

## EFFECT OF DIETARY PROBIOTIC SUPPLEMENTATION ON BIOCHEMICAL PROFILE OF MURRAH BUFFALO CALVES

NAMAN SINGH<sup>1</sup>, AKLANK JAIN<sup>2</sup>, BISWAJIT ROY<sup>3</sup> AND MOHAN SINGH THAKUR<sup>4</sup>

Department of Livestock Production and Management  
College of Veterinary Science and A.H., NDVSU, Jabalpur, (M.P)

Received: 17 March, 2016; Accepted: 19 June, 2016

### ABSTRACT

The study was conducted at Livestock Farm Adhartal, NDVSU, Jabalpur for a period of three months. A total of 18 murrah buffalo calves of both sexes just after colostrum feeding were selected and divided into 3 groups on the basis of their body weight. Group 1 (control) was fed with the basal ration. Group 2 (T<sub>1</sub>) was fed with the basal ration with probiotic (*Saccharomyces cerevisiae*) @5g/animal/day and group 3 (T<sub>2</sub>) was fed with the basal ration with probiotic (*Saccharomyces cerevisiae*+ *Lactobacillus sporogenes*) @ 5g/animal/day. The present study indicated that the total serum protein was significantly (p<0.05) lower in control animals (7.46 g/dl) in comparison to T<sub>1</sub> (8.76 g/dl) and T<sub>2</sub> (8.50 g/dl) animals. However, no significant difference was observed between T<sub>1</sub> and T<sub>2</sub>. The serum albumin concentration varied significantly (p<0.05) among different groups. Highest concentration was observed in T<sub>2</sub> group (3.71 g/dl) and lowest value observed in control group (3.53 g/dl). The globulin concentrations also varied significantly (p<0.05) among the experimental groups. Highest value was observed in the T<sub>1</sub> group (5.15 g/dl). The highest A:G ratio was observed in T<sub>2</sub> group. Serum glucose level differed significantly (p<0.05) among the experimental groups. The mean cholesterol values in all the experimental groups were 80.02±1.38, 66.33±1.40 and 71.41±1.16 mg/dl, respectively for the Control, T<sub>1</sub> and T<sub>2</sub> groups. The results indicated that there was significantly (p<0.05) lower cholesterol concentration in the probiotic fed group as compared to control group. Further, the calves under T<sub>1</sub> group had lower serum cholesterol concentration than in the calves of T<sub>2</sub>. From the study it can be concluded that the total serum protein and blood glucose concentration could be elevated by supplementation of probiotic in buffalo calves. Since the probiotic has anticholesteroleamic effect the cholesterol was lower in probiotic fed group as compare the non fed group.

**Key words:** Blood glucose, Buffalo calves, Colostrum, Probiotics, Serum cholesterol, Total serum protein.

India possesses 111.30 million buffalo which is 57.3% of the total world buffalo population (194.2 million). At present India is producing 127.3 million tonnes milk, out of which the buffalo contributes about 62.35% of the total milk produced<sup>4</sup>. In India, buffalo calf rearing is not given much attention. This is largely due to economic compulsion to sell milk for human consumption and perhaps not realizing the potential values of these animals in their adulthood.

A heavy toll of neonates has been reported in buffalo calves particularly during first three months of their post natal life. Calf mortality up to 3 months of age was 29.1% and 38.85% in cattle and buffalo, respectively<sup>2</sup>. Comparatively higher mortality in buffalo calves might be due to inadequate milk supplied to them at their early stage of life, which ultimately affects the growth rate of calves.

Against the background of growing public concern on the use of antibiotics in food animals, interest in finding alternative to antibiotics has been increasing like probiotics<sup>8</sup>.

