

## Effect of Probiotics Supplementation on Nutrient Intake and Feed Conversion Efficiency in Lactating Kankrej Cows

Ajay P Raval, Devchand A Sadrasaniya, Ashok P Patel, Sanjay Joshi, Vijay Chaudhary, Suresh Patel, Ingle Pandurang, Bharat B Rajgor, N Emmanuel, Bhagwat SR

Department of Animal Nutrition  
College of Veterinary Science and Animal Husbandry  
Sardarkrushinagar (B.K.) - 385506 (North Gujarat)

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### Abstract

An on-farm trial of 90 days was conducted at Kushkal village, Palanpur taluka in Banaskantha district of Gujarat to study the effects of probiotics supplementation on nutrient utilization and feed conversion of lactating kankrej cows. Fourteen lactating Kankrej cows of uniform body weight, milk yield and with 2<sup>nd</sup> and/or 3<sup>rd</sup> lactation number in the initial stages of lactation were selected for the experiment to observe the effect of probiotic supplementation and were divided into two dietary treatments i) T1 (control: concentrate mixture + Green fodder + Dry fodder) and ii) T2, Probiotics supplementation (15 g/d/animal probiotics containing *Saccharomyces cerevisiae*;  $1.5 \times 10^8$  cfu/g and bacteria, *Lactobacillus sporogens*;  $5 \times 10^7$  cfu/g + T1) were fed. The results revealed that supplementing probiotics to lactating Kankrej cows significantly improved intake of DM, CP and TDN while DCP intake, water intake and feed conversion efficiency of nutrients like DM, CP, DCP and TDN in relation to milk yield and FCM remained statistically similar as compared to control. The average DM intake of experimental cows during digestion trial in treatment groups T1 and T2 were  $10.03 \pm 0.04$  and  $10.27 \pm 0.04$  kg/d and when expressed as kg/100kg B.wt. it was  $2.66 \pm 0.06$  and  $2.75 \pm 0.09$  and in terms of g/kg  $W^{0.75}$  was  $117.15 \pm 2.03$  and  $120.69 \pm 3.02$ . The treatment group T2 recorded significantly higher ( $P < 0.01$ ) DM intake. The average CP and TDN intake of T1 and T2 groups were  $1012.03 \pm 1.53$  and  $1057.91 \pm 9.40$  g/d and  $6135.39 \pm 254.17$  and  $6919.64 \pm 262.35$  g/d, respectively, differ ( $P < 0.05$ ) statistically but the average DCP intake was  $576.44 \pm 35.88$  and  $665.75 \pm 39.63$  g/d, respectively, remained statistically ( $P < 0.05$ ) similar.

The average digestibility coefficient of OM, CP, CF and NFE in T1 and T2 were remain statistically ( $P < 0.05$ ) similar except DM ( $65.21 \pm 1.88$  and  $70.89 \pm 1.76$ ) and EE ( $46.92 \pm 2.78$  and  $59.78 \pm 3.47$ ). The feed conversion efficiency of experimental Kankrej cows in treatment groups T1 and T2 in terms of intake of DM (kg/kg milk yield), CP (g/kg FCM), DCP (g/kg milk yield) and TDN (kg/kg FCM yield) respectively, were statistically ( $P < 0.05$ ) similar.

**Keywords:** DCP; Feed conversion efficiency; Kankrej cows; Nutrient utilization; Probiotics.

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**Corresponding author: Dr. S.R. Bhagwat**, Professor & Head, Department of Animal Nutrition, College of Veterinary Science and Animal Husbandry Sardarkrushinagar (B.K.) - 385506 (North Gujarat). Email: shekhar.bhagwat@gmail.com.

## Introduction

Successful strategies are need for the time to increase the efficiency of feed intake and nutrient utilization by manipulating rumen fruitful microbial population. The microbial environment of the gastro-intestinal tract influences the performance of the animals (Baghel *et al.* 2005). The rumen harbors a dense and complex microbial population responsible for 60-70 % of total digestion therefor, the potential prospective benefits of probiotic are greater with ruminants than with monogastrics (Fuller 1992). The use of Probiotics culture in large and small ruminants has been appreciated for the improvement in feed intake and nutrient utilization (Nocek and Kautz 2006). Probiotics has potential to improve nutrient utilization of dairy animal which directly or indirectly helps in increased milk production, milk fat, milk protein and lactose content in milk (Williams 1989, Adams *et al.* 1995).

Further the large majority of descript cattle belongs to draught and dual-purpose breeds among which Kankrej is a well established dual-purpose breed of cattle, giving sustainability to the marginal farmers and contributing to agriculture based economy of the nation (Singh 2006). Hence present study was carried out to study the effects of probiotics supplementation on nutrient utilization and feed conversion of lactating kankrej cows.

