

NUTRITIONAL EVALUATION OF *PROSOPIS JULIFLORA* PODS FOR SHEEP

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Abstract: The chemical composition of *Prosopis juliflora* pods was estimated and the digestibility of its nutrients was analysed in adult sheep. The pods contained 91.74% DM, 86.13% OM, 12.96% CP, 22.53% CF, 1.67% EE, 57.23% NFE, 5.61% TA, 42.82% NDF, 30.17% ADF, 2.55% ADL, 0.59% Ca and 0.23% P. The DCP and TDN contents were 9.09% and 63.77% respectively. The nutrient supply from the pods was observed to be adequate to support maintenance and growth requirements of adult sheep.

Keywords: *Prosopis juliflora* pods, sheep, chemical composition, nutrient digestibility.

INTRODUCTION

Prosopis juliflora is an aggressive invading species commonly known as American mesquite, Vilayati babul or Vilayati kikar belonging to family Leguminosae sub family Mimosidae. It was introduced during 1876 in India to colonize arid terrains because of its tolerance to drought, submergence and salinity and its high coppicing ability and now it has spread into many parts of India in about 20 lakh hectares. The potential usefulness of these trees for pod production has long been recognized. Mature trees produce about 20 – 40 kg/tree/year (Shukla *et al.*, 1984). This tree is being widely used as a fuel wood or charcoal reserve along with pod production for livestock feed in many places of Tamilnadu state. In the southern region of Tamilnadu, it is estimated that about 4 million ones of pods are available per year @ 10 tonnes per hectare from the *Prosopis juliflora* vegetation. Though grazing sheep and goats consume ripened pods readily, the quantum of pods available throughout the year is not fully utilized as animal feed. Rakesh Pancholy and Mali (1999) had suggested substitution of conventional feed stuffs with *Prosopis juliflora* pods up to 50% for effective utilization of these pods as well as improving the nutritional value of ruminant rations. Hence, a study was undertaken to analyse the nutrient composition and nutritive value of *Prosopis juliflora* pods with an aim to propagate its worth so as to increase its utility as a feed resource among the livestock farmers of southern Tamilnadu.

MATERIALS AND METHODS

Random samples of *Prosopis juliflora* pods (six nos. each) were collected from dense vegetations of Tirunelveli, Thoothukudi and Virudhunagar districts of southern Tamilnadu. The samples were analysed for dry matter by drying overnight at 100°C in hot air oven. Then the oven dried samples were ground to pass through 1mm sieve and analysed for proximate principles – crude protein (CP), crude fibre (CF), ether extract (EE), total ash (TA) (AOAC, 2005); fibre fractions – NDF, ADF, ADL (Goering and Van Soest, 1970) and major minerals – calcium, phosphorus contents. A digestion trial was conducted using four adult rams of local Kilakaraisal breed, about 15 months old with mean body weight 26.18 ± 0.43 kg. The selected rams were dewormed and placed in individual pens with facilities for providing feed and water separately. They were provided with crushed *Prosopis juliflora* pods *ad libitum* as sole feed and adapted for a period of fifteen days followed by collection of dung samples for seven days. Average daily consumption of dry matter was calculated from the daily records of feed intake. The samples of *Prosopis juliflora* pods, faeces were analysed for dry matter and proximate principles and digestibility, nutritive value of pods were calculated based on the values obtained in the study. Statistical analysis was done as per Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

The results of estimation of proximate composition, fibre fractions and major minerals are given in Table 1.

Table 1. Chemical composition of *Prosopis juliflora* pods collected from southern districts of Tamilnadu

Chemical Composition	Mean \pm SE
Dry matter (DM)	91.74 \pm 1.28 %
Organic matter (OM)	86.13 \pm 1.12 %
Crude protein (CP)	12.96 \pm 0.73 %
Ether extract (EE)	1.67 \pm 0.22 %
Crude fibre (CF)	22.53 \pm 1.43 %
Nitrogen free extract (NFE)	57.23 \pm 2.05 %
Total ash (TA)	5.61 \pm 0.74 %
Acid Insoluble Ash (AIA)	0.90 \pm 0.15 %
Calcium	0.59 \pm 0.12 %
Phosphorus	0.23 \pm 0.09 %

Neutral Detergent Fibre (NDF)	42.82 ± 1.87 %
Acid Detergent Fibre (ADF)	30.17 ± 1.05 %
Acid Detergent Lignin (ADL)	2.55 ± 0.34 %

The estimated values for dry matter, crude protein and ether extract contents of ripened pods of *Prosopis juliflora* collected from various places of southern Tamilnadu were within the range observed by Koech *et al.* (2011) and Kidane Hintsu *et al.* (2015). Crude fibre content was similar to the values reported by Ibrahim and Gaili (1985). The fibre fractions of pods viz. NDF, ADF values were similar to those observed by Koech *et al.* (2011) and Osman Mahgoub *et al.* (2005). Calcium and phosphorus levels were comparable to the values reported by Ravikala *et al.* (1995). The results of dry matter intake, nutrient digestibility and nutritive value in rams fed *Prosopis juliflora* pods as sole feed are given in Table 2.

