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Effect of Azolla (*pinnata*) Supplementation on the Haematological and Blood Biochemical Parameters of Deccani Ram Lambs Reared under Grazing Based Production System

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ABSTRACT

Background: Most of the shepherds in Telangana follow extensive rearing system, thereby intake of nutrients by the animal is minimal while grazing. In this context, Azolla, an unconventional feed with high protein and nutritive value may meet the nutritional demand of sheep and help in gaining optimum body weight at an early age in grazing system of management. Therefore, the present study was aimed to study the changes in haematological and blood biochemical parameters of lambs with azolla meal supplementation under grazing based production system.

Methods: Eighteen weaner ram lambs were divided in to three experimental groups *i.e.*, T1, T2 and T3 with six lambs in each group, such that average group weights were uniform. T1 group was control with no azolla supplementation while in T2 and T3, azolla was supplemented at the rate of 10 and 20% of dry matter intake, respectively. Duration of experimental feeding was 120 days. The mean haematological and blood biochemical studies were done by collecting the blood samples before the start, in the middle and at the end of the experiment.

Result: The haematological parameters like PCV, Hb, RBC and WBC showed no significant difference between the groups. The mean total protein at the end of the experiment was significantly ($p<0.01$) higher in T3 group as compared to T2 and T1 groups. The mean albumin value in the middle and at the end of the experiment was non significantly higher in T3 group followed by T2 and T1 group. The mean BUN value at the end of the experiment was non significantly lower in T3 group followed by T2 and T1 group.

Key words: Azolla, Blood biochemical parameters, Deccani ram lambs, Grazing based production system, Haematological parameters.

INTRODUCTION

Deccani sheep are native to Telangana and are small in size, with low grade in wool quality reared chiefly for mutton production. The majority of the farmers of Telangana follow the traditional practice of an extensive rearing system. During grazing, as the lands are not induced grazing lands, the quantity of nutrients that animal gets are very less, leading to negative energy balance. The grazing material is also of not high value, especially the crop residues and routine grass material that is available for grazing. Moreover, Deccani sheep are hardy and have the potential to grow fast, if they are provided with some supplementation in the form of protein and required nutrients.

Azolla pinnata appears to be a potential source of nutrients (Indira *et al*., 2009) with crude protein of 23.74% and also as it contains almost all essential amino acids and minerals such as iron, calcium, magnesium, potassium, phosphorus, manganese, as well as substantial quantities of vitamin A precursor beta carotene and vitamin B12. Azolla was also found to contain probiotic and bio polymers (Pillai *et al*., 2002). In this context, a study was planned to analyze the effect of inclusion of azolla as a supplement on the haematological and blood biochemical parameters of lambs reared under grazing based production system.

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MATERIALS AND METHODS

The Experiment was conducted in the year 2019 at Livestock Research Station, PVNR Telangana Veterinary University, Mahbubnagar district, Telangana. Eighteen weaner ram lambs in the age group of 3-4 months were selected basing on their body weights and were randomly divided into three groups (T1, T2 and T3) of six lambs each in a completely

randomized design (CRD). The lambs of T1, T2 and T3 were allowed to graze daily from 9:00 AM to 4:00 PM. After grazing, azolla was given as whole feed supplement at the rate of 10 and 20% of dry matter intake to the T2 and T3 groups, respectively and no azolla was given to T1 group. Duration of experimental feeding was 120 days. Azolla was cultivated in three pits, each with a dimension of 5 m × 4 m with 0.3 m depth. Azolla was harvested every week from all the pits was washed thoroughly with clean water, shade dried such that it becomes crispy while green color still retained and were stored in air tight bags for further use.

Deworming was done for all the lambs with Albendazole @ 10 mg per kg body weight at the beginning and in the middle of the research. All the animals were kept in a well-ventilated shed with adequate space requirement providing *ad libitum* of hygienic water for the purpose of drinking. The shed was disinfected and cleaned regularly with bleaching water and allowed to dry before the arrival of lambs from grazing.

