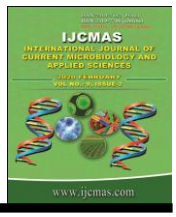
Int.J.Curr.Microbiol.App.Sci (2020) *9*(2): 387-391

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 9 Number 2 (2020)**
Journal homepage: http://www.ijcmas.com



Original Research Article https://doi.org/10.20546/ijcmas.2020.902.048

Effect of Enzyme Supplementation on Production Performance of Dairy Animals

Mukesh Sharma, Kranti Sharma, O.P. Dinani*, S.P. Tiwari and Sharad Mishra

Chhattisgarh Kamdhenu Vishwavidyalaya Anjora, Durg, Chhattisgarh, India

**Corresponding author*

Keywords

Enzymes, xylanase milk production, dairy

Article Info

Accepted:
05 January 2020
Available Online:
10 February 2020

A B S T R A C T

This experiment was based on the hypothesis that whether use of exogenous enzymes in ruminant diets is beneficial for feed digestion and improving animal productivity or not. For this study, total 20 cows and 20 buffaloes were selected and divided into four groups namely A, B, C and D. The trial was conducted on Private Dairy farm of Rajnandgaon District, Chhattisgarh, India where pre and post feeding effect of Hostazyme (Xylanase) was studied. The above study recommended the use of Hostazyme at 5 g per day in cows and 10 g per day in buffaloes for economic milk production.

Introduction

Upon initial consideration, exogenous enzyme might be expected to alter feed utilization in ruminants either through their effects on the feed prior to consumption, or through their enhancement of digestion in the rumen and/or in the post-ruminal digestive tract, therefore, the objective of this study was to investigate the effects of exogenous enzyme preparation Hostazyme (Xylanase) on cellulytic activity in the rumen of cattle and buffalo fed ration with different amount of crude protein and fat. The use of exogenous enzymes in ruminant diets is benefit feed digestion and improves animal performance (Rust *et al.*, 1965; Yang *et al.*, 1998; Kung *et al.*, 1998), but the mechanism is still complex and not very clear.

Researchers have already shown the increased feed digestion is likely not simply due to supplemental enzymatic activity, but the contribution of added exogenous enzymes to total ruminal activity is relatively small (Rovics and Ely,1962; Beauchemin *et al.*, 1997). In a study on the relationship between rumen and exogenous enzymes found that the final hydrolytic effect exceeded the normal enzyme activity in the rumen (Morgavi *et al.*,

2000). They found the synergistic interaction between exogenous enzyme preparations and rumen microorganisms.

The rumen microbial population presents a rich and until recently, underutilized source of novel enzymes with tremendous potential for ruminants. The enzyme activities confirmed to exist in the rumen are diverse, and include plant cell wall polymer-degrading enzymes. The variety of enzymes present in the rumen arises not only from the diversity of the microbial community but also from the multiplicity of fibrolytic enzyme produced by individual micro-organism (Yanke *et al.*, 1995).

Therefore the study conducted to investigate the effect of exogenous enzyme (Hostazyme® from Huve Pharma SEA) on milk production and chemical composition of milk in cattle and buffalo in tropical conditions.

Materials and Methods

For this study, total 20 cows and 20 buffaloes were selected and divided into four groups namely A, B, C and D. The trial was conducted on Private Dairy farm of Rajnandgaon District, Chhattisgarh, India where pre and post feeding effect of Hostazyme was studied. Group A contained cows with average yield of 13.2 kg per day with average 110 days post calving and all 10 cows were fed similar diet of 10 kg fresh Napier green fodder, 5 kg paddy straw and 7.5 kg of concentrate ration (Table 1) on daily basis.

Group B contained 10 cows at same phase of lactation 110 days post calving and yielding 17.4 kg milk per day. All 10 cows of group B were fed 10 kg Napier, 5 kg paddy straw and 9.5 kg of concentrate (Table 1).

While groups C and D were contained 10 buffalo in each group and fed 10 kg Napier and 7.5 kg paddy straw with 7 kg of concentrate (Table 1) as daily diet. All buffaloes are in third lactation and 90 days post calving as average 9.5 kg milk yield per day.

