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Effect of *Saccharomyces cerevisiae* and *Lactobacillus acidophilus* as Probiotics on Performance of Barbari kids

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ABSTRACT

A total of 18 weaned Barbari kids were randomly assigned to three different groups, with six animals in each group. Composition of the rations was as follows; T_1 (Control); Basal ration (DCP-18%, TDN-70%), T_2; Basal ration + probiotic (*Lactobacillus acidophilus*, 6×10^9 cfu/g) @ 2g/animal/day, T_3; Basal ration + probiotic (*Saccharomyces cerevisiae*, 4×10^9 cfu/g) @ 2g/animal/day. The effect of feeding two types of probiotics to Barbari kids revealed significant difference ($P<0.05$) on body weight of kids fed with *Saccharomyces cerevisiae* (T_3 group) as compared to *Lactobacillus acidophilus* fed (T_2 group) and control group (T_1). The average daily body weight gain was significantly ($P<0.01$) higher in T_3 group followed by T_2 and control group. The body measurements were non-significantly higher in T_2 and T_3 group as compared to control group (T_1). Feed efficiency ratio of group T_3 (*Saccharomyces cerevisiae*) 0.13±0.00 was higher than the group T_2 (*Lactobacillus acidophilus)* 0.09±0.00 followed by T_1 (basal ration) 0.05±0.00. Average daily body weight gain in Barbari kids was more in T_3 group as compared to T_2 group. No significant effect on dry matter intake was observed across the groups. Higher digestibility coefficient for dry matter, crude protein, ether extract, crude fibre and nitrogen free extract were observed in T_3 group as compared to T_2 and control group. It can be concluded that probiotic supplementation improves daily body weight gain in Barbari kids.

Keywords: Probiotics, barbari kids, supplementation, feed intake, growth performance

Small ruminants occupy an important economic and ecological niche in agricultural systems throughout the developing countries like India (Devendra 2005). Goats are raised mostly to safeguard against crop failure and unfavorable crop price in intensive cropping areas. They represent a more liquid form of capital than cattle and are readily tradable hence, goat is popularly known as 'Poor Man's Cow'. According to (FAOSTAT 2011) the total goat population of India is 157 million and it contributes 16.9% world's goat population. High growth and improved feed conversion ratio (FCR) are important economic traits in animals. However, the growth traits such as weight gain in pre and post weaning periods significantly decreased due to lower nutrient intake or feed efficiency due to large livestock population in India (Toukourou and Peters 1999). The farmers were interested in early maturity of kids. So, now a days many growth promoters are used in the form of microbial feed additives which stimulate growth by improving ruminant nutrient utilization in terms of live weight gain, growth performance and milk production of the animal in the tune of 7-8% (Wallace and Newbold, 1993).

The term "probiotics" comes from the Greek words "pro" (in favour) and "biotic" (life) was first used by (Parker 1974) and described it as the "organisms and substances that contribute to intestinal microbial balance". It is a live microbial feed supplement that beneficially affects the host animal by improving intestinal microbial balance. Thus, the effective micro-organisms (probiotics) culture includes strains of lactic acid bacteria (*Lactobacillus acidophilus* and *Streptococcus*) and other organisms such as yeast (*Saccharomyces cerevisiae*, *Bacillus substilis*, *Bifidobacterium*, *Aspergillus oryzae*) (Panda 2002). Antunovic *et al*. (2007) reported a positive impact of probiotic supplementation on nutrient intake, weight gain and feed conversion ratio (FCR) in ruminants. Absence of scientific or economic approach is often a major limitation

for the success of goat farming (Pinar *et al.* 2014; Kishore *et al.* 2014). It is well known that farm profits are directly related to weight gain and feed efficiency of growing animals which ultimately affect the growth of goat kids. Keeping in view of these facts the present study was designed to evaluate the effect of probiotics on performance of Barbari kids.

