## PHYSICO-CHEMICAL CHARACTERISTICS OF RUMEN LIQUOR IN BUFFALO CALVES SUPPLEMENTED WITH GROUND FLAXSEED

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## SUMMARY

The present study was planned to evaluate the effect of ground flaxseed supplementation on physico-chemical characteristics of rumen liquor in buffalo calves. The results revealed that there was significant ( $P \le 0.5$ ) reduction in ruminal pH, values of methylene blue reduction time and sedimentation activity test in animals following supplementation of ground flaxseed in total mixed ration@ 15% on dry matter basis. There was no alteration in rumen liquor with respect to changes in colour, odour and consistency. It can be concluded from the present study that following supplementation of ground flaxseed, there was significant improvement in normal rumen functions as exhibited by enhanced rumen microbial activity.

Keywords: Buffalo calves, Flaxseed, Physico-chemical characteristics, Rumen liquor

The methane produced by the animals represents an energy loss (2–12% of gross energy) to the atmosphere, mainly by eructation, where it has a negative impact on the climate (Johnson and Johnson, 1995). Flaxseed is an oilseed which can be used as a source of high-quality protein and fat for ruminants (Neveu *et al.*, 2014). Flaxseed added to the diet of lactating dairy cows reduced the CH<sub>4</sub> emissions because they lowered the amount of organic matter that is fermented in the rumen and also reduced the activity of the ruminal methanogens and protozoal numbers (Beauchemin *et al.*, 2009).

Besides reducing methane emission, the target of rumen manipulation is to improve fibre degradation, prevent energy losses and improve the health of dairy animals. The systematic study on the effect of flaxseed supplementation on rumen microbes, their activity and rumen fermentation pattern is not available. Therefore, keeping in view the importance of rumen microbial population in improving digestibility and health of ruminants, the present study was planned to evaluate the effect of ground flaxseed supplementation on rumen microbial activity in buffalo calves.

Four apparently healthy fistulated male buffalo calves of 2-2.5 years of age and weighing between 200-250 kg were used in the present study. They were divided into control (goup1) and treatment (group 2) groups. Same animals were used in both the groups.

The animals were offered conventional diet with roughage to concentrate ratio of 60:40 on DM basis as TMR, only once a day as per ICAR guidelines (2013). The animals of group 1 were kept on control diet for 21 days. The animals in the treatment group were supplemented with ground flaxseed in TMR @ 15% on dry matter basis in concentrate (replacing oil seed cakes) per animal for 21 days. Rumen liquor samples were collected through rumen fistula at 0 hour (before feeding) and at 1, 3, and 6 hours after feeding on  $22^{nd}$ ,  $23^{rd}$  and  $24^{th}$  day. Rumen liquor samples were physically examined for its colour, odour and consistency. pH was determined by portable digital pH meter immediately after taking samples. Methylene blue reduction time (MBRT) and Sedimentation activity test (SAT) were determined by the methods described by Gnanaprakasam *et al.* (1986) and Nicholas and Penn (1958), respectively. Data were analyzed by simple ANOVA and factorial design (Snedecor and Cochran 1994), by using SPSS (2012) version 20 and the differences in means were tested by Tukey's test.

The data of oral supplementation of TMR (total mixed ration) containing flaxseed on physico-chemical characteristics of rumen liquor is presented in Table 1. The results revealed that the normal rumen liquor in control group was greenish to yellow greenish in colour, with ammonical odour and viscous to watery consistency. However, there was no significant change in colour, odour and consistency of rumen liquor in the treatment group supplemented with ground flaxseed. Similarly, Singh *et al.* (2019) observed no significant change in physical characteristics of rumen liquor in buffalo claves supplemented with Yea Sacc1026.

The pH of rumen liquor in Group I and II varied from  $6.76\pm0.061$  to  $7.42\pm0.068$  and  $6.41\pm0.039$  to  $7.04\pm0.031$ , respectively. The highest value of pH was observed at 0 hour and lowest at 3 hour post feeding interval in both the groups. The overall mean ruminal pH decreased significantly in group II as compared to control group. The decrease in pH in group II could be due to the decreased levels of ammonia nitrogen and higher levels of total

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 Table 1

 Effect of ground flaxseed supplementation on physico-chemical characteristics of rumen liquor in male buffalo calves

Sampling time after feeding	0	1	3	6	Overall
(hours)	(Before feeding)				$Mean \pm SE$
рН					
GROUPI	$7.42{\pm}0.068^{aA}$	$7.09{\pm}0.069^{{}_{bdA}}$	$6.76 {\pm} 0.061^{\text{cA}}$	$7.02{\pm}0.048^{\text{daA}}$	$7.07 \pm 0.046^{\text{A}}$
GROUPII	$7.04{\pm}0.031^{aB}$	$6.72{\pm}0.034^{{}^{\mathrm{bA}}}$	$6.41 \pm 0.039^{\text{cB}}$	$6.84{\pm}0.038^{\text{dbB}}$	$6.75 {\pm} 0.038^{\scriptscriptstyle \mathrm{B}}$
Methylene Blue Reduction Time (	min)				
GROUPI	$11.67 \pm 1.667^{Aa}$	$4.03{\pm}0.750^{\text{bA}}$	1.36±0.221 <sup>cbA</sup>	$6.89{\pm}0.951^{\text{dbA}}$	$5.99{\pm}0.749^{\text{A}}$
GROUPII	$5.95 \pm 1.011^{aB}$	$1.87 \pm 0.287^{bA}$	$0.50{\pm}0.032^{\text{cbA}}$	$2.90{\pm}0.540^{\text{dbB}}$	$2.80{\pm}0.409^{\scriptscriptstyle \mathrm{B}}$
Sedimentation Activity Test (min)					
GROUPI	14.33±0.226 <sup>aA</sup>	$9.78{\pm}0.167^{{}^{\mathrm{bA}}}$	6.32±0.169 <sup>cA</sup>	$11.06 \pm 0.763^{\text{dbA}}$	$10.38 \pm 0.464^{\text{A}}$
GROUPII	$6.92{\pm}0.218^{aB}$	2.86±0.193 <sup>bB</sup>	$1.08 \pm 0.211^{CB}$	$3.48{\pm}0.303^{\text{dbB}}$	$3.59 \pm 0.329^{B}$

Each value is a mean of 12 observations representing triplicate samples from 4 experimental animals. Mean with different superscripts (a, b, c, d) horizontally represent significant (P<0.05) difference within groups. Mean with different superscripts (A, B) vertically represent significant (P<0.05) difference between groups.

volatile fatty acids. Similarly Buccioni *et al.* (2012) reported that generally, in spite of the lowering of pH values at beads 1 (15% oil content), beads 2 (20% oil content) and linseed oil on 4% (DM basis) than control within all treatment of flaxseed, the mean of pH values remained always within a physiological range (normal range of pH between 6.0 and 6.7). Similar were the findings of Mruthunjaya *et al.* (2010) who observed that the pH of strained rumen liquor was reported to be negatively correlated with concentration of TVFA.

The results revealed that values of SAT and MBRT were highest at 0 hour and lowest at 3 hour postprandial in both the groups. Similar findings were observed by Radostits et al. (2000) who observed that normal values of sedimentation activity test (SAT) varied between 3 min in animals just fed to 9 min. if last feeding has occurred previously. Singh et al. (2019) also observed lowest values of MBRT and SAT at 3 hr after feeding and highest values before feeding in healthy buffalo calves following supplementation of yea sacc1026 during summer season. Similarly, Singh et al. (2016) observed lowest value of MBRT at 3 hour post feeding and highest at 0 hr. (before feeding) in control and treatment groups during rumen dysfunction and following supplementation of herbal product (HB Strong). The overall mean SAT and MBRT values were significantly lower in group II supplemented with ground flaxseed as compared to group I (control). The fall in SAT and MBRT values could be due to increased microbial activity because of supplementation of flaxseed which significantly improved the microbial population.

It can be concluded from the present investigation that oral administration of ground flaxseed in feed improved the digestive efficiency of animals by enhancing rumen microbial population.

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