

IN SACCO NUTRIENT DEGRADABILITY OF RAIN TREE (*ALBIZIA SAMAN*) PODS IN MURRAH BUFFALO BULLS

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Abstract: The present experiment was conducted to evaluate the chemical composition and *in sacco* nutrient degradability of Rain Tree (*Albizia saman*) pods in Murrah buffalo bulls. Results indicated that pods contained 95.98% DM; 3.21% TA; 19.32% CP; 3.4% EE; 28.4% CF; 54.33% NFE; 39.72% NDF; 30.72% ADF; 9.72% Hemi-cellulose; 17.48% Cellulose and 8.89% ADL. Chemical composition revealed that the pods are high in dry matter, protein and energy rich carbohydrates which suggest the potential as a component of feed for livestock. The pods were evaluated *in sacco* to study the degradation kinetics of DM, CP, NDF and ADF in rumen. Data revealed that effective degradability % (ED) of rain tree pods at a rumen outflow rate (0.05^{-h}) was 41.1, 34.3, 20.8 and 8.4 for DM, CP, NDF and ADF, respectively. Further, the pods contained a 72 h degradability % (58.19, 40.85, 24.97 and 12.20) and potential degradability (A+B) % (59.94, 41.19, 28.77 and 14.83) for DM, CP, NDF and ADF, respectively. It is concluded that rain tree pods contained a considerable nutrient degradability *in sacco* and can be used as a feed ingredient for livestock.

Keywords: Rain tree pods, Chemical composition, *In sacco* degradability, Effective degradability

Introduction

Rain tree (*Albizia saman*), family-Fabaceace is a tropical tree, easily recognized by its characteristic umbrella shaped canopy, native to deciduous and sub-deciduous forests of India, Srilanka, Burma and Bangladesh and usually reaches to a height of 15-25m. The bark of the tree is dark grey, rough and fissured in long plates or corky ridges. It is propagated by seeds and cuttings and thrive best in hot moist localities and dry barren lands. The tiny flowers are massed in pinkish heads and the leaves are alternately arranged along twigs (Parrotta, 2005). Mature pods are black-brown, oblong, lumpy 4-8 inch long, 0.6-0.8 inch wide, 0.25 inch thick, straight or slightly curved but eventually cracking irregularly, and filled with sticky, brownish pulp that is sweet and edible. A mature tree can yield about 500-600 kg green forage foliage and 250-300 kg pods per annum. The leaves and pods of the trees are esteemed as fodder for livestock. Ripen pods are available from February to May, when other fodders are scarce (Babayemi and Bamikole, 2006). The ripen pods fall on the ground

and go waste. Shortage of quality animal feeds necessitated the exploration of alternative sources of feeding materials for possible incorporation into animal diets (Fasuya, 2005). Rain tree is cultivated and naturalized throughout the tropics. It is reported to be a valuable supplement to goats and other ruminants (Jetana *et al.*, 2010) with highly digestible sugars (10.00-17.30 %), protein (15.31-18.00%), low cost and non-toxic (Hosamani *et al.*, 2005). A multitude of minor uses is documented for rain tree, most of them are of local significance, but all could be explored for wider applicability. Hence, an attempt has been made to evaluate the chemical composition and *in sacco* nutrient degradability of rain tree pods with an aim of using them as a feed for livestock.

Materials and Methods

The present work was carried out in Department of Animal Nutrition, NTR College of Veterinary Science, Gannavaram, Andhra Pradesh. Mature and dried rain tree pods were sampled from growing trees in the villages nearby Gannavaram. The pods were further sun dried for five days, finely ground through 2 mm sieve using Wiley mill and the powdered samples were stored in air tight plastic containers prior to analysis. The proximate composition (AOAC, 2007) and forage fiber constituents (Van Soest *et al.*, 1991) of pods were analyzed. Calcium and Phosphorus content were determined as per Talapatra *et al.* (1940).

Three fistulated Murrah buffalo bulls maintained on a conventional diet comprising of 4.0 kg paddy straw, 5.0 kg Hybrid Napier and 1.5 kg concentrate mixture were used to study the *in sacco* nutrient degradability of rain tree pods. Pre-weighed samples of ground pods were incubated for 0, 3, 6, 12, 24, 48 and 72 h in the ventral sac of the rumen using nylon bags. The bags were removed in a sequential manner, washed and dried for estimation of nutrient (DM, CP, NDF and ADF) degradability by *in situ* nylon bag technique (AFRC, 1993) and effective degradabilities were estimated by standard software (Orskov and Mc Donald, 1979). The data were statistically (Snedecor and Cochran, 1989) analyzed to compare Means (SPSS 17.0 version).

