International Scholars Journals

International Journal of Agricultural Sciences ISSN: 2167-0447 Vol. 14 (5), pp. 001-003, May, 2024. https://internationalscholarsjournals.org/ © International Scholars Journals

Full Length Research Paper

Rumen and blood biochemical profile of goats fed on pelleted complete diet

A. P. Dhok*, D. H. Rekhate and K. P. Bhadane

Department of Animal Nutrition
Nagpur Veterinary College, Nagpur
(Maharashtra Animal & Fishery Sciences University, Nagpur)
*Corresponding author – atuldhok123@yahoo.co.in

Received 19 February, 2024; Accepted 04 March, 2024 and Published 28 May, 2024

Abstract

An experiment was conducted on twelve goats selected randomly to study the rumen and blood biochemical profile on pelleted complete diets. The goats were fed with pelleted complete diet up to 150 days of experiment T1 (12% CP, 55% TDN), T2 (14% CP, 60% TDN). Roughage to concentrate ratio was maintained at 60:40 with arhar straw as basal roughage. The concentrate mixture consisted of maize grain, cotton seed cake, groundnut cake, arhar chunni, mineral mixture and salt. The rumen and blood biochemical profile was studied at every month from each goat under study. The rumen liquor parameters varied significantly (p < 0.0.1) between the treatments except for pH. The blood biochemical parameters also varied significantly (p < 0.01) except for the serum calcium. It was inferred that the pelleted complete diet of varying energy and protein levels had a significant effect on various rumen and blood biochemical's except pH and calcium, though there were significant differences between treatments, all the parameters were in normal range reflecting better health of animals.

Keywords: Pelleted complete feed, blood biochemical's, rumen profile.

INTRODUCTION

Goats play an important role in the economy of rural poor in India, but the productivity is low due to their poor nutritional status. Nutrition probably is the most important single factor influencing the production performance of goats and rumen fermentation pattern is affected by the type of feed, roughage to concentrate ratio and plane of nutrition. The study of blood profile received great significance from the standpoint of nutrition because level of various blood components often serve as a valuable guideline in asserting the nutritional adequacy of the diet and nutritional status of animals. Therefore the study was conducted to assess the effect of pelleted complete diet on rumen and blood biochemical profile of goats.

MATERIALS AND METHODS

Twelve non descript local goats were equally divided into two treatments T_1 with average body weight 16.66 ± 0.25 kg and T_2 with average body weight 15.03 ± 0.32 kg. Goats under both these treatments were fed with pelleted complete diet up to 150 days of experiment T_1 (12% CP, 55% TDN), T_2 (14% CP, 60% TDN). The goats under the T_1 group were fed complete feed comprised of arhar straw (60%), jowar grain (15%), cotton seed cake (15%), arhar chunni (8.5%) mineral mixture (01%) and common salt (0.5%) and T_2 group with arhar straw (60%), jowar grain (15%), arhar chunni (05%), cotton seed cake (12%), groundnut cake (6.5%), mineral mixture (01%) and common salt (0.5%). The CP and TDN varied amongst the groups as mentioned above. The samples of rumen liquor were collected at every month by stomach tube 2 hrs post feeding and strained rumen liquor was estimated for pH, ammonia nitrogen (Conway, 1957), total volatile fatty acids (Barnett and Reid, 1957), total nitrogen (AOAC, 1990), TCA-ppt-N (McKenzie and Wallace, 1954) and non protein nitrogen by subtraction of

Table 1 Rumen fermentation and blood biochemical's in goats on pelleted complete feed.

Parameters	T_1	T_2
Rumen fermentation		
pH	6.25± 0.01	6.33± 0.04
NH_3-N** (mg/100 ml SRL)	21.94^b ± 0.44	15.09^a ± 0.22
TVFA** (M Mol/100 ml SRL)	10.93^a ± 0.19	12.24^b ± 0.22
Total nitrogen ** (mg/100 ml SRL)	70.12^a ± 0.93	99.51^b ± 1.52
TCA-ppt-N** (mg/100 ml SRL)	33.84^a ± 1.30	53.63^b ± 1.05
NPN** (mg/100 ml SRL	36.46^a ± 1.31	45.84^b ± 0.85
Blood biochemical's		
Glucose** (mg/dl)	62.52^b ± 1.57	53.67^a ± 1.01
Total protein** (g/dl)	6.20^a ± 0.05	7.06^b± 0.01
Albumin** (g/dl)	3.25^a ± 0.05	3.89^b ± 0.03
Globulin** (g/dl)	2.94^a± 0.08	3.16^b ± 0.04
Total lipids** (mg/100 ml)	349.79 ± 8.84^a	426.18 ± 13.8^b
Calcium (mg/dl)	10.59 ± 0.11	10.38 ± 0.09
Phosphorus** (mg/dl)	4.82^a± 0.08	5.63^b± 0.17

** $p<0.01$

total nitrogen and TCA-ppt-N. The blood samples were also collected at every month from jugular vein and serum was separated and analyzed for glucose (Trinder, 1969), total serum protein (Gornall, 1949), albumin (Dumas, 1971), globulin (by subtracting albumin from total protein), total lipids (Annino, 1956), calcium (Gittelman, 1967), phosphorus (Lorentz, 1982). The data collected during the experiment were analyzed using students T test as per Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

The rumen liquor parameters varied significantly ($p < 0.01$) except for the rumen liquor pH. The findings are in accordance with Singhal and Mudgal (1983) observed in goats fed on three different complete feeds, where as Raut *et al.,* (2002) reported slightly higher values for pH in goats fed arhar straw based complete diets. The NH_3-N showed an increasing trend in both group from 0^{th} day to 150^{th} day of experiment, where it was significantly higher in T_2 group, findings are comparable with Senani and Joshi (1995) in Barbari kids fed different levels of *Leucaena* fodder and also with Singhal and Mudgal (1983) in goats fed on wheat straw and berseem. The TVFA concentration was significantly more in T_2 group. Senani and Joshi (1995) reported similar values in Barbari kids, higher TVFA concentrations due to pelleted complete feed may have increased the energy availability to the goats and may be due to less secretion of buffer salts in rumen as result of grinding and pelleting observed and supported by Singhal and Mudgal (1983).

The observations on total nitrogen are in agreement with Gangabhavani *et al.,* (1997) and also with Sridhar *et al.,* (1999) in sheep fed with diet containing varying levels of energy. The TCA-ppt-N was much higher than reported by Sridhar *et al.,* (1999), which might be due to the amount of microbial protein synthesis in the rumen, which depends on the energy in the form of ATP provided by fermentation of organic matter. Higher TCA-ppt-N was probably because of efficient utilization of nitrogen fraction and energy (Senani and Joshi, 1995). The NPN values recorded in the present study are also higher than reported by Gangabhavani *et al.,* (1997). Even after the variations amongst the rumen fermentation parameters, the values were within the normal range.

The blood biochemical parameters revealed significant ($p < 0.01$) variation except for serum calcium. The blood glucose values in both the groups were higher than reported by Karim and Verma (2000) under intensive feeding and grazing plus concentrate supplementation in Malpura lambs, however total serum protein values were in agreement with Parwe *et al.,* (1990) who recorded 6.98 ± 0.04 and 7.41 ± 0.17 g/dl in Osmanabadi goats maintained on standard ration and grazing. The serum albumin and globulin were in agreement with Behra *et al.,* (1993), reporting 3.91, 4.91 g/dl and 2.95, 2.98 g/dl, respectively in Black Bengal goats. Total lipids values were significantly higher in T_2 group with 60 per cent TDN,

which were also higher than reported by Parwe *et al.,* (1990). The calcium and phosphorus values were in the normal range of 9.37 to 11.50 and 3.86 to 6.45 mg/dl, reported Behra et al., (1993) and also corroborates with Parwe *et al.,* (1990) who reported 9.66 ± 0.16, 10.49 ± 0.32 mg/100 ml and 5.51 ± 0.11, 5.81 ± 0.27 mg/100 ml for calcium and phosphorus respectively in Osmanabadi goats maintained on standard ration. Even after the variations amongst the blood biochemical parameters, the values were within the normal range. It was concluded that the pelleted complete diet of varying energy and protein levels had a significant effect on various rumen and blood biochemicals except pH and calcium, though there were significant differences between treatments, all the parameters were in normal range reflecting better health of animals. It is suggested that pelleted complete feed having 12, 14% CP and 55, 60% TDN may be used under stall fed conditions for better health and rumen fermentation.

REFERENCES

Annino, J.S. (1956). *Clinical chemistry principles and procedures* 4th little Brown and Co., Boston: 184

AOAC 1990. *Official Methods of Analysis* 15th Ed Association of Official Analytical Chemists, Arlington, USA

Behra, P.C., Bisoi, P.C., Mohanty, B.P. and Panda, G.M. (1993). Clinically important serum constituents of Black Bengal goats, *Indian Vet. J.* **70**: 713-717

Bernett, A.J.G. and Reid, R.K. (1957). Studies on the production of volatile fatty acids from the grass by rumen liquor in artificial rumen 1 TVFA production from fresh grass. *J. Agric. Sci.* **48**: 315

Conway, E.J. (1957). *Micro diffusion analysis and volumetric error* 4th Ed Crossby Lockwood and Sons, London (UK)

Dumas, B.T. (1971). Determination of serum total proteins and albumin. *Clin. Chem. Acta*, **31**: 87-96

Gangabhavani, G., Naidu, M.N. and Reddy, K.J. (1997). Effect of feeding different levels of energy on nitrogen fractions in the rumen of weaned Deccani lambs, *Indian Vet. J.* **74**: 539-541

Gittelman, H.J. (1967). Estimation of serum calcium. *Anal Biochem*, **18**: 521

Gornall, A.G. (1949). Determination of serum protein by means of biuret reaction, *J. Biol. Chem*. **177**: 751

Karim, S.A. and Verma, D.L. (2000). Blood metabolites and circulating mineral profile of lambs maintained under feeding and grazing with supplementation. *Indian J. Small Ruminants* **6**: 77-81

Lorentz, K. (1982). UV molybdate method of phosphorus analysis, *Clin. Chem. Acta*, **126**: 37

McKenzie, H.A. and Wallace, H.S. (1954). The Kjeldahl's determination of nitrogen, a critical study of digestion conditions, temperature catalyst and oxidizing conditions, *Austr. J. Chem.*, **17**: 55

Parwe, G.B., Sawant, M.K. and Vadlamudi, V.P. (1990). Blood biochemical studies in Osmanabadi goats: Influence of age and sex, *Livestock Advisor* **15**: 45-48

Raut, R.G., Rekhate, D.H. and Dhok, A.P. (2002). Nutrient utilization in goats fed arhar (*Cajanus cajan*) straw based complete feed pellets, *Indian J. Anim. Nutr.* **19**: 135-139

Senani, S. and Joshi, D.C. (1995). Nutrient utilization in Barbari kids fed different levels of Leucaena leucocephala, *Indian J. Anim. Nutr.* **12**: 189-194

Singhal, K.K. and Mudgal, V.D. (1983). Utilization of complete feeds by goats, *Indian J. Diary Sci.,* **36**: 250-253

Snedecor, G.W. and Cochran, W.G. (1994). *Statistical methods* 8th Ed, Iowa State University Press, USA

Sridhar, V., Reddy, T.J., Raghava Rao, R and Purushottam, N.P. (1999). Effect of varying levels of energy on biochemical changes in the rumen of Deccani sheep, *Indian J. Anim. Sci.*, **69**: 268-269

Trinder, P. 1969. *J. Clin. Pathol.* **22**: 158