



Effect of Feeding Bypass Fat and Bypass Protein on Rumen Fermentation Characteristics of Local Goats

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ABSTRACT

Twenty four local goats were used to study rumen fermentation characteristics as affected by feeding concentrate mixture supplemented with bypass fat and bypass protein. Local goats were divided into four equal groups. Group T0 was fed with concentrate mixture + green and dry roughage, Group T1 was fed with concentrate mixture + green + dry roughage supplemented with bypass protein @ 2.5 per cent of dry matter intake, Group T2 was fed with concentrate mixture + green + dry roughage supplemented with bypass fat @ 2.5 per cent of dry matter intake, Group T3 was fed with concentrate mixture + green + dry roughage supplemented with bypass protein and bypass fat in combination each @ 2.5 per cent of dry matter intake. It was found that NH₃-N concentration differ significantly amongst the treatment groups whereas other ruminal attribute like pH, TVFA, Total Nitrogen, TCA-precipitated-N and NPN were not affected significantly. It was concluded that feeding concentrate mixture supplemented with bypass fat and bypass protein @ 2.5 per cent of dry matter intake separately and in combination had no adverse effect on the rumen fermentation pattern of local goats.

Key Words: Bypass fat, Bypass protein, Goat, Fermentation, Rumen, Volatile fatty acid.

INTRODUCTION

Goat is the earliest domesticated ruminant can sustain itself on marginal lands and has a higher reproductive rate in comparison to cattle and buffaloes. Even if management, breeding, feeding, disease prevention and control are the requisite tools to secure optimum production from goats, feeding devote the most. Nutritional imbalances generate poor production, reproduction or reproductive failures. In India, goats are mostly maintained under extensive system with little or no supplementation. Furthermore, they consume far-ranging variety of weeds, grasses, leaves, small branches of bushes and trees and crop residues containing essential nutrients in disproportion ratios as well as variety of anti-nutritional components. Feed input is crucial factor of goat production enterprise. A proper feeding is mandatory for maximum exploitation of the genetic potential.

Advanced technologies in the field of feeding are changing the goat production scenario. Strategies to aid sustainable livestock production in different agro-climatic zones encircles evaluation of alternative forage and feed with better nutritional attributes through treatments, enhancing bioavailability of nutrients and precision nutrition for maximum efficient utilization of feed and feed processing technologies, rumen modulation, identifying of mineral imbalance and their ameliorations . Protected nutrient technology is one such approach, involving feed management through passive rumen manipulation. The protected nutrients mainly include protected fat and protein and are called as bypass nutrients. Bypass nutrients escape rumen degradation and then get digested and absorbed in the lower gastrointestinal tract (Yadav and Chaudhary, 2010). To increase the efficiency of dietary protein and fat utilization, use

of protected or bypass nutrients supplementations were suggested (Garg, 1998). Therefore, the present study was carried out to note down the effect of feeding bypass fat and bypass protein on rumen fermentation characteristics of local goats.

MATERIALS AND METHODS

The experiment was carried out at the Cattle Breeding Farm, Telangkhedi, Nagpur and laboratory work was conducted in the Department of Animal Nutrition, Nagpur Veterinary College, Nagpur. Twenty four day old local kids were randomly divided into four groups considering the sex and body weight in such a way that each group carry three male and three female with non- significant difference between the treatment groups. Group T₀ was fed with concentrate mixture + green and dry roughage, Group T₁ was treatment T₀ supplemented with bypass protein @ 2.5 per cent of dry matter intake, Group T₂ was fed with concentrate mixture + green + dry roughage supplemented with bypass fat @ 2.5 per cent of dry matter intake, Group T₃ was fed with concentrate mixture + green + dry roughage supplemented with bypass protein and bypass fat in combination each @ 2.5 per cent of dry matter intake.