Probiotics for ruminants have mainly been selected to improve ruminal digestion by increasing pH in the rumen<sup>12</sup>, fiber digestion<sup>7</sup> and the synthesis

(Part of M.V.Sc. Thesis)

- 1 M.V.Sc Scholar
- 2 Professor, Dept of Livestock Production & Management College of Vety. Science & A.H., Jabalpur (M.P.)
- 3 Corresponding author: Associate Professor, LPM, E-mail: drbiswajitroy@gmail.com
- 4 Asstt. Professor, AG&B, Jabalpur

of microbial proteins<sup>18</sup>. The probiotic also enhances the activity of ruminal microflora. Keeping in view of these facts, the present investigation was planned to study certain biochemical parameters in growing buffalo calves using *Saccharomyces cerevisiae* and combination of *Saccharomyces cerevisiae* + *Lactobacillus sporogenes* based probiotics.

## MATERIALS AND METHODS

The work was conducted at Livestock Farm Adhartal, NDVSU, Jabalpur for a period of three months. A total of 18 Murrah buffalo calves of both sexes just after colostrum feeding were selected and divided into 3 groups. Basal diet was formulated with the use of maize, GNC, wheat bran, fish meal, mineral mixture and vitamins, and salt<sup>14</sup>. Calves of the group 1 (control) was fed with only basal ration. Group 2 (T<sub>1</sub>) was fed with basal ration with probiotic (*Saccharomyces cerevisiae*) @5g/animal/day and group 3 (T<sub>2</sub>) was fed the basal ration with probiotic (*Saccharomyces cerevisiae*+ *Lactobacillus sporogenes*) @ 5g/animal/day. Calves had free access to water and calf starter (having 22% DCP and 72% TDN) and green chaffed fodder. Standard managemental practices like cleaning watering and feeding etc. were adopted in all the experimental groups.

Blood samples were collected from all the calves at fortnightly interval from jugular vein by taking all aseptic precautions in the morning just before feeding. Serum was extracted to study total protein, serum albumin, serum globulin, ratio of albumin to globulin, Glucose and serum cholesterol by using analytical kit (Erba Manheim, Transasia biomedical India PVT Ltd). The collected data were statistically analyzed, using ANOVA<sup>17</sup>.

## RESULTS AND DISCUSSION

The analysed results of various biochemical parameters are presented in table 1. Total protein concentration was significantly (p<0.05) lower in control (7.46 g/dl) in comparison to the T<sub>1</sub> (8.76 g/dl) and T<sub>2</sub> (8.50 g/dl) group. However, no significant difference was observed between T<sub>1</sub> and T<sub>2</sub> groups. The albumin concentration significantly (p<0.05) varied among experimental groups. Highest

concentration was observed in T<sub>2</sub> group (3.71 g/dl) and lowest value observed in control group (3.53 g/dl). The globulin concentration also varied significantly (p<0.05) among the experimental groups. Highest value was observed in the T<sub>1</sub> group (5.15 g/dl). The highest A:G ratio was observed in T<sub>2</sub> group.

Serum protein level in blood indicates the balance between anabolism and catabolism of protein in the body. Serum total protein consists mainly of albumin and globulin. They are the most availed groups of protein and carry out a wide variety of biological functions. The main function of albumin in blood is to act as a buffer and assist in ion transport and in particular those of water insoluble vitamin and cofactors. Significant increase in albumin suggest normal status of liver function since liver is the main organ of albumin synthesis so higher or normal albumin means that probiotic supplementation did not damage or affect the liver function. Researcher<sup>6</sup> reported that the serum globulins are responsible for the immune status of the animal. Increased serum total protein and globulin levels observed in the present study indicate that there was improved immune body status of calves.

The present findings are comparable with the finding of<sup>13</sup> while supplementing the live dried yeast (*Saccharomyces cerevisiae*) to the Rahmani sheep. They found that treated group had higher total serum protein than control and there were no significant differences in albumin, globulin and A:G. However, in buffalo<sup>16</sup> calves recorded decrease in A:G due to dietary yeast supplementation.