Haematological and blood biochemical studies

Haematological and blood biochemical studies were done by collecting the blood samples before the start, middle and at the end of the experiment. Blood collection was done early in the morning by restraining the lamb on the floor. After proper restraining, 5 ml of blood was collected from each lamb aseptically. The collected blood from jugular vein of each lamb was immediately transferred into two vacutainers, one containing anti-coagulant 'Sodium Heparin' to analyze the Complete Blood Picture (CBP) and another serum collection vacutainer for the estimation of blood biochemical parameters.

Analysis of blood sample for haematological parameters

Blood samples were analyzed by using ABX Micros ESV 60 haematology analyzer to study the CBP *i.e.*, RBC (10^6/µL), WBC (10^3/µL), Hb (g/dL) and PCV (%) at College of Veterinary Science, Rajendranagar, Hyderabad. The haematological values obtained were compared with standard values as mentioned by Coles (1980).

Analysis of blood sample for blood biochemical parameters

The vacutainers containing blood samples were centrifuged to collect the serum for the analysis of total protein, albumin and blood urea nitrogen (BUN) at College of Veterinary science, Rajendranagar. All the serum samples of three treatment groups were analyzed for the estimation of total protein and albumin by using test kits named LIQUIXX TOTAL PROTEIN of Erba company at 546 nm wavelength and LIQUIXX ALBUMIN of Erba company at 630 nm wave length, respectively using 'UV/Vis' microplate Spectro-photometer'. Likewise, analysis of serum BUN values was done by using test kit named LIQUIXX UREA (BUN) of Erba company using 'UV/Vis' Cuvette spectrophotometer'. The blood biochemical values of total protein and albumin obtained were compared with standard values as mentioned by Jackson and Cockcroft (2002) and BUN values obtained were compared with standard values as mentioned by Coles (1980).

Statistical analysis

The data were subjected to the standard statistical procedure (Snedecor and Cochran, 1994) to compare the means of different treatment groups.

RESULTS AND DISCUSSION

Haematological studies

The mean haematological parameters of the experimental groups before, middle and at the end of the research are shown in Table 1, 2 and 3 respectively. The values obtained at three different stages were more or less nearer to the reference values as mentioned by Coles (1980). In the present study, it was observed that there was no significant difference ($p>0.05$) between the means of PCV, Hb, RBC, WBC in all the three treatments at three stages of experiment. Similar observations were reported by Anitha *et al*. (2016) in rabbits and Cherryl *et al*. (2014) in pigs. Kumar *et al*. (2016) in Barbari bucks observed that when 100 g of fresh azolla was fed per day under intensive system showed no significant difference between the means of Hb, RBC and WBC. Further, in the present study, there was non-significant decrease in the means of WBC in all the treatment groups was observed from the beginning of experiment and the reason may be that proper care was taken to the lambs. From the results of haematological studies, it could be inferred that supplementation of azolla had no influence on the haematological parameters of lambs under grazing based production system.

Table 1: Mean haematological parameters of Deccani ram lambs before the start of experiment.

Parameters	Azolla supplementation		
	T1 (0%)	T2 (10%)	T3 (20%)
PCV (%)^{NS}	24.18±1.55	24.17±0.55	25.12±0.43
Hb (g/dL)^{NS}	7.82±0.34	7.68±0.30	8.03±0.23
RBC (10^6/µL)^{NS}	7.12±0.29	7.03±0.35	7.10±0.28
WBC (10^3/µL)^{NS}	12.57±0.77	12.23±0.67	12.03±1.01

NS: Non significant difference.

Table 2: Mean haematological parameters of Deccani ram lambs during middle of the experiment.

Parameters	Azolla supplementation		
	T1 (0%)	T2 (10%)	T3 (20%)
PCV (%)^{NS}	25.32±1.77	26.18±0.67	26.32±0.41
Hb (g/dL)^{NS}	8.62±0.38	8.65±0.14	8.78±0.47
RBC (10^6/µL)^{NS}	8.19±0.53	8.30±0.24	8.57±0.37
WBC (10^3/µL)^{NS}	10.75±0.48	10.55±0.49	10.45±0.95

NS: Non significant difference.

