Print ISSN : 0972-8813
e-ISSN : 2582-2780

[Vol. 19(3), September-December, 2021]

Pantnagar Journal of Research

(Formerly International Journal of Basic and Applied Agricultural Research ISSN : 2349-8765)

G.B. Pant University of Agriculture & Technology, Pantnagar

PANTNAGAR JOURNAL OF RESEARCH

Vol. 19(3) September-December, 2021

CONTENTS

The effect of probiotics and growth stimulants on growth performance of Murrah Buffalo

SAMEER PANDEY[1], RAJ KUMAR[2], D.S. SAHU[3], SHIWANSHU TIWARI[4], PAWAN KUMAR[5], ATUL SHARMA[6]and KARTIK TOMAR[7]

[1,2,3,5,6,7]Department of Animal Husbandry, College of Agriculture, Sardar Vallabhbhai Patel University of Agriculture and Technology, Modipuram-250110(Meerut), [4]Department of Animal Genetics and Breeding, College of Veterinary and Animal Sciences, G.B. Pant University of Agriculture and Technology, Pantnagar-263145(U.S. Nagar, Uttarakhand)

ABSTRACT: The present study was conducted to evaluate the impact of Probiotics and growth stimulants on growth performance of murrah buffalocalves. The calves were selected from Livestock Research Center at Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut. Eighteen murrah buffalo were divided into three groups. T_0 as control in which animals were fed normal basal diet while in group T_1 and T_2animals were fed in addition to normal basal diet, one and two bolus of probiotics and growth stimulant (Ecotas bolus), respectively. Each bolus contains (*Lactobacillus sporogenes* 20×106 CFU, *Saccharomyces cerevisiaei* 25×109CFU, *Aspergillus oryzae* 20×106 CFU, Zinc sulphate 200 mg, Cobalt sulphate 40 mg, Copper sulphate 100 mg, DL-Methionine 1 g and Fructo-oligosaccharide 250 mg). The parameters studied were growth Body weight at fortnightly interval, body weight gain, average daily gain, feed consumption and Feed conversion ratio. The supplementation of probiotics and growth stimulants had significant effect on body weight gain, average daily gain and FCR. Probiotic and growth stimulants supplementation showed improved total gain 26.22 and 33.32 %, ADG 23.48 and 32.35 % and FCR 12.32 and 15.67 % in T_1 and T_2group respectively. On the basis of above results It may be concluded that the " Ecotas bolus" a combination of probiotics and growth stimulants improved growth performance and feed conversion efficiency in buffalo calves.

Key words: Average daily gain, body weight gain, buffalo, feed conversion efficiency,probiotic

India has emerged today as the largest producer of milk in the world crossing 97 million tons annually. The organized dairy sector in India is largely dependent on buffalo milk as they contribute more than 57 Per cent of the total milk produced in the country. India is the world's seventh largest country occupying 2.47% of the world geographical area which supports about 16% of earth's human population and 15% of the world's livestock population and has 23.81% forest and tree cover. Livestock is the backbone of the rural economy in India. Livestock enable integrated farming, sustain livelihoods. About 70% of the population is engaged in agriculture and rearing of livestock is subsidiary to agriculture (Yadav and Gulati, 2006). Livestock and livelihood go hand in hand towards reducing poverty. Buffalo production business in India is mainly in the hands of small and marginal farmers, in which males are either replaced in their own herd, used for draft purpose or are slaughtered for meat production. However, in general it is observed that males are neglected and underfed due to non remunerative cost of raising male animals by the farmers to save milk from the dam for disposal in the market. Thus, in India, every year, about ten million such male calves succumb to death incurring a loss of about Rs. 750 million per annum. These calves could otherwise be salvaged for meat production, which will improve the economic condition of the farmers (Ranjhan, 2006). There is lot of scope for buffalo meat production in comparison to cow meat, due to its tender and low cholesterol content, low intra-muscular fat and 25% higher protein than beef (Yadav and Gulati, 2006), besides a very good source of iron, vitamin B2, B6, B12. Moreover, no social taboos attached to the buffalo slaughter unlike cow and swine. In India, the tremendous export potential lies with buffalo meat. Export opportunities have increased in the recent years with growth in demand for animal products in the developing countries and India is at advantage to provide variety of livestock products that could bind better acceptability in term of price and preference to these ever increasing consumers.The term probiotic was first used by Parker (1974) to describe “microorganisms and substances which contribute to intestinal microbial balance”.