## Material and Methods

An on-farm trial of 15 days preliminary feeding and 90 days experimental period was conducted in village Kushkal, Palanpur taluka of Banaskantha district. Fourteen lactating Kankrej cows of uniform body weight, milk yield and with 2<sup>nd</sup> and/or 3<sup>rd</sup> lactation number in the initial stages of lactation were selected for the experiment to observe the effect of probiotics supplementation. Seven healthy animals, each allotted to two dietary treatments in completely randomized design. Two dietary treatments i) T1 (control concentrate mixture + Green fodder + Dry fodder) and ii) T2 (T1+15 g/d/animal probiotics containing *Saccharomyces cerevisiae*;  $1.5 \times 10^8$  cfu/g and bacteria, *Lactobacillus sporogens*;  $5 \times 10^7$ cfu/g) were given. All the animals were individually fed and their nutrient requirements were met as per ICAR feeding standards (1998). Daily feed intake and residue leftover by individual animal were accurately measured and on the basis of that nutrient intake of DM, CP, DCP and TDN of individual animal were worked out. At the end of experiment, digestion trial of 7 days was conducted. The water intake of each animal was measured only during digestion trial. The samples of feeds and fodder were analyzed for proximate principals by AOAC (1999) method.

**Table 1: Chemical Composition of concentrate mixture (Banas Dan), Dry fodder and green fodder being fed to lactating Kankrej cows (on % DM basis)**

Principles	Concentrate Mixture (Banas Dan)	Dry fodder (Jowar)	Green Fodder (Maize/Oat)
Dry matter	92.00	90.15	21.79
Organic matter	91.00	92.65	90.79
Crude protein	21.50	2.78	9.15
Ether extract	3.83	1.25	2.16
Crude fibre	8.48	39.25	31.76
Nitrogen free extractives	57.19	49.37	47.72
Total ash	9.00	7.35	9.21

## Results and Discussion

All the feeds offered to the lactating Kankrej cows during the digestion trial period were analyzed for the chemical composition i.e dry matter (DM), Organic matter (OM), Crude protein (CP), Ether extract (EE), Nitrogen free extract (NFE) and Total ash (TA) content. The

treatment group T2 recorded significantly higher ( $P < 0.01$ ) DM intake. The average CP and TDN intake of T1 and T2 groups were  $1012.03 \pm 1.53$  and  $1057.91 \pm 9.40$  g/d and  $6135.39 \pm 254.17$  and  $6919.64 \pm 262.35$  g/d, respectively, differ ( $P < 0.05$ ) statistically but the average DCP intake was  $576.44 \pm 35.88$  and  $665.75 \pm 39.63$  g/d, respectively, remained statistically ( $P > 0.05$ ) similar. Findings of

**Table 2: Effect of Probiotics on nutrient utilization of lactating Kankrej cows**

Parameters	T1 (Control, Without Probiotics)	T2 Treatment, With Probiotics)	P value
Water intake (L/d)	$38.39 \pm 0.34$	$38.21 \pm 0.33$	NS
DM Intake (kg/d)	$10.03 \pm 0.04^a$	$10.27 \pm 0.04^b$	( $P < 0.01$ )
CP intake (g/d)	$1012.03 \pm 1.53^a$	$1057.91 \pm 9.40^b$	( $P < 0.01$ )
DCP intake (g/d)	$576.43 \pm 35.88$	$665.75 \pm 39.63$	NS
TDN Intake (g/d)	$6135.39 \pm 254.17^a$	$6919.64 \pm 262.35^b$	( $P < 0.05$ )

Means with different superscripts in rows differ significantly ( $P < 0.05$ ,  $P < 0.01$ )

NS =Non-significant

**Table 3: Digestibility coefficient (%) of various nutrients fed lactating Kankrej cows during digestibility trial**

Parameters	T1 (Control, Without Probiotics)	T2 Treatment, With Probiotics)	P Value
DM	$65.27 \pm 1.88^a$	$70.89 \pm 1.76^b$	( $P < 0.05$ )
OM	$56.64 \pm 2.12$	$61.86 \pm 2.10$	NS
CP	$56.91 \pm 3.41$	$62.85 \pm 3.42$	NS
CF	$36.52 \pm 3.73$	$43.53 \pm 4.80$	NS
EE	$46.92 \pm 2.78^a$	$59.78 \pm 3.47^b$	( $P < 0.05$ )
NFE	$69.75 \pm 1.82$	$74.50 \pm 1.52$	NS

