Use of dry *Leucaena leucocephala* leaves as a protein' supplement in sheep diets

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SUMMARY

Fifteen yearling desert rams. 25 kg live body weight (B. wt) were randomly allocated to 3 dietary treatments of 5 animals each. The three dietary treatments were; sorghum Stover (S.S) given *ad lib* for control treatment group (A) whereas group **(B)** and (C) were offered in addition to (S.S), 10.0 g /kg and 20.0g/kg live body weight respectively, dried *Leucaena leucocephala* leaves (D.L.L.L). The results showed that the total dry matter intake (ME) was significantly (P< 0.05) higher by 30% and 50% in groups Band C respectively compared to that in the control group (A). However, the sorghum stover intake was not affected by the (D.L.L.L) supplementation level in group B&C. The digestibility coefficient of (S.S) was improved by (D.L.L.L) supplementation and was found to be statistically significant (P<0.05) at groups B and C levels. Body weight gains were significantly (P <0.05) affected by the treatment. While they were negatively affected in-group A, the gains were positive at 12 g /day and 49g/day in B and C respectively.

INTRODUCTION

In the dry lands of Sudan where 75% of the animal wealth is kept, a major constraint to production from ruminants is the unavailability of good quality feeds. In these areas livestock production is most limited by seasonal deficits in forage quantity and/or quality. The poor crude protein (CP) content of the arid zones forage, is the major limiting factor for livestock production, this effect coupled with the increasing cost of the conventional protein supplement for livestock with special reference to ruminants lead to loss of weights, high mortality rates especially among the young and poorly fed females during pregnancy. To alleviate such problems and to bridge the seasonality of good quality forage, supplementation of poor quality roughages with non-conventional feed resources such as leguminous

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tree lends itself as a feasible alternative. Of all tropical legumes , Leucaena lucocephala "commonly referred to as Leucaena" probably offers several types of uses (NAS, 1977). It can produce nutritive forage, firewood, and timber and rich organic fertilizer. Its diverse uses includes revegitating tropical hill slopes and providing wind-breaks, shade and ornamentation. NAS (1977) reported that Leucaena is responsible for some of the highest weight gain measured in cattle feeding on forage, but still its potential is largely unrealized .

Leucaena grows best where annual rainfall is ranging from 600-1700 mm (25-65 Inch). However, it is predominantly covers areas where annual rainfall amounts to only 250mm (10 Inch) (NAS, 1977). Under irrigation Leucaena performs well with annual yield up to 44 tonnes of dry matter (DM) per hectare (ILCA, 1986).

Literature reviewed on the nutrient composition of Leucaena indicated that the plant is a rich source of protein ranging between 19.7% - 26.6% (Rose—Innes and Mabey 1964a, Upadhyaya et al., 1974, NRC 1975, Skerman 1977, Mathius et al., 1984, Bajarcharya et al., 1985 Vargas & Elvira 1987, Akkasaeng et al., 1989 and Rajaguru 1990,) poor in cell wall content and ash, contains a balanced ratios of calcium to phosphorus (Ca : P) and is a rich energy source (12.1 MJ/kg M.E) Devendra, (1990). The digestibility of dry matter (DM) of Leucaena varied from about 65% to 87% Skerman (1977). Lower values were reported by Sampet and Pattaro (1987) (64%), Vargas and Elvira (1987) (48%) and Akkasaeng et al., (1989) (53%). In Sudan, Leucaena leucocephala is grown in Southern and western Sudan as a feasible tree in forestry and agro forestry practices but still not used officially as animal feed .

MATERIAL AND METHODS

Animals:

Fifteen yearling desert ram lambs of about 25 kg live body weight were picked out from the University of Khartoum Farm flock for the purpose of this study. On arrival to the study site (Faculty of Animal Production, Shambat), the lambs were dosed with broad-spectrum anthelmentics, ear tagged and individually housed in' iron bars stalls which were already cleaned and disinfected.

The feed ingredients used were:-

Sorghum Stover (S.S) purchased from local stocks.

