litres of methane and 1050 litres of carbondioxide are exhaled by ruminants. It is important to enable proper digestion process as 2 to 12 per cent energy is lost by cattle after consumption (Sherwood et al., 2005). Fitzsimons et al., (2014) felt to identify effective utilization of feed or to produce less methane per unit body weight. In this context, it is proposed to experiment the usage of indigenous veterinary medication in understanding the functional role for mitigating gas production and efficient rumen function.

## MATERIALS AND METHOD

The goat ruminal contents were collected from slaughters house and carried to laboratory in air tight pouch. The ruminal contents were strained through muslin cloth with the help of artificial saliva. Inorder to maintain anaerobic condition, carbon dioxide was blown directly to the container containing strained rumen fluid. The water bath of in vitro rumen model was filled with ordinary water and heated to 380 C before start of experiment. This temperature was maintained up-to 30 minutes so that it will prevent any shock to rumen microflora due to temperature difference. Ruminal chambers were filled with strained ruminal fluid of about one litre and assembly were fitted as per manufacturer's instruction (Rumen In vitro model: RUSI-E-TEK, EAGA tools and instruments, Chennai). Subsequently, ruminal contents were kept in ruminal chambers for 2 hours (380 C and in anaerobic condition) in enabling adaptation of rumen microflora. The salivation tube, gas collection bags, overflow tubes were fitted and experiment was started. The saliva was regulated in cyclic manner such that after each 20 seconds the saliva was released for a duration of 4 seconds. The test medications was enclosed in non-digestive semi permeable membrane pouch in ruminal chamber and assembly was marked as Test chamber. Inorder to evaluate the efficacy of test preparation, the pH parameter was noted in control chamber (without medication) and test chamber (with medication) for a period of 0, 1, 2, 3 and 4 hours duration. The gas produced was quantified after 4 hours of experimentation. The results were compared and analysed statistically (Gupta, 2000)

## RESULTS AND DISCUSSION

**Table 1. Effect on pH of rumen content in artificial chamber**

| SN | pH (Control chamber) $X_1$ | $(X_1 - \bar{X}_1)^2$ | pH (Test chamber) $X_2$ | $(X_2 - \bar{X}_2)^2$ |
|---|---|---|---|---|
| 1 | 6.1 | 0.1024 | 6.2 | 0.010 |
| 2 | 5.8 | 0.0004 | 6.1 | 0.000 |
| 3 | 5.7 | 0.0064 | 6.0 | 0.010 |
| 4 | 5.7 | 0.0064 | 6.1 | 0.000 |
| 5 | 5.6 | 0.0324 | 6.1 | 0.000 |
| | $\bar{X}_1 = 5.78$ | $\Sigma (X_1 - \bar{X}_1)2 = 0.148$ | $\bar{X}_2 = 6.1$ | $\Sigma(X_2 - \bar{X}_2)^2 = 0.02$ |

The study revealed that the mean pH of control chamber was 5.78± 0.19 ( $\bar{X}1\pm\alpha$) and that of test chamber was 6.1± 0.07 ( $\bar{X}2\pm\alpha$) (Table 1). The results were analyzed using t statistic and found that the calculated value of t at 8 degree of freedom was 3.486 at 5 per cent level of significance. It was found to be more than the table value of t0.05 which was 2.306. Hence it can be concluded that the indigenous veterinary medication had significantly sustained the rumen pH in comparison to control chamber without medication. The increasing concerns were expressed towards consumption of animal products and felt to use some new means for enhancing consumer preferences (Montossi et al., 2013) The experimental study illustrated a model for mitigating greenhouse gas emission and to enhance productive function of rumen fermentation through indigenous veterinary medications. These low cost medications or supplements need to be reinforced among stakeholders so as to reach farm animals distributed over wider geographical regions.

## CONCLUSION

Livestock environment interaction has been a subject of interest to production scientists. Studies had noted the implications of such interactions and did not evaluate the protective role of indigenous veterinary system towards environment. Ruminants play significant role in utilization of forages and grassland for providing desired livestock produce. An efficient biological production system for animal is necessary for overcoming environmental concern for farming system. The

experimental study observed that the rumen content administered with ginger (*Zingiberofficinale*) had maintained the pH during sampling period of four hours. However in control group the rumen pH had changed towards acidic. The mean pH of rumen fluid among test group was significantly higher than the control sample. Further, the test medication could reduce about 200 millilitre of fermented gas under invitro simulation model in comparison to control ruminant chamber. Thus the study illustrated the role of indigenous system in maximizing production by sustaining desired pH and reducing gas production.

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