Means with different superscripts in rows differ significantly ( $P < 0.05$ )

NS =Non-significant

chemical composition of feeds offered during the trial period have been shown in Table 1. The intakes of DM, CP and TDN from the experimental rations fed to lactating Kankrej cows during digestibility trial are presented in Table 2. The average DM intake of experimental cows during digestion trial in treatment groups T1 and T2 were  $10.03 \pm 0.04$  and  $10.27 \pm 0.04$  kg/

**Table 4: Effect of Probiotics on feed conversion efficiency of different nutrients in lactating Kankrej cows**

Parameters		T1 (Control, Without Probiotics)	T2 Treatment, With Probiotics)	P value
DM	milk yield (Kg/Kg Milk Yield)	$1.20 \pm 0.07$	$1.15 \pm 0.05$	NS
	FCM yield (Kg/Kg FCM Yield)	$1.10 \pm 0.07$	$0.96 \pm 0.04$	NS
CP	milk yield (g/kg milk yield)	$121.88 \pm 7.54$	$117.88 \pm 4.93$	NS
	FCM yield (g/kg FCM yield)	$62.42 \pm 3.63$	$61.54 \pm 2.04$	NS
DCP	milk yield (g/kg milk yield)	$68.34 \pm 7.54$	$73.58 \pm 3.79$	NS
	FCM yield (g/kg FCM yield)	$111.15 \pm 6.97$	$98.94 \pm 3.98$	NS
TDN	milk yield (kg/kg milk yield)	$0.73 \pm 0.05$	$0.77 \pm 0.03$	NS
	FCM yield (kg/kg FCM yield)	$0.67 \pm 0.04$	$0.64 \pm 0.02$	NS

NS =Non-significant

d and when expressed as kg/100kg B.wt. it was  $2.66 \pm 0.06$  and  $2.75 \pm 0.09$  and in terms of g/kg  $W^{0.75}$  was  $117.15 \pm 2.03$  and  $120.69 \pm 3.02$ . The

present study in relation to nutrients intake are supported by Nocek and Kautz (2006) and Dann *et al.* 2000 while Raeth-Knight *et al.* 2007 and Dutta and Kundu (2008) found contrasting results with present experiment. Average daily voluntary water intake remained statistically non-significant.

The average digestibility coefficient of OM, CP, CF and NFE in T1 and T2 were remain statistically ( $P < 0.05$ ) similar except DM ( $65.21 \pm 1.88$  and  $70.89 \pm 1.76$ ) and EE ( $46.92 \pm 2.78$  and  $59.78 \pm 3.47$ ). Digestibility coefficient of different nutrients was presented in the Table 3. Findings of present study corroborate with Gomez-Alarcon *et al.* (1991) and Putnam *et al.* (1997) while contrasting results found by Doreau and Jouany (1998) and Dutta and Kundu (2008). The data on feed conversion efficiency in terms of DM, CP, DCP and TDN are presented in Table 4.

The feed conversion efficiency of experimental Kankrej cows in treatment groups T1 and T2 in terms of intake of DM ( $1.20 \pm 0.07$  and  $1.15 \pm 0.05$  kg/kg milk yield,  $1.10 \pm 0.07$  and  $0.96 \pm 0.04$  kg/kg FCM yield), CP ( $121.88 \pm 7.54$  and  $117.88 \pm 4.93$  g/kg milk yield,  $62.42 \pm 3.63$  and  $61.54 \pm 2.04$  g/kg FCM yield), DCP ( $68.34 \pm 7.54$  and  $73.58 \pm 3.79$  g/kg milk yield,  $111.15 \pm 6.97$  and  $98.94 \pm 3.98$  g/kg FCM yield) and TDN ( $0.73 \pm 0.05$  and  $0.77 \pm 0.03$  kg/kg milk yield,  $0.67 \pm 0.04$  and  $0.64 \pm 0.02$  kg/kg FCM yield), respectively, were statistically ( $P < 0.05$ ) similar. Thus, results of present study indicate that supplementation of probiotics (*Lactobacillus sporogens* and *Saccharomyces cerevisiae*) culture in ration of experimental Kankrej cows did not have adverse effect on feed conversion efficiency of DM, CP, DCP and TDN in relation to milk yield and FCM and remained statistically similar as compared to control.

## Conclusion

Supplementing probiotics to lactating Kankrej cows significantly improved CP and TDN intake while DCP intake and digestibility coefficients of OM, CP, CF and NFE except DM and EE remained statistically similar as compared to control. Daily voluntary water

intake and feed conversion efficiency of nutrients in relation to milk yield and FCM remained statistically similar as compared to control.

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