MATERIALS AND METHODS

Eighteen murrah buffalo (female) calves between 12 to 18 months of age groups were selected from Livestock research center (LRC). The Ecotas bolus which contains Probiotics (L. sporogenes, *Saccharomyces cerevisiae* and *Aspergillus oryzae*) and growth stimulants (Zinc sulphate, Cobalt sulphate, Copper sulphate, DL- Methionine and Fructo-oligosaccharide) were procured from Intas Pharmaceuticals Ltd. All the experimental animals were kept under conventional housing system consisting of 18 normal pens of almost similar sizes (2X3) feet. The housing conditions for all animals were similar during entire period of experiment. The sheds were washed and cleaned daily to prevent any infections. The ingredient composition of concentrate mixture fed to the all animals was same. Clean and fresh water was provided freely to all animals twice a day. The animals were divided in to three groups, T_0 as control in which animals were fed normal basal diet while in group T_1 and T_2animals were fed in addition to normal basal diet, one and two bolus of probiotics and growth stimulants i.e. Ecotasbolus respectively, The groups were maintained as per SVPUA&T standard feeding schedule (Morning 5 AM and Evening 5 PM). However, in treatment groups feed additives as Ecotas bolus. were offered per day per animal as detailed below

The animals were weighed before feeding and watering in the morning on two consecutive days at the start of experimental and thereafter at fortnightly interval during the experimental period of 90 days.The body weight gain of animals and average daily weight gain (g/day)calculated using formulae given below:

Body weight gain = final body weight-initial body weight

$$\text{Average body weight gain (Kg)} = \frac{\text{Final weight of animal - Initial weight of animal}}{\text{Number of feeding days}}$$

Feed conversion ratio (FCR) - FCR was calculated by the amount of dry matter intake (kg) required for per unit (per kg) weight gain by animals during the trial period.

$$\text{FCR} = \frac{\text{Average Feed Consumption (Kg)}}{\text{Average body weight gain (Kg)}}$$

Statistical Analysis

Data acquired in the experiment were analysed as per Snedecor and Cochran (1994).

RESULTSAND DISCUSSION

The mean maximum body weight (122.01 kg) was in T_2 and minimum body weight was (118.04 kg) in control (T_0). In T_1 group the mean body weight was recorded (120.11 kg). Body weights of calves fed with or without probiotics and growth stimulants at fortnightly interval were presented in Table 1. Final body weights recorded were 132.01 kg, 140.36 kg and 141.80 kg in T_0, T_1 and T_2 group respectively after the 90 days of feeding trial.

Feed additive/animal/day is given at detailed below (Ecotas Bolus)

Feed additive	Groups		
	T_0 (Control group)	T_1 (treatment group)	T_2 (treatment group)
Lactobacillus sporogenes	-	10 ×106 CFU	20×106 CFU
Saccharomyces cerevisiae	-	12.5×109 CFU	25×109 CFU
Aspergillus oryzae	-	10×106 CFU	20×106 CFU
Zinc sulphate	-	100 mg	200 mg
Cobalt sulphate	-	20 mg	40 mg
Copper sulphate	-	50 mg	100 mg
DL-Methionine	-	0.5 g	1 g
Fructo-oligosaccharide	-	125 mg	250 mg
Biotin	-	5 mg	10 mg

The improvement in growth performances observed in animals fed with probiotics (Malik and Bandla, 2010). The final body weight at T_2 and T_2 group was 4% and 12% higher in comparison of control groups. Youssef *et al.* (2017) reported that the antibiotic, probiotics and lactic acid supplementation increased the body weight compared that of control. But Sarangi *et al.* (2016) report the prebiotic and probiotic groups showed lower body weight than symbiotic and control groups.