Results and Discussion

Chemical composition (Table 1) revealed that rain tree pods contained 95.98, 3.21 and 19.32, per cent DM, TA, and CP, respectively. The nutritional components of a particular feed are driving factor of its nutritional potential. In this study, rain tree pods have high DM content, lower ash content (<2.5 %) and higher crude protein content which is an important feed component considered for selection in feed formulation. Further, the samples are rich in

carbohydrate (NFE) and can be used as a fodder for animals as a source of energy. Lower values (%) for DM, CP and CF and higher values (%) for TA and EE were reported in Samanea pods (Barcelo and Barcelo, 2012), while the NFE (53.09 %) corroborated with the value in the present study (54.33 %). This higher value of NFE reflects that rain tree pods are rich in carbohydrates and are relished by livestock due to its sweet taste.

The crude fibre content is low which indicates that most carbohydrates are easily digestible. Similar chemical composition is reported by (Hosmani *et al.*, 2005) in rain tree pods. The values indicated that it is equivalent to any cereal grain by-products like deoiled rice bran (Hosamani *et al.*, 2000). The ash content of rain tree pods is 3.21 % in the present study. Akintayo (2004), states that any plant material intended to be used in feed formulation should have ash content less than 2.5 %. This gives an indication that the samples with more ash content could not be used as selfdom feeding material, but rather mixed with other ingredients for better results. This suggests that rain tree pods can be used by mixing with other feed ingredients. In the present study, the pods have Ca to P ratio (Ca/P) of 2:1 which indicates the better bioavailability of macro-minerals. The difference in the composition of the rain tree pods by various authors may be due to change in the soil, pod age and the age of the tree producing the pod (Durr, 2001).

The chemical composition itself may not be pure indicative of its usage as feed to animals, but has to be supplemented with digestibility or feeding trials. *In sacco* studies revealed that degradability (%) of pods after 72 h incubation in the rumen was 58.19, 40.85, 24.97 and 12.20, respectively, for DM, CP, NDF and ADF. The potential degradability (PD) % was 59.94, 41.19, 28.77 and 14.83 and Effective degradability (ED) % at 0.05^{-h} rumen outflow rate was 41.1, 34.3, 20.8 and 8.4, respectively, for DM, CP, NDF and ADF in rain tree pods (Table 2). Higher DM digestibility was reported by Semae *et al.* (2013) in pods compared to the present study. The intake of dry matter and digestibility of crude protein, ether extract was optimum in goats (Thomas *et al.*, 1976), sheep (Kathaperumal *et al.*, 1988) and cattle (Thole *et al.*, 1992) fed rain tree pods. This may be due to ease of availability of sugars from pods. The nutritive value in rain tree pods was almost equivalent to cereal grain by-products such as de oiled rice bran. It was inferred that rain tree pods contain higher protein and sugars, lower fibre, silica, lignin and tannin. It has got better digestible crude protein and total digestible nutrients equivalent to cereal grain by- products. These findings can be used to correlate with the values of *in sacco* degradability in the present study particularly in terms of

dry matter and crude protein. The rain tree pods can very well be incorporated in the diet of ruminants to replace concentrate to reduce the cost of feeding significantly.

Conclusion

It is inferred that rain tree pods contain higher protein and sugars, low fibre and lignin and *in sacco* studies indicated better potential and effective rumen degradability of nutrients. Hence, it is concluded that pods can be incorporated into the diet of ruminants without any adverse effect. Nevertheless, more research on animal responses, through *in vivo* trials are needed to support the nutritional characteristics reported in this study.

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Table 1. Chemical composition (% DM basis) of rain tree pods

Parameter	Rain tree pods
Dry matter	95.57 ± 0.09
Total Ash	3.21 ± 0.12
Crude Protein	19.32 ± 0.24
Ether Extract	3.40 ± 0.31
Crude Fibre	28.40 ± 0.61
Nitrogen Free Extract	54.33 ± 0.45
Neutral Detergrnt Fibre	39.72 ± 0.13
Acid Detergent Fibre	30.72 ± 0.29
Hemi-cellulose	9.72 ± 0.37
Cellulose	17.48 ± 0.46
Acid Detergent Lignin (ADL)	8.89 ± 0.22
Calcium	0.24 ± 0.09
Phosphorus	0.13 ± 0.07

Values are expressed, as mean ± standard deviation of three replicates

Table 2. *In sacco* nutrient (DM, CP, NDF and ADF) degradability (%) of rain tree pods

<i>In sacco</i> degradability (%)	72 h	PD (A+B)	ED (0.05^{-h})
DM	58.19 ± 0.46	59.94 ± 0.57	41.1 ± 0.24
CP	40.85 ± 0.97	41.19 ± 0.95	34.3 ± .64
NDF	24.97 ± 0.64	28.77 ± 0.43	20.8 ± 0.37
ADF	12.20 ± 0.32	14.83 ± 0.75	8.4 ± 0.19

Values are expressed, as mean ± standard deviation of three replicates