MATERIALS AND METHODS

Present investigation was conducted for a period of three month (February, 2014 to May, 2014) at Livestock Farm Adhartal, Nanaji Deshmukh Veterinary Science University, Jabalpur (Madhya Pradesh). A total of 18 young Barbari kids were selected just after weaning at the age of 2 months of either sexes and randomly distributed in three groups (T1, T2 and T3) six in each. All the received the same basal ration except bacterial and fungal origin probiotics. T1 was treated as control. T2 group received probiotic *Lactobacillus acidophilus* (6×10^9 cfu/g) @ 2g/animal/day. T3 group received probiotic *Saccharomyces cerevisiae* (4×10^9 cfu/g) @ 2g/animal/day. Clean and fresh water was made available round the clock. Basal ration was prepared by using maize (45%), ground nut cake (30%), arhar chuni (17%), wheat bran (15%), mineral mixture (2%) and salt (1%).

Body weight was taken at the start of experiment and at fortnightly interval with the use of electronic weighing balance in the morning before feeding. Feed efficiency ratio and dry matter intake was calculated by using the standard formula. At the end of experiment digestion trial for seven days was conducted, samples of feed, fodder and faeces were collected for analysis of proximate principles viz. dry matter (DM), crude protein (CP), ether extract (EE), crude fiber (CF), nitrogen-free extract (NFE), and total ash by the standard methods (AOAC, 2012). Mean and Standard error (S.E.) of different treatments groups were analyzed, using standard statistical method as described by (Snedecor and Cochran, 1994). The significant effects of different means were compared by Duncan Multiple Range Test.

RESULTS AND DISCUSSION

Growth performance

The body weight and average body weight gain of Barbari kids were depicted in Table 1. The study revealed that mean fortnightly body weight of kids in T_3 group fed on probiotic *Saccharomyces cerevisiae* was higher (9.70±0.41 kg) than the kids of T_2 group fed on probiotic *Lactobacillus acidophilus* based ration (8.82±0.41 kg) and T_1 group fed only basal ration (8.30±0.38 kg). Statistical analysis revealed that the mean body weight of T_3 group was significantly different ($P<0.05$) from T_2 and T_1. The average daily body weight gain was significantly ($P<0.01$) higher in *Saccharomyces cerevisiae* fed group followed by *Lactobacillus acidophilus* and control group. In the present study, higher body weight and gain in body weight of kids fed with *Saccharomyces cerevisiae* (T_3 group) as compared to *Lactobacillus acidophilus* fed (T_2 group) and control group (T_1). In accordance with the present study, Elseed *et al.* (2007) reported higher average daily gain in *Saccharomyces cerevisiae* supplemented group and Ozsoy *et al*. (2013) reported increase in total body weight gain in live yeast culture group as compared to control group. In contrast, Rao and Dutta (2005) observed no significant effect on body weight gain while supplementing *Lactobacilli* in male Muzzaffarnagri lambs. Similar finding were observed by El – Shaer (2003) in sheep.

Table 1: Effect of probiotics on changes in body weight (kg), average daily gain ratio of Barbari kids

Groups	T_1	T_2	T_3
Body weight (kg)	8.30^{a} ±0.38	8.82^{a}±0.41	9.70^{b}±0.41
Average daily gain (g/animal)	16.65^{A}±1.84	32.91^{B}±3.26	48.55^{C}±4.12

Means bearing different superscripts with in a row differ significantly (^{AB}, $P<0.01$; ^{ab}, $P<0.05$)

The heart girth, height at wither and body length were found to be increased in T_2 and T_3 group as compared to control group T_1. But the difference in increase was not statistically significant. As regard the paunch girth of the growing kids of treatment groups T_2 and T_3 differed significantly ($P<0.01$) with control group T_1 (Table 2). Growth of animal is not only restricted to the body weight but the body measurements like body length, heart girth, height at wither and paunch girth are also subjected to change proportionately. In the study all growth parameters increase non significantly except paunch girth result are in accordance with (Kochewad *et al.* 2009) reported that,

all the growth parameters were higher in the probiotics treatment group as compared to the control group, though the difference was not significant.