Table 1: Body weight (kg) of murrah buffalo calvesfeed with or without probiotics and growth stimulants at fortnightly interval

Fortnights	Treatments		
	T_0	T_1	T_2
0	104.55±4.78	106.18±5.74	105.18±10.05
1	109.00±4.76	110.96±5.98	109.43±10.19
2	113.25±4.92	116.15±6.24	114.46±10.35
3	117.91±4.99	121.78±6.41	120.75±10.50
4	122.43±4.97	128.05±6.46	127.71±10.60
5	127.11±5.02	133.91±6.47	134.78±10.74
6	132.01±5.18	140.36±6.56	141.80±10.79
Mean±SE	118.04±4.95a	120.11±5.56a	122.01±10.44a

The mean maximum body weight (122.01 kg) was in T_2 and minimum body weight was (118.04 kg) in control (T_0). In T_1 group the mean body weight was recorded (120.11 kg).

Effect of probiotics and growth stimulants on body weight gain is depicted in Table 2 and Fig 1. Body weight gain show significant difference (pvalue) amongst the treatment groups. The body weight gain was significantly higher in the murrah buffalo calves of T_2 group (36.61±0.37 kg) as compare to that of T_0 and T_1 group.

Table 2: Body weight gain (kg) in murrah buffalo calves during feeding 90 days

Fortnights	Treatments		
	T_0	T_1	T_2
1	4.45±0.17	4.78±0.30	4.08±0.47
2	4.25±0.29	5.18±0.42	5.20±0.38
3	4.66±0.26	5.63±0.18	6.28±0.28
4	4.51±0.17	6.26±0.21	6.96±0.42
5	4.68±0.23	5.86±0.23	7.06±0.35
6	4.90±0.20	6.45±0.20	7.01±0.34
TOTAL	**27.46±0.22c**	**34.18±0.26b**	**36.61±0.37a**

The similar improvement in increases the weight gain of young individuals with supplementation of probiotic were observed by Pandey and Agrawal (2001), Hussain Dar *et al.* (2017), Di Francia *et al.* (2008) and Radzikowski (2017). Yadav *et al.* (1996) also reported that supplemented with probiotics the body weight gains were increased in murrah buffalo calves. Overall average daily gain was significantly higher in the animals of T_2 group (408.72 g/day) as compare to T_0 group (304.77 g/day). However, the ADG (381.31 g/day) of T_1 was similar with the ADG (408.72 g/day) of T_2, where ADG of T_1 and T_2 group of calves were not significantly different. Higher average daily gain (g/day) in the animals of treatment group represents the higher growth rate as compare to the animals of control group (Table 3). Higher growth rate of murrah buffalo calves supplemented with probiotic and growth stimulants could be due to positive effect of probiotic and growth stimulants which provide the microbial protein and nutrients.

Table 3: Average daily gain (g/day) in murrah buffalo during feeding trial of 90 days

Fortnights	Treatments		
	T_0	T_1	T_2
1	296.33±11.90	318.44±20.23	285.00±29.04
2	283.00±19.79	345.27±28.44	346.30±25.89
3	310.66±17.85	386.33±15.06	418.66±18.72
4	300.83±11.77	417.33±14.47	464.16±28.16
5	311.66±15.81	390.83±15.66	470.66±23.62
6	326.16±13.47	429.66±13.96	467.50±23.19
Mean±SE	**304.77±15.10b**	**381.31±17.97a**	**408.72±24.77a**

The similar improvement in average daily gain was observed by Spaskaya (1998) who reported that daily weight gain increase of 4.0 to 11.6 per cent in probiotics fed treatment group. Gombos (1995), Kumar *et al.* (1998) and Nehru *et al.* (2017) also reported that the average daily weight gain was significantly higher (P<0.01) in treatment group which fed probiotics.

-The average feed consumption (dry matter intake) was similar among three groups, which was 2.61, 2.87 and 2.89 kg/day, respectively in T_0, T_1 and T_2 group of calves (Table 4).

The feed consumption increased in linearly with increased period of feeding probiotics and growth stimulants.