Table 2. DM intake, nutrient digestibility and nutritive value in rams fed *Prosopis juliflora* pods

Parameter	Mean ± SE
Dry matter intake (DMI) (%)	3.47 ± 0.55
Nutrient digestibility (%)	
Dry matter (DM)	62.59 ± 1.32
Crude protein (CP)	70.15 ± 1.19
Ether extract (EE)	69.52 ± 0.78
Crude fibre (CF)	56.47 ± 1.73
Nitrogen free extract (NFE)	68.75 ± 1.92
Nutritive value (%)	
Digestible crude protein (DCP)	9.09 ± 0.44
Total digestible nutrients (TDN)	63.77 ± 1.85

The average dry matter intake (DMI) of adult rams during the experimental period was 3.47% which was found to be adequate to support maintenance and growth requirements (weight gain @ 50 g/day) in sheep (Ranjhan, 1998). However, the observed DMI was lower than the level consumed by weaned feedlot lambs (3.99%) reported by Ravikala *et al.* (1995). Digestibility of 62.59% and 70.15% were observed for DM and CP in adult sheep in this study. Similar *in situ* ruminal digestibility values were also observed for DM and CP in *Prosopis juliflora* pods by Batista *et al.* (2002). Moreover, the total digestible nutrients

(TDN) observed in this study (63.77%) was higher than the values reported by Ravikala *et al.* (1995) in sheep (54.52%) fed rations containing 30% *Prosopis juliflora* pods. The DCP and TDN contents of *Prosopis juliflora* pods fed as a sole feed in this study were higher than values observed by Nagalakshmi and Narasimha Reddy (2012) in sheep fed conventional ration containing *ad lib* sorghum stover and concentrate mixture. The higher digestibility of nutrients could be attributed to the higher availability of nutrients for the growth of rumen microbes. High palatability and increased nutrient utilization of *Prosopis juliflora* pods might have resulted in higher DCP and TDN contents.

CONCLUSION

The results of this study have clearly shown that *Prosopis juliflora* pods contained high organic matter and protein with adequate amount of calcium and phosphorus minerals. Dry matter intake, digestible protein and other nutrients of these pods could support maintenance and growth requirements in sheep. Therefore sheep farmers should be advised to explore the potential of these pods and supplement them in lamb diets to improve their growth rate and to prevent weight loss in adult sheep during dry seasons.

REFERENCES

- [1] A.O.A.C., 2005. Official Methods of Analysis, Association of Official Analytical Chemists, 18th Edn., Arlington, VA, USA.
- [2] Batista, A.M., Mustafa, A.F., Mckinnon, J.J. and Kermasha, S. 2002. *In situ* ruminal and intestinal digestibilities of mesquite (*Prosopis juliflora*) pods. Animal Feed Science and Technology 10: 107-112.
- [3] Goering, H.K. and Van Soest, P.J. 1970. Forage fiber analysis. USDA Agriculture Handbook No.379.
- [4] Ibrahim, A.A., Gaili, E.S., 1985. Performance and carcass traits of goats fed on diets containing different proportions of mesquite (*Prosopis chilensis*). Tropical Agriculture (Trinidad) 62: 97-99
- [5] Kidane Hintsu, Mulubrhan Balehegn and Emiru Birhane. 2015. Utilization of Pods of *Prosopis Juliflora*, an Invasive Tree, as a Replacement to Concentrate Feed for Goats in Ethiopia; Livestock Research for Rural Development; 27 (9)
- [6] Koech O. Kipchirchir, Kinuthia R.Ngugi and Wahome, R.G. 2011. Use of dry land tree species (*Prosopis juliflora*) seed pods as supplement feed for goats in the arid and semi arid lands of Kenya. Environmental Research Journal 5 (2):66-73

- [7] Nagalakshmi, D. and Narasimha Reddy, D. 2012. Effect of feeding sorghum stover based densified blocks on nutrient utilization and rumen fermentation pattern in sheep. *Indian Journal of Animal Nutrition* 29 (3): 262-267.
- [8] Osman Mahgoub, Isam T.Kadim, Neil E.Forsberg, Dawood S.Al-Ajmi, Naseeb M.Al-Saqry, Abdullah S. Al-Abri and Kanthi Annamalai. 2005. Evaluation of Meskit (*Prosopis juliflora*) pods as a feed for goats. *Animal Feed Science and Technology* 121: 319-327.
- [9] Rakesh Pancholy and Mali, P.C. 1999. Effective utilization of *Prosopis juliflora* pods by ensiling with desert grass *Lasirus indicus*. *Bioresource Technology* 69: 281 -283.
- [10] Ranjhan, S.K. 1998. Nutrient requirements of livestock and poultry. Publication and Information Division, Indian Council of Agricultural Research, New Delhi, India.
- [11] Ravikala, K., Patel, A.M., Murthy, K.S., and Wadhvani, K.N. 1995. Growth efficiency of feedlot lambs on *Prosopis juliflora* pods based diets. *Small Ruminant Research* 16: 227-231.
- [12] Shukla, P.C., Talpada, P.M. and Pande, M.B. 1984. Agro industrial byproducts as livestock feed. *Prosopis juliflora* pods a new cattle feed resource. Technical Bulletin, I.C.A.R. Animal Nutrition Department, Gujarat Agricultural University, Anand, India.
- [13] Snedecor, G.W. and Cochran, W.G. 1994. Statistical methods, 8th ed, Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi, India.