Table.1 Feed formula of concentrate ration offered to experimental animals

Raw material	Percentage
1 Maize	43
2 Soya DOC 45%	13
3 Rape seed cake (Ext)	10
4 Mustard oil cake	10
5 De-Oiled Rice Bran	14
6 Rice Polish	6
7 By Pass Fat	2
8 Mineral Mixture	2
Total	100

All milk record were analysed for 10 days as pre-trial period and Group A and C were fed 5gm Hostazyme per day, and Group B and D were fed 10 gm Hostazyme per day as top dressing. All rations remain same as mentioned in Table 1.

Results and Discussion

The supplementation of exogenous enzyme in dairy diet has significant effect on milk production in group A where 5 gm dose rate of hostazyme was added. Milk yield was significantly improved ($p<0.05$) (improvement of 700 g per day), and in group B where dose was kept 10 gm per day, the improvement of milk yield was non-significant ($p>0.05$). Effect on Fat (%) and SNF (%) was non-significant ($p>0.05$) in both groups A and B of cows.

In group C and D where all buffaloes were fed at 5 gm and 10 gm Hostazyme daily respectively shown non significant effect on fat and SNF percentage ($p>0.05$) in both group (Table 4 and 5) while milk yield improved in both group significantly ($p<0.05$), 0.3 kg and 0.73 kg per day respectively.

The cost of 730 gm of milk increment is much higher than the cost of feeding 10 gm of Hostazyme, which show the economic importance of feeding Hostazyme in cows and buffalo feeding.

Supplementation of ruminant diets with exogenous feed enzymes is one of the developing horizons of dairy Industry, regarding the extensive research and positive responses.

Table.2 Production parameters of cows fed 5 gm Hostazyme per day

Particulars	Milk production (kg)	Fat%	SNF%
Pre feeding	13.27±0.16	3.6±0.031	8.35±0.04
Post Feeding	13.97±0.21	3.6±0.042	8.37±0.03
Difference	0.7	0	0.02
***p*-value**	0.02792	0.3600	0.7650

Table.3 Production parameters of cows fed 10 gm Hostazyme per day

Particulars	Milk production (kg)	Fat%	SNF%
Pre feeding	17.42±0.15	3.6±0.03	8.35±0.022
Post Feeding	17.82±0.93	3.7±0.08	8.37±0.021
Difference	0.4	0.1	0.02
***p*-value**	0.68018	0.4600	0.5995

Table.4 Production parameters of buffaloes fed 5 gm hostazyme per day

Particulars	Milk production (kg)	Fat%	SNF%
Pre feeding	9.67±0.084	7.2±0.026	9.07±0.036
Post Feeding	9.97±0.047	7.3±0.022	9.14±0.030
Difference	0.3	0.1	0.07
***p*-value**	0.00880	0.6800	0.1517

Table.5 Production parameters of buffaloes fed 10 gm hostazyme per day

Particulars	Milk production (kg)	Fat%	SNF%
Pre feeding	9.37±0.14	7.2±0.043	9.03±0.033
Post Feeding	10.10±0.11	7.3±0.033	9.02±0.031
Difference	0.73	0.13	0.01
***p*-value**	0.00272	0.1500	0.7200

The high complexity of the rumen ecosystem makes it difficult to define which, if any enzyme activity is needed to draw out animal improved production performance (Fontes *et al.,* 1995).

Developing new *in vitro* screening methods, instead of *in vivo* experiments can help ruminant nutrition scientists to evaluate new products and theories more precisely and economically (Gonzalez-Garcia *et al.,* 2008). Besides, predominate understanding about the mode of action and target animal requirements could be helpful to reformulate diets with efficient influence of exogenous feed enzymes. However, more investigation is necessary to describe and observe new approaches (Doerner and White, 1990).

Exogenous enzymes have been used extensively to increase the digestibility of existing nutrients, and to supplement the activity of the endogenous enzyme. Researchers examined the use of exogenous enzymes in ruminants' diet (Burroughs *et al.*, 1960).

These results support the outcome of Lopuszanska-Rusek and Bilik (2011) where they observed enhanced milk production with xylanase-esterase supplementation and a tendency of improving DMI and milk production with xylanase and cellulase enzyme supplementation.