Table 4: Feed consumption (dry matter intake in kg/day) in murrah buffalo calves during feeding 90 days

Fortnights	Treatments		
	T_0	T_1	T_2
1	2.35±0.10	2.58±0.13	2.55±0.24
2	2.47±0.11	2.62±0.15	2.65±0.24
3	2.56±0.09	2.78±0.14	2.79±0.23
4	2.63±0.11	2.92±0.15	2.93±0.26
5	2.74±0.11	3.07±0.15	3.10±0.26
6	2.93±0.11	3.25±0.13	3.29±0.26
Mean±SE	**2.61±0.10a**	**2.87±0.14a**	**2.89±0.25a**

The results pertaining to the feed consumption in the present findings are in agreement with the previous studies of Higginbotham and Bath (1993) reported that the feed intake (FI) increased in probiotic fed group compared to control group. However, Kamalamma (1996) and Timmerman *et al.* (2005) reported no effect of probiotic treatment on daily meal intake.

Feed conversion ratio in terms of feed consumption (kg) per kg gain is an important tool to measure the efficiency of feed. The FCR of different groups over the experimental period are presented in Table 5. An improved FCR was significantly higher in T_1 and T_2 than that of T_0 (control) group of animals. However no significant difference was observed in T_1 and T_2 groups. The highest FCR 7.32 was in T_2 followed by T_1 (7.61) and T_0 (8.68).

Table 5: Feed conversion ratio in murrah buffalo during feeding trial of 90 days

Fortnights	Treatments		
	T_0	T_1	T_2
1	7.98±0.44	8.16±0.29	9.37±1.22
2	8.95±0.72	7.78±0.59	7.81±0.88
3	8.39±0.57	7.20±0.14	6.73±0.64
4	8.83±0.57	7.01±0.28	6.33±0.49
5	8.91±0.54	7.93±0.51	6.62±0.57
6	9.01±0.29	7.60±0.29	7.09±0.63
Mean±SE	**8.68±0.52a**	**7.61±0.35b**	**7.32±0.74b**

The results pertaining to the feed consumption ratio in the present findings are in agreement with the previous study of Malik and Bandla (2010), Hossain *et al.* (2012) and Gupta *et al.* (2015). Whereas Riddell *et al.* (2010) and Hosseinabadi *et al.* (2013) reported a non-significant improvement in FCR with addition of probiotic during pre-weaning period in calves.

CONCLUSION

The supplementation of probiotics and growth stimulants had significant effect on body weight gain, average daily gain and FCR. Probiotic and growth stimulants supplementation T_1 and T_2 improved total gain 26.22 and 33.32 %, ADG 23.48 and 32.35 % and FCR 12.32 and 15. 67 % respectively. Therefore, it is concluded that supplementation of probiotics and growth stimulants in buffalo calves feed improve the growth performance and feed conversion efficiency of buffalo calves.

REFERENCES

Di Francia, A., Masucci, F., De Rosa, G., Varricchio, M. L. and Proto, V. (2008). Effects of Aspergillus oryzae extract and a Saccharomyces cerevisiae fermentation product on intake, body weight gain and digestibility in buffalo calves. *Journal Animal Feed Science and Technology*, 140: 67–77.

Gombos (1995). Effect of probiotics and yeast culture on the performance of pigs and dairy cows. *Krimiva*, 37(1): 13-17.

Gupta, P., Sharma, K. S., Porwal, M. and Joshi, M. (2015). Biological performance of female calves fed diets supplemented with different strains of Lactobacilli. *Int. J. of Sci. Environment and Technology*, 4: 1181 – 1187.

Higginbothom, G. E. and Bath, D. L. (1993). Evaluation of lactobacillus fermentation cultures in calf feeding systems. *J. Dairy Sci.*, 76(2): 615-620.

Hossain, S. A., Parnekar, S., Haque, N., Gupta, R. S., Kumar, D. and Tyagi, A. K, (2012). Influence of dietary supplementation of live yeast (Saccharomyces Cervisiae) on nutrient utilization, ruminal and biochemical profiles of Kankrej calves. *Int. J. App. Anim. Sci.*, 1: 30-38.