Dry *Leucaena leucocephala* leaves (D.L.L.L), which were collected fresh from the University of Khartoum Farm, sun dried and stored in plastic bags.

Three dietary treatments were prepared; Sorghum Stover (group A), Sorghum Stover + 10g/kg live weight dried Leucaena leaves (group **B)** and Sorghum Stover + 20g/kg live weight dried Leucaena leaves (group-C)

The three diets were fed *ad fib* individually and separately for each sheep. The 15 lambs were allocated to (diets), in a randomized complete block design of three experimental groups (blocks), of five lambs each.

The rations were offered daily for an adaptation period of 15 days and 60 Days thereafter. During the latter period the data collected were feed intake, live weight changes (measured weekly) and digestibility of nutrients. The latter was done using the total collection method using three lambs for each treatment group.

The chemical composition of the sorghum Stover and Leucaena leaves shown in Table (1) was done according to the method of AOAC, (1975). Total Digestible 'Nutrients (TDN) of the rations used were calculated according to McDonald *et al.*, (1982) from estimates of organic nutrient digestibility coefficient. The data collected were subjected to analysis of variance (ANOV A) according to Steel and Torrie (1960).

Table 1. Chemical Composition of Sorghum Stover and *Leucaena* leaves (%)

Nutrient	Sorghum stover	*Leucaena leucocephala*
DM	94.30	89.4
OM	84.60	79.3
CP	07.00	19.6
CF	30.40	20.1
EE	01.80	06.70
NFE	45.40	32.90
ASH	09.70	10.10

RESULTS AND DISCUSSION

Table (2) shows the feeding and live-weight changes of the lambs. It can be seen generally that Leucaena has improved significantly ($P < 0.05$) both dry matter intake and live weight changes. These improvements were significantly ($P < 0.05$) affected by the level of Leucaena in diet B and C.

Table 2. Feed intake and live weight changes of the lambs fed the Experimental diets.

Parameter measured	A	B	C	S.E
Dry matter intake (kg/d)	1.0[a]	1.3[b]	1.5C	0.15
Roughage intake (kg/d)	1.0	0.9	1.0	0.07
TDN(%)	47.7	73.1	73.6	
Live weight changes g/day	-34.9 [a]	12.6[b]	49.0e	1.5

S.E = standard error of means.
A, b, c = Means in the same row with different superscripts are significantly different (P < 0.05).

Nutrients digestibility coefficient are presented in Table (3). The percentage values of the dry matter (DM), organic matter (OM), crude protein (CP), crude fiber (CF) and ether extract (EE) of the three rations were significantly ($P < 0.05$) affected by addition of Leucaena leaves to basal sorghum Stover feed.

Table 3. Nutrients digestibility of Sorghum Stover and *Leucaena* leaves fed lambs.

Nutrient	A	B	C	S.E
DM	61.7 [a]	78.7[b]	83.9 c	1.1
OM	56.4[a]	72.4[b]	79.8[e]	1.2
CP	62.5 [a]	71.3[b]	80.6'	1.7
CF	64.4[a]	76.6[b]	91.0'	1.7
EE	54.3[a]	77.5[b]	85.7'	1.3

S.E = Standard error of means.
A, b, c = Means in the same row with different superscripts are significantly different (P < 0.05).

Feeding *Leucaena leucocephala* leaves as a supplement to sorghum stover has improved the digestibility of the nutrients by 28, 28, 15,19, and 43% and 36, 4, 29, 4 and 58% of dry matter, organic matter, crude protein,

crude fiber and ether extract in the treatments groups **B** and C over A, respectively (Table 2).

This is considered a positive response to Leucaena feeding which favourably compares with other results in the literature. The mean values obtained at the present for the dry matter digestibility in the Leucaena are higher than those study (64, 48 and 53%) reported by Sampet and Pattaro (1987), Vargas and Elvira (1987) and Akkasaeng *et aL,* (1989) respectively for similar lambs. On the other

hand roughage intake (Table 2) was affected differently by Leucaena supplementation, while it was lowest for group B lambs; it had equal mean values for straw intake in groups A and C.

Unlike straw intake, dry matter intake (table