Significant increment of milk production in response to the enzyme supplementation was also observed by Klingerman *et al.*, (2009) where the percentages of milk fat and milk protein were unaffected by treatment.

Finally it can be concluded that feeding Hostazyme (Xylanase) supplementation on cow or buffalo has significant and economic effect on milk production and can improve the profit share of dairy farmer.

Adding exogenous enzyme has economic importance for feed millers also if they considered their marketing strategy based on these results. The above study recommended the use of Hostazyme (Xylanase) at 5 g per day in cows and 10 g per day in buffaloes for economic milk production.

References

Beauchemin K.A., Jones S.D.M., Rode L.M. and Sewalt, V.J.H. (1997). Effects of fibrolytic enzyme in corn or barley diets on performance and carcass characteristics of feedlot cattle. *Can. J Anim. Sci. 77*, 645–653.

Burroughs W., Woods W., Ewing S.A, Greig J. and Theurer, B. (1960). Enzyme additions to fattening cattle rations. *J. Anim. Sci. 19*, 458–464.

Doerner K. C. and White B.A. (1990).Assessment of the endo-B-1-4-glucanase components of *Ruminococcus flavefaciens* FD-1. Appl Environ Microbiol, 56:1844-1850.

Fontes C.M.G.A., Hall J., Hirst B.H., Hazlewood G. P. and Gilbert. H.J. (1995).The resistance of cellulases and xylanases to proteolytic

inactivation.Appl.Microbiol.Biotechnol. 43:52-57.

Gonzalez-Garcia Eliel, Caja Gerardo, Albanell Elena, Casals Ramon and Such Xavier (2008). *In vivo* digestibility and *in vitro* gas production of diets supplemented with fibrolytic enzymes in dairy goats. J. Ani. and Feed Sci. 17. 10.22358/jafs/66680/2008.

Klingerman Candice, Hu Wenping, McDonell E.E., DerBedrosian M.C. and Kung Limin. (2009). An evaluation of exogenous enzymes with amylolytic activity for dairy cows. J. dair.sci. 92. 1050-9. 10.3168/jds.2008-1339.

Kung L.Jr., Treacher R.J. and Cohen M.A. (1998). Enzyme-treated forages for lactating cows, J. Anim. Sci. *76 Suppl. 1*, 196.

Lopuszanska-Rusek Magdalena and Bilik Krzysztof (2011). Influence of Pre- and Postpartum Supplementation of Fibrolytic Enzymes and Yeast Culture, or Both, on Performance and Metabolic Status of Dairy Cows. Annals of Animal Science. 11. 10.2478/v10220-011-0005-z.

Morgavi D. P., Rode L. M., Beauchemin K. A., McAllister T. A., Nsereko V., Wang Y., Iwaasa A. D. and Yang W. Z. (2000) Interaction between rumen hydrolytic enzymes and those of *Trichoderma longibrachiatum* in degrading fiber substrates, J. Dairy Sci, 82,Suppl. 1.

Rovics J. J. and Ely C. M. (1962). Response of beef cattle to enzyme supplement, J. Ani. Sci. 21, 1012.

Rust J. W., Jacobsen N. L., McGilliard A. D. and Hotchkiss D. K. (1965) Supplementation of dairy calf diets with enzyme-Effect on nutrient utilization and on composition of rumen fluid, J. Ani. Sci. 24, 156–160.

Yang W. Z., Rode L. M. and Beauchemin K. A. (1998) Effects of fibrolytic enzyme additives on milk production of dairy cows, J. Ani. Sci 76,Suppl. 1, 320.

Yanke L. J. , Selinger L. B. and Cheng K. J. (1995).Comparison of cellulytic and xylanolytic activities of anaerobic rumen fungi. Proceedings of the 23rd Biennial Conference on Rumen Function, p 32 Chicago.

How to cite this article:

Mukesh Sharma, Kranti Sharma, O.P. Dinani, S.P. Tiwari and Sharad Mishra. 2020. Effect of Enzyme Supplementation on Production Performance of Dairy Animals. *Int.J.Curr.Microbiol.App.Sci.* 9(02): 387-391. doi: https://doi.org/10.20546/ijcmas.2020.902.048