Table 2: Body measurement of Barbari kids

Parameter (inch)	T1	T2	T3
Heart girth	18.64±0.21	19.20±0.22	19.13±0.18
Height at wither	18.36±0.19	18.21±0.20	18.18±0.17
Body length	15.45±0.21	15.97±0.21	16.01±0.81
Paunch girth	19.78^{A}±0.27	21.07^{B}±0.22	20.78^{B}±0.22

Means bearing different superscripts with in a row differ significantly (^{AB}, P<0.01)

Feed intake, dietary composition and digestibility of nutrients

The daily dry matter intake (g/animal) was higher in T_3 (360.09±22.44) and T_2 (350.06±20.21) group as compared to T_1 (311.80±13.67). Statistically there were no significant difference between the treatment groups and feed efficiency ratio (FER) of group T_3 (*Saccharomyces cerevisiae*) 0.13±0.00 was higher than the group T_2 (*Lactobacillus acidophilus)* 0.09±0.00 and T_1 0.05±0.00 (basal ration). Seo *et al*. (2010) noticed positive effects of probiotics on nutrients intake and it may be attributed to numerous factors like they attach to the intestinal mucosa and prevents potential pathogen establishment leading to improved nutrient digestion which enhances dry matter intake (DMI). So, in the present study higher daily dry matter intake was observed in T3 and T2 as compared to T1. In contrast to our finding (Kumar *et al.* 2013) observed that the DMI were similar in control and *lactobacilli* culture fed Barbari kids.

Statistically the feed efficiency ratio (FER) did not differ significantly due to various treatments (Table 3). Higher feed efficiency ratio was in supplemented group than the control group, Improved FER in probiotic supplementation is in accordance with the results of (Gupta and Gupta 2007) who reported improved feed utilization in ruminants when supplemented with Ecotas containing probiotic and other growth stimulants. The reason of increase feed efficiency may be due to yeast cultures increase ruminal cellulose digestion and consequently it also increase microbial growth in the rumen and enhanced microbial protein synthesis so ultimately it improves the feed efficiency

Table 3: Daily dry matter intake and feed efficiency of Barbari kids

Groups	T_1	T_2	T_3
Daily dry matter intake(g/animal)	311.80 ± 13.67	350.06 ± 20.21	360.09 ± 22.44
Feed efficiency ratio	0.05 ± 0.00	0.09 ± 0.00	0.13 ± 0.00

The average value of proximate principles (% DM basis) of experimental diets and digestibility coefficient of various nutrients are depicted in the Table 4. It was found that the digestibility coefficient for all organic nutrients were higher in kids fed with probiotic *Saccharomyces cerevisiae* (T_3) followed by kids fed with probiotic *Lactobacillus acidophilus* (T_2) and control group (T_1). Higher digestibility coefficient for dry matter (DM), crude protein (CP), ether extract (EE), crude fiber (CF) and nitrogen free extract (NFE) was observed in probiotics fed group as compare to the control group. Results were supported by the findings of (Whitley *et al.* 2009) also reported improved apparent DM, CP, NDF and ADF digestibility coefficient diet supplemented with commercial probiotics than control group. Fermentation activity of bacteria, especially of cellulolytic strains appears to increase by feeding yeast culture resulting in higher NDF and DM digestibility similar view expressed by (Haddad and Goussous 2005).

Table 4: Proximate composition and digestibility coefficients of organic nutrients

Para-meters	Proximate composition of feed ingredients		Digestibility of the organic nutrients		
	Concentrate	Berseem	T_1	T_2	T_3
DM	87.52	17.4	64.65	67.31	70.02
CP	17.91	13.74	67.23	69.45	72.78
EE	3.97	2.34	69.03	70.04	71.64
CF	8.06	26.75	57.04	58.85	61.23
NFE	61.22	40.53	70.36	71.87	74.09
TA	4.24	14.64			

CONCLUSION

On the basis of the findings of the present study, it can be concluded that probiotic supplementation improves daily body weight gain in Barbari kids without significant change in the feed intake.

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