In the present study, serum glucose level (mg/dl) differed significantly (p<0.05) among the experimental groups (Table 1). The higher blood glucose level in T1 and T2 group as compare to control may be due to the effect of yeast culture through activity of amylase enzyme that lead to increased carbohydrate hydrolysis in the small intestine. This might be attributed to increasing the activity of cellulolytic bacteria that acts on cellulose fibers degradation, thus, produced more glucose, and increased the glucogenic precursor propionate in rumen or decreased plasma insulin

and insulin glucose ratio leading to an increase in gluconeogenesis and ultimately the higher blood glucose level<sup>5</sup>. The results of the present study are in agreement with other workers<sup>10</sup> who observed that live yeast treated group had higher glucose level in comparison to control.

Similarly, when Holstein-Friesian calves and calves received yeast, demonstrated higher glucose content in treated groups as compare the control. The present results are in accordance with that obtained by researcher<sup>1</sup>.

The mean cholesterol concentrations were  $80.02 \pm 1.38$ ,  $66.33 \pm 1.40$  and  $71.41 \pm 1.16$  mg/dl, respectively in Control, T<sub>1</sub> and T<sub>2</sub> groups. The results indicated that there were significantly ( $p < 0.05$ ) lower cholesterol concentration in the probiotic fed group compare to control. Further, T<sub>1</sub> had the lower cholesterol than T<sub>2</sub>, but non-significant.

The lower level of cholesterol may be attributed to stimulation of bacterial lipid synthesis or due to anticholestroleamic effect of yeast culture treatment<sup>9</sup>. Anticholestroleamic effect is mainly the property of the yeast culture there by T<sub>1</sub> had the lowest cholesterol level compared to T<sub>2</sub>. This may be the reason of lowest cholesterol of T<sub>1</sub> group than both the group. This finding is in accordance with<sup>3</sup> where probiotic bacteria (*Lacto acidophilus* and *L. plantarum*) fed to Holstein Friesian calves (3-4 day old) and serum cholesterol level found significantly reduced. Diets treated with yeast or fungi resulted in decrease of serum cholesterol concentration in Friesian calves<sup>15</sup> and buffalo heifers<sup>6</sup>. Researcher<sup>7</sup> supplemented the live dried yeast (*Saccharomyces cerevisiae*) to the Rahmani sheep and found decrease in cholesterol concentration.

**Table 1. Effect of probiotics on certain biochemical parameters in Murrah buffalo calves**

Parameters	C	T <sub>1</sub>	T <sub>2</sub>
Total protein (g/dl)	7.46 <sup>b</sup> ±0.17	8.76 <sup>a</sup> ±0.24	8.50 <sup>a</sup> ±0.23
Albumin (g/dl)	3.53 <sup>b</sup> ±0.08	3.61 <sup>ab</sup> ±0.11	3.71 <sup>a</sup> ±0.11
Globulin (g/dl)	4.34 <sup>c</sup> ±0.12	5.15 <sup>a</sup> ±0.15	4.78 <sup>b</sup> ±0.13
A:G	0.73 <sup>b</sup> ±0.02	0.71 <sup>b</sup> ±0.02	0.78 <sup>a</sup> ±0.02
Glucose (mg/dl)	62.55 <sup>b</sup> ±1.57	66.00 <sup>a</sup> ±0.74	67.44 <sup>a</sup> ±0.89
Cholesterol (mg/dl)	80.02 <sup>a</sup> ±1.38	66.33 <sup>c</sup> ±1.40	71.41 <sup>b</sup> ±1.16

Means bearing different superscripts within a row differ significantly ( $p < 0.05$ )

## CONCLUSION

The study concluded that the total protein and blood glucose concentration was higher in probiotic supplemented groups. Since the probiotic has anticholestroleamic effect the cholesterol was lower in probiotic fed group as compared to the non fed group.