Hosseinabadi, M., Dehghan-Banadaky, M. and Zali, A. (2013). The effect of feeding of bacterial probiotic in milk or starter on growth performance, health, blood and rumen parameters of suckling calves. *Res. Anim. Product*, 4:8–14.

Hussain Dar, A., Singh, S. K., Mondal, B. C., Palod, J., Kumar, A., Singh, V., Sharma, R. K. and Khadda, B. S. (2017). Effect of probiotic, prebiotic and synbiotic on faecal microbial count and cell-mediated immunity in crossbred calves. *Indian Journal of Animal Research*, 52(10): 1452-1456

Kamalamma, krishnamoorthy, U. and Krishnappa, P. (1996). Effect of feeding yeast culture (Yea-sacc 1026) on rumen fermentation *In vitro* and production performance in crossbred dairy cows. *Animal Feed Science and Technology*, 57(3):247-256

Kumar, U., Sareen, V. K. and Singh, S. (1998). Effect of supplementation of yeast culture (Yea-sacc1026) in the diet on live weight gain in buffalo calves. *Indian J. Anim. Sci.*, 68(5): 501-503.

Malik, R. and Bandla, S. (2010). Effect of source and dose of probiotics and exogenous fibrolytic enzymes (EFE) on intake, feed efficiency, and growth of male buffalo (Bubalus bubalis) calves. *NDRI Karnal., Animal Health and Production.*, 42: 1263-1269.

Nehru, P. A., Sunandhadevi, S., Rama, T. and Muniyappan, N. (2017). Effect of Probiotic Supplementation on Growth Performance of Crossbred Calves in an organized Cattle Farm. *J. Anim. Health Prod*., 5(3): 89-91.

Pandey, P. and Agrawal, I. S. (2001). Nutrient utilization and growth response in crossbred calves fed antibiotic and probiotic supplemented diets. *Indian J. Ani. Nutl*., 18(1): 15-18.

Ranjhan, S. K. (2006) Safety assurance of exported Indian cara beef: Meeting WTO guidelines. Proceedings of Animal Nutrition Association World Conference, New Delhi,Pp 54-58.

Riddell, J. B., Gallegos, A., Harmon, D. and Mcleod, K. (2010). Addition of a Bacillus based probiotic to the diet of pre ruminant calves: influence on growth, health, and blood parameters. *Int. J. Appl. Res. Vet. M.*, 8:78–85.

Sarangi, N. R., Babu, L. K., Kumar, A., Pradhan, C. R., Pati, P. K. and Mishra, J. P. (2016). Effect of dietary supplementation of prebiotic, probiotic, and symbiotic on growth performance and carcass characteristics of broiler chickens, *Veterinary World*, 9(3): 313-319.

Spaskaya, T. A. (1998). The use of probiotics for improving disease resistance in calves. IzuertiyaTimiayazevskoi Seiskokhozyaist vennoi Akademii, 4: 169-179.

Timmerman, H. M., Mulder, L., Everts, H., Van Espan, D. C., Van Der Wal, E., Klaassen, G., Rouwers, S. M. G., Hartemink, R., Rombouts, F. M. and Beynen, A. C. (2005). Health and growth of veal calves fed milk replacers with or without probiotics. *J. Dairy Sci*., 88(1): 2154-2165.

Yadav, R. S. and Gulati, H. K. (2006). Management and buffalo production system in India. Proceedings of National symposium on Buffalo for Rural Upliftment- management and production systems, Pp. 146-158.

Yadav, M. S., Sengupta, B. P., Yadav, R. S. and Singh, B. (1996). Effect of feeding yeast culture with BY-Pass protein on growth, feed efficiency and ruminal profile in murrah buffalo calves and heifers. *Indian J Anim. Prod. Mgmt.*, 12 (3,4): 170-173.

Youssef, I., Mostafa, M. I., Ahmad, S., Mariam and Abdel-Wahab, A. (2017). Effects of Dietary Inclusion of Probiotics and Organic Acids on Performance, Intestinal Microbiology, Serum Biochemistry and Carcass Traits of Broiler Chickens. *Journal of World's Poultry Research*, 7(2): 57-7.

Received: November 11, 2021
Accepted: December 31, 2021