Table 3: Mean haematological parameters of Deccani ram lambs at the end of the experiment.

Parameters	Azolla supplementation		
	T1 (0%)	T2 (10%)	T3 (20%)
PCV (%)^{NS}	25.90±0.85	26.67±1.05	27.12±0.69
Hb (g/dL)^{NS}	9.27±0.13	9.45±0.38	10.08±0.28
RBC (10^6/ µL)^{NS}	8.20±0.37	8.36±0.23	8.68±0.47
WBC (10^3/ µL)^{NS}	10.95±0.31	10.45±0.40	10.67±0.76

NS: Non significant difference.

Blood biochemical studies

The mean values of total protein, albumin and BUN in three different stages of experiment for the three treatment groups are presented in Table 4, 5 and 6 respectively. The values of total protein and albumin obtained at three different stages were comparable with the reference values as mentioned by Jackson and Cockcroft (2002) and similarly for BUN as mentioned by Coles (1980). In the present study, it was observed that there was significant ($p<0.01$) increase in total protein, non-significant increase of albumin and non-significant decrease of BUN for the T3 group at the end of the experiment. These results are in agreement with Kumari (2015) studied in goat kids when azolla ration was fed upto 20 per cent. While the reports of Roy *et al*. (2016) showed that there was a non-significant increase of albumin and significant decrease of BUN to the azolla inclusion group in Hariana heifers. On contrary to the results of total protein obtained in the present study at the end of experiment, Roy *et al*. (2016) in Hariana heifers found non-significant decrease of total protein when fed with the test diet

Table 4: Effect of azolla supplementation on total protein (g/dL) levels.

Period of analysis	Azolla supplementation		
	T1 (0%)	T2 (10%)	T3 (20%)
Before the start of experiment^{NS}	6.15±0.12	6.07±0.05	6.29±0.14
Middle of the experiment^{NS}	6.24±0.06	6.48±0.19	6.57±0.22
End of the experiment*	6.40^{a}±0.05	6.72^{a}±0.13	7.26^{b}±0.19

*Means with different superscripts in a row differ significantly ($p<0.01$)

NS: Non significant difference.

Table 5: Effect of azolla supplementation on Albumin (g/dL) levels.

Period of analysis	Azolla supplementation		
	T1 (0%)	T2 (10%)	T3 (20%)
Before the start of experiment^{NS}	2.77±0.09	2.73±0.10	2.75±0.06
Middle of the experiment^{NS}	2.82±0.17	2.87±0.11	2.92±0.07
End of the experiment^{NS}	2.85±0.15	2.92±0.11	2.98±0.13

NS: Non significant difference.

Table 6: Effect of azolla supplementation on Blood Urea Nitrogen (mg/dL) levels.

Period of analysis	Azolla supplementation		
	T1 (0%)	T2 (10%)	T3 (20%)
Before the start of experiment^{NS}	18.42±0.21	18.44±0.18	18.42±0.13
Middle of the experiment^{NS}	18.49±0.09	18.32±0.17	18.31±0.19
End of the experiment^{NS}	18.47±0.06	18.27±0.15	18.23±0.18

NS: Non significant difference.

containing concentrate mixture replaced at 5% azolla on DM basis. The present findings of significant increase in mean value of total protein for T3 group may indicate more availability of nitrogen at tissue level. In the current study, non-significant increase of albumin in T3 group at the end of the experiment was observed and it may indicate the nutritional adequacy of protein. The mean value of BUN at the end of the experiment was non-significantly low in azolla supplemented group may signify more anabolic activity in the lamb's body leading to tissue growth and also indicate good dietary protein metabolism.

CONCLUSION

Present study concluded that inclusion of shade dried azolla upto 20 per cent of dry matter intake in the lamb diets did not appear to affect haematological and blood biochemical parameters under grazing based production system.

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