## REFERENCES

1. Abdel-Khalek, A.E., Mehrez, A.F. and Omar, E.A. 2000. Effect of yeast culture (Lacto-Sacc) on rumen activity, blood constituents and growth of suckling Friesian calves. Proc. Conf. Anim. Prod. In: the 21th Century, Sakha, Kafr-El-sheikh, Egypt, 18 – 20, April 2000, pp. 201 – 210.
2. Acharya, R.M. 1988. The buffalo: dairy draught and meat animal of Asia. In: second world buffalo Congress, New Delhi, 12-17, December 1988, I, pp 1-17.
3. Al-Saiady, M.Y. 2010. Effect of probiotic bacteria on immunoglobulin G concentration and other blood compoants of newborn calves. *Journal of Animal and Veterinarian Advances*, **9** (3): 604-610.
4. BAHS 2012. Basic Animal Husbandry Statistics, <http://www.dahd.nic.in>.
5. Dawson, K.A. 1993. Biotechnology in the feed industry. In: Altech's Ninth Animal Symposium, Lyons, T.P. (ed.). *Altech Technology Publication* pp 269.

6. El-Ashry, M.A., El-Sayed, H.M., El-Koussy, H.M., Khorshed, M.M., Saleh, H.M. and Ammar, A.K. 2004. Effect of Lacto-Sacc on feed efficiency, some blood constituents and reproductive performance of growing Egyptian buffalo heifers. *Egyptian Journal of Nutrition and Feeds*, **7**(1): 97– 108.
7. El-Waziry, A.M., Ibrahim, H.R. 2007. Effect of saccharomyces cerevisiae of yeast on fiber digestion sheep fed berseem (trifolium alexandrinum) hay and cellulose activity. *Aust. J. Basic Appl. Sci.* 1:379-385.
8. Frizzo, L.S., Soto, L.P., Zbrun, M.V., Bertozzi, E., Sequeira, G., Rodriguez Armesto, R. and Rosmini, M.R. 2010. Lactic acid bacteria to improve growth performance in young calves feed milk replacer and spray-dried whey powder. *Animal feed Science and Technology*, **157**:159-167.
9. Fuller, R. 1989. Probiotics in man and animals. *J. Appl. Bacteriol.*, **66**: 365-378.
10. Hossain, S.A., Panerkar, S., Hague, N., Gupta, R.S., Kumar, D. and Tyagi, A.K. 2012. Dietary supplementation of live yeast (*Saccharomyces Cerevisiae*) on nutrient utilization, ruminal and biochemical profile of Kankrej calves. *International Journal of Animal Science*, **1** (1): 30-38.
11. Jain, N.C. (1993). *Essentials of veterinary haematology*. Lea and Febger, Philadelphia, USA.
12. Mohamed, M.I., Maareck, Y.A., Abdel-Magid, S.S., Awadalla, I.M. 2009. Feed intake, digestibility, rumen fermentation and growth performance of camel fed diets supplemented with a yeast culture or zinc bacitracin. *Anim. Feed Sci. Technol.* 149:341-345.
13. Mousa, Kh., El-Malky, M., Komonna, OM, O.F. and Rashwan, S.E. 2012. Effect Of Some Yeast And Minerals On The Productive And Reproductive Performance. *Ruminants Journal of American Science*, 8(2): 212-214.
14. Mudgal, V. and Baghel, R.P.S. 2010. Effect of probiotic supplementation on growth performance of pre-ruminant buffalo (*Babalus bubalis*) Calves. *Buffalo Bulletin*. **29** (3).
15. Ragheb, E.E., Mehrez, A.F. and Abdel-Khalek, A.E. 2003. Digestibility coefficients, blood parameters, feed efficiency and growth performance of weaned Friesian calves fed diet supplemented with lacto-Sacc. *Egyptian Journal of Nutrition and Feeds*, **6**: 693 – 702.
16. Shahin, G.F., Khinizy, A.E.M. and Abd-EIKhabir, A.M. 2005. Effect of non-hormonal growth promoters on growth, nutrient digestibility and feed efficiency by growing buffalo calves. *J. Agri. Sci.*, **30** (1): 103-113.
17. Snedecor, G.W. and Cochran, W.G. 1994. *Statistical Methods*, 7<sup>th</sup> Edn., Oxford and IBH Publishing Co., New Delhi, 350 p.
18. Uyeno, Y., Shigemori, S., Shimosato, T. 2015. Effect of Probiotics/ Prebiotics on Cattle Health and Productivity: Mini review. *Microbs. Environ.* 30(2):126-132.