Collection of rumen liquor

Rumen liquor samples were collected after 2 hr of feeding from each kid of every group monthly (from 4th month onwards upto nine months) using stomach tube to determine pH, total volatile fatty

acids (TVFA), ammonia nitrogen, total nitrogen, and TCA-ppt-N concentration of strained rumen liquor (SRL). The rumen liquor was immediately brought to the laboratory in insulated thermos and strained through double layer muslin cloth.

a) pH of rumen liquor

The pH of strained rumen liquor (SRL) was determined using pen pH meter immediately after collection.

b) Ammonia nitrogen

The ammonia nitrogen in rumen liquor was estimated as per Conway method (1957) on the same day after collection.

c) Total volatile fatty acids (TVFA)

The total volatile fatty acids in rumen liquor were found out as per the procedure laid down by Bennett and Reid (1957).

d) Total nitrogen content of rumen liquor

Total nitrogen was estimated by Kjeldhal's method of AOAC (1990) using Automatic Rapid Nitrogen Analyser (Kelplus).

e) TCA – precipitated nitrogen content of rumen liquor

TCA-precipitated nitrogen in rumen liquor was estimated by Mckenzie and Wallace (1954) method.

f) NPN

Non protein nitrogen of rumen liquor was calculated by subtracting the TCA-ppt nitrogen from total nitrogen content of SRL.

Table 1. Effect of feeding bypass protein, bypass fat and their combination supplemented ration on rumen fermentation pattern of local goats.

Rumen Liquor Profile, mg/dl	Treatment			
	T ₀	T ₁	T ₂	T ₃
pH	6.2±0.03	6.2±0.04	6.2±0.05	6.2±0.04
NH ₃ -N*	17.84b±0.38	17.84b±0.38	15.57a±0.55	15.57a±0.55
TVFA, mEq/dl	10.68±0.09	10.79±0.14	10.68±0.15	10.70±0.14
Total Nitrogen	75.91±1.17	76.41±1.16	77.80±0.88	77.05±0.94
TCA-ppt-N	44.00±0.52	45.50±0.61	44.50±0.54	44.37±0.55
NPN	31.91±1.34	30.91±1.34	33.29±1.17	32.68±1.09

Values with different superscript differ significantly * (P<0.05)

Effect of feeding Bypass Fat

RESULTS AND DISCUSSION

The rumen liquor study (Table 1) conducted at every fortnight for pH, NH₃-N, TVFA, Total Nitrogen, TCA-precipitated-N and NPN.

Ruminal pH

The ruminal pH revealed non-significant variations, between T0, T1, T2 and T3 groups. Since the ammonia level in the studies did not show substantial decrease on feeding of bypass nutrients in goats, the ruminal pH remain unaffected in various experimental groups. Similar findings were reported by Bayourthe *et al* (2014) on fat-supplemented diet. The significant effect for ruminal pH were reported by Hassan *et al* (2011) on supplementation of protected arginine and Hassan *et al* (2012) by feeding different level of dietary crude protein formulated with high and low rumen degradable to undegradable dietary nitrogen. Shamoone *et al* (2009) on formaldehyde treated barley and wheat bran.

NH₃-N

The ammonia nitrogen concentration in the strained rumen liquor differ significantly in treatment groups. This was indicative of reduction of proteolysis, due to bypass nutrient treatment. The values obtained for NH₃-N in the study corroborated by the values reported by Fiorentini *et al* (2015) fed protected fat (lactoplus). The significant effect for ammonia nitrogen in the rumen liquor was observed in Dosky *et al* (2012) on formaldehyde and heat treated protected protein, Shamoone *et al* (2009) fed formaldehyde treated barley and wheat bran and Shankhpal *et al* (2016) fed bypass fat.

Total Volatile Fatty Acids(TVFA)

The TVFA production was higher in group T3 fed with combination of bypass fat and bypass protein indicating that bypass nutrients slightly lowered the fermentation of feed in the rumen. Shankhpal *et al* (2016) found significant effect on supplementation of bypass fat in combination with yeast. Hassan (2011), Bayourthe *et al* (2014) and

Fiorentini (2015) have reported significant effect for TVFA production.

Total Nitrogen

There was no significant variation for total nitrogen in T0, T1, T2 and T3 groups. The findings were in agreement with Bhatt *et al* (2017) and Shankhpal *et al* (2016) who reported non-significant variation for total nitrogen.

TCA-precipitated-N

The TCA-precipitated -N was slightly higher in T1 group than other groups. Higher TCA-ppt-N values in treatment groups was indicative of higher microbial protein synthesis. The results were in agreement with Shankhpal *et al* (2016) whereas, Bhatt *et al* (2017) reported significant effect.

NPN

There was no significant variation for NPN in T0, T1, T2 and T3 groups. In contrast, Shankhpal *et al* (2016) found significant variation in treatment groups.

CONCLUSION

It is concluded that feeding concentrate mixture supplemented with bypass fat and bypass protein @ 2.5 per cent of dry matter intake separately and in combination had no adverse effect on the rumen fermentation pattern of local goats.

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