

EFFECT OF MANDATORY FEEDING OF ATRIPLEX ON CRUDE FIBRE UTILIZATION AND BLOOD BIOCHEMISTRY OF TEDDY GOATS

Ashiq Ali Gill, M.Riaz, R.A. Gill, S.H. Hanjra and Arshad Iqbal

Department of Livestock Management

University of Agriculture, Faisalabad.

Twenty five Teddy goats were used to see the effect of Atriplex feeding on crude fibre utilization and blood biochemistry for a period of 90 days. The crude fibre digestibility coefficients in goats kept on feeding regime I, II, III, IV, and V were 69.31, 77.51, 71.20, 60.78 and 38.34% respectively, which were statistically different. In the study of blood biochemistry values pertaining to glucose, bilirubin, total protein (albumin, globulin and albumin globulin ratios), urea, uric acid, calcium and Glutamic Oxaloacetic Transaminase (GOT) were found to be statistically non-significant among different feeding regimes. On the other hand mean value of cholesterol in animals fed Sudex alone (ration I) were significantly higher over the other four rations ($P < 0.01$). Likewise the alkaline phosphatase mean values in goats fed ration II were found significantly ($P < 0.01$) higher over the animals kept on other feeding regimes, but non-significant different from animals on ration III. Animals on rations I, IV and V revealed non-significant variation but different from animals feeding regime III.

INTRODUCTION

Livestock sector has been envisaged an integral part of a sound system of agricultural production which is contributing towards national economy in numcrore ways. For instance their role in income generation, milk and meat production, security employment, fertilizer, weed control fibre production etc. Among these, food production can be kept at the top of the list due to its growing need for ever growing human population. Of the total 25 goat breeds existing popularity owing to Teddy is early maturity, prolificacy and meat quality. This goat has estimated to produce on an average 15 Kg meat per kidding in the shape of young kids. (Khan, 1981). On the other hand when coupled with sheep produced 763 thousands tons of mutton annually (Anonymous 1992-93). This production is still low due to the problem of feed scarcity which they are facing. Moreover poor quality land,

high temperature, malady of salinity and water logging are further exaggerating the situation of these factors. Waterlogged and salt affected soils can be improved by growing certain salt tolerant plants such as *Atriplex amnicola* for animal feeding which are otherwise worthless. Similar efforts are on the way in the country but are in preliminary stage. As a part of this programme a project was planned to see the effect of Atriplex feeding with Sudex on the blood biochemistry of Teddy/Dwarf goats.

MATERIALS AND METHODS

Twenty five Teddy goats of almost similar age and weight were selected from the flock maintained at the Livestock Experiment Station, University of Agriculture, Faisalabad. The animals were divided into five different groups (five in each group). This division of animals and five feeding regimes were allotted to each group randomly. A weighed quantity of

both the green fodders (Sudex and Atriplex amnicola) each in pure form and in three different ratios were offered *ad libitum* for a period of 90 days. Like fodder, animals were given water round the clock. A seven days non experimental period was also given to the animals for adoption to new feeding regimes, and each group was maintained in separate pen of loose housing. The chemical analysis of both feeds offered and feed refused voided in the faeces in each group was done for working out the digestibility of crude fibre (A.O.A.C., 1984). Blood samples for the first time were collected from each animal (before any feed given) on five feeding regimes after four weeks of the start of the experiment, thereafter second and third blood sampling was made at four weeks interval respectively. The data thus collected were analysed using analysis of variance technique (Steel and Torrie, 1982) and comparison of mean differences of the parameter studied were made by applying Duncan's Multiple Range (DMR) test (Duncan, 1955) (biochemical studies of blood samples including glucose, cholesterol, triglycerides, bilirubin concentration (direct and indirect), total protein, albumin, globulin, albumin/globulin ratio, uric acid, urea, calcium alkaline phosphatase, glutamic pyruvic transaminase and glutamic oxaloacetic transaminase).

RESULTS AND DISCUSSION

(a) Crude fibre digestibility:

The crude fibre digestibility coefficients in goats kept of feeding regimes, I, II, III, IV and V were 69.31, 77.51, 71.20, 60.78 and 38.34% respectively. Statistical analysis revealed significant variations ($P < 0.01$) among various feed combinations. Moreover digestibility of Sudex was found to be improved if Atriplex inclusion rate is maintained from 25 to 50%. Reduction in crude fibre digestibility in some cases might be due to lignification in Atriplex.

The results of the present study are substantiated by Bhattacharayya (1989). The proximate analysis of both feed i.e. feed offered and feed voided as faecal material are given in Table 1.

(b) Biochemistry

The mean values of various parameters on different feeding regimes studied in biochemistry are given in Table 2.

i) Glucose concentration: The mean values for glucose ranged from 26.31 to 31.26 mg/ml which are normal and the data pertaining to glucose concentration after subjected to statistical analysis revealed non-significant variation among various feeding regimes. With increase of Atriplex in the rations corresponding values of glucose were apparently found lowered but were non-significant statistically. These findings are almost similar as reported by Ramzan (1984) and Nasim *et al.* (1981).

ii) Cholesterol Concentration: Mean values observed in animals fed Sudex alone (ration I) were significantly higher over the other four rations ($P < 0.01$). The difference between mean value in rations other than I were found non-significant in spite of the fact that there was a decreasing trend in cholesterol level with the corresponding increase in Atriplex, which could be the possible reason of low fat percentage level in the carcass. The values of cholesterol concentration in the study were somewhat lower than reported by Nasim *et al.* (1981) and Ramzan (1984). Their values being 154.55 to 155.37 and 124.63 to 131.65 (mg/100 ml) in Beetal and Barbari goats respectively.

iii) Triglyceride Concentration: The differences in mean values due to different feeding regimes were found significant statistically ($P < 0.05$). Triglycerides values were observed maximum (39.79) in goats fed only Atriplex. This might be due to increased salt content of Atriplex in the ration which

Table 2 : Mean values of various blood parameters

Feeding regimes	I	II	III	IV	V
Blood Components					
Glucose (mg/100 ml)	31.26	29.06	29.53	26.31	29.91
Cholesterol (mg/100 ml)	74.87	56.20	40.09	58.53	54.89
Trizlycerides (mg/100 ml)	30.88	27.76	25.86	35.51	39.79
Total Bilirubin (mg/100 ml)	0.22	0.22	0.22	0.24	0.21
a) Direct	0.16	0.12	0.11	0.12	0.14
b) Indirect	0.06	0.08	0.11	0.13	0.07
Total Protein (g/lit)	81.83	81.12	77.91	80.73	77.94
a) Albumin	41.52	41.04	40.45	41.57	42.71
b) Globulin	40.31	40.08	37.46	39.19	35.24
c) Albumin/Globulin (g/lit) ratio	1.05	1.03	1.07	1.06	1.23
Uric acid (mg/100 ml)	0.68	0.48	0.67	0.60	0.77
Urea (mg/100 ml)	34.00	31.54	34.84	36.96	33.79
Calcium (mg/100 ml)	9.03	9.20	9.21	8.96	8.96
Akaline					
Phosphatase (units/lit)	372.25	626.88	506.63	240.65	205.15
Glutamic Pyruvic transaminase (units/lit)	30.33	30.27	30.87	30.83	33.06
Glutamic Oxyaloacetic transaminase (units/lit)	138.00	130.33	138.51	160.45	145.69

resulted mobilization of triglycerides to meet the basic energy requirements of animals body. However values are comparable with the results reported by Pugliese *et al.* (1982), their values being 27.31 to 28.46 mg/100 ml.

iv) **Bilirubin Concentration:** Bilirubin being a function of liver, plays an important role in physiological systems of the animal body. About 85% of bilirubin is formed from haemoglobin of RBC and 15% from other haemoprotein mainly hepatic cytochromes (Benjamin, 1985).

(a) **Total Bilirubin:**

Total bilirubin values of experimental goats maintained on different feeding regimes are given in Table 2. Mean values ranged from 0.21 mg/100 ml in ration V to 0.24 mg/100 ml in ration IV. The results have been found

statistically non-significant. These findings are in line with those reported by Lewis (1976).

(b) **Direct Bilirubin:**

Mean values ranged from 0.11 to 0.16 mg/100 ml. The statistical analysis of the data have shown significant differences due to different feeding regimes ($P < 0.05$) yet these values remained within normal range. Mean values in dwarf goats maintained on feeding regime I (Sudex only) and V (Atriplex only) were non-significantly different. No work has been reported in the literature on this parameter.

(c) **Indirect Bilirubin:**

Statistical analysis have shown non-significant differences among mean values observed under different feeding regimes. Although none of the literature reviewed

showed any finding by the workers in this regard but the values obtained in the study were in normal ranges (0.06 to 0.13 mg/ml).

v) Total Protein Concentration: Total protein values of the serum of the experimental Dwarf goats are given in Table 2. These observations have been found statistically non-significant. Findings of this study are in line with the results reported by Gray *et al.* (1988) and Iqbal *et al.* (1990). Contrary to these results Lewis (1976) and Nasim *et al.* (1981) obtained their values being 67.0 and 61.80 g/litre respectively. These variations might be due to some physiological function, dehydration and polycythemia.

a) Albumin Concentration:

Knowledge about the amount of albumin and globulin is necessary because decrease in one fraction may be masked by an increase in the other. Statistical analysis showed non-significant effect between different rations. The value of the study is in close agreement with that of Dukes (1970) who found the value being 39.6 g/litre.

b) Globulin Concentration:

Statistically significant differences ($P < 0.05$) were found among different feeding regimes. However non-significant differences were observed between the animals fed on feeding regimes II, III, IV, and V respectively. Similar results were obtained by Babin and Del (1982).

c) Albumin/Globulin ratio:

The mean values generally ranged from 1.03 to 1.23 g/lit. The data when subjected to statistical analysis showed non-significant differences in the mean values of animals maintained on feeding regimes I, II, III and IV except for ration V which were found to be significant ($P < 0.05$). Moreover, these values

are comparable to normal values reported by Oshiro *et al.* (1979).

vi) Uric Acid Concentration: Values of uric acid concentration are presented in Table 2 ranging from 0.048 to 0.77 mg/100 ml which is consistent with the values reported by Dukes (1970) and Castro *et al.* (1977). Their values were ranging 0.3 to 1.0 and 1.0 ± 0.40 mg/100 ml respectively.

vii) Urea Concentration: The mean values observed in this study ranged from 31.54 to 36.96 mg/100 ml. The data obtained on urea concentration, when subjected to statistical analysis revealed a non-significant effect due to different feeding regimes. The results of the study are in line with the study are in line with the values reported by Gray *et al.* (1988), their values being 44.45 ± 17.15 mg/100 ml.

viii) Calcium Concentration: Statistical analysis showed a non-significant variation due to different feeding regimes. Values of the study ranged from 8.86 to 9.81 mg/100 ml and are in line with the results reported by Lewis (1976) and Iqbal *et al.* (1990), their values being 9.6 and 10.24 to 12.20 mg/100 ml respectively. These variations may also be due to breeds and species differences.

ix) Alkaline Phosphatase: The mean values for alkaline phosphatase ranged from 205.15 to 626.88. The values observed in goats fed ration II were found significant ($P < 0.01$) which is higher over animals maintained on other feeding regimes, but non-significantly different in animals maintained on ration III. Animals kept on feeding regimes I, IV and V showed a non-significant variation but different from feeding regime III. It was observed that by increase in Atriplex rate in the rations, alkaline phosphatase value decreased. The values obtained in this study are higher than those reported by Lewis *et al.* (1976) and Castro *et*

al, (1977), their values being 173.0 ± 37.1 and 56.9 ± 38.9 units/litre respectively. This higher trend in values may be attributed to slight breed variation and use of young animals passing through a rapid growing phase of their life.

x) Glutamic Pyruvic Transaminase (GPT): The values ranged from 30.27 to 33.06 units/lit and the differences in GPT values of the animals due to different rations have been observed to be non-significant statistically. The mean values of the study are in close agreement with the normal values for GPT in goats as reported by Giantsis (1977), his values being 24.7 units/litre.

xi) Glutamic Oxaloacetic Transaminase GOT: These values ranged from 130.33 to 160.45 (IU/lit) but the differences in GOT values were found to be statistically different from each other ($P > 0.05$). The data further revealed that GOT values in animals fed ration IV (Atriplex 75%) were significantly higher than animals fed ration I, II, and III ($P < 0.05$) but were with non-significant difference from the values of the animals fed ration V (Atriplex 100%). The results of the GOT values were also non-significant in animals fed ration I, III and V. The values were significantly lower in animals fed ration II compared to animals fed ration V ($P < 0.05$). Moreover non-significant difference in GOT value were also found in animals fed ration I, II and III also. This variation could be due to change in protein metabolism. These values of the study are in line with those reported by Giantsis (1977), the value being 123.1 IU/litre respectively.

REFERENCES

- Anonymous. 1992-93. Economic Survey. Economic Advisor's Wing, Ministry of Finance, Govt., of Pakistan, Islamabad.
- A.O.A.C.. 1984. Official Methods of Analysis of the Association of Official Analytical chemists, Arlington, Virginia, USA.
- Babin, M. and M. Del. 1982. Serum protein picture of healthy sheep. (Vet. Bull. 52: 7416,1982).
- Benjamin, M.M. 1985. Outline of Veterinary Clinical Pathology, Iowa State Univ. Press, Ames, Iowa, USA.
- Bhattacharyya, B. and R. Dattagupta. 1989. some biochemical constituents of blood serum in growing kids. Indian Vet J. 64 : 618-619.
- Castro, A, D.S. Dhindsa, AS. Hoversland, H. Malkus, C. Rosenthal and J. Metcalfe, 1977. Serum biochemistry values in normal pygmy goats. Amer. J. Vet. Res. 38 : 2085-87.
- Duncan, D.B. 1955. Multiple range and multiple F tests, Biometrics. 11-12.
- Dukes, H.H. 1970. Duke's Physiology of Domestic Animals. Cornell Univ. Press, London, UK.
- Giantsis, N.G. 1977. Transaminases I. Normal serum values in cattle, sheep, goats, horse and mule. (Vet. Bull. 50: 6144, 1980).
- Gray, R., C. Berg and R. Windsor. 1988. Blood parameters of goats Atresia village, Kgatleng Agriculture District Botswana. (Vet. Bull. 58: 7987, 1988).
- Khan, AH. 1981. Teddy Bakarion Ki Dekh (urdu). Education and Ext. Dept., Bull. I, LPRI, Bahadurnagar, Okara.
- Iqbal, T., M.A. Jabbar, K. Ahmad and P. Akhtar, 1990. A study on the comparison of some haematological and biochemical parameters of Afghan and LohiPakVet.J.I.O: 101-103.

- Lewis, J.H. 1976. Comparative haematology: Studies on goats. *Amer. J. Vet. Res.* 38 : 601-605.
- Nasim, S.M., N. Ahmad B.B. Khan, M.A Sial and AG. Khan. 1981. Blood picture and meat production efficiency of Barbari goats. *Pak. J. Agri. Res.* 1:60-63.
- Oshiro, S., A Shinjo and H. Takahashi. 1979. Comparative studies on the plasma composition of buffaloes, cattle and goats. (*Vet., Bull.* 51 : 1398,1981).
- Pugliese, A, L. Chiofalo, F. Domina, M.G., Pennisi, C, Magistri, and O. Catarsini. 1982. Metabolic profiles of goats. II. Some proteins, lipids and glucose. (*Vet. Bull.* 53: 2143,1983).
- Ramzan, M. 1984. Studies on growth pattern and blood picture of beetal and barabari goats. M.Sc. Thesis, Univ. of Agri, Faisalabad.
- Steel, R.G.D. and J.H. Torrie, 1982. Principles and Procedures of Statistics. McGraw Hill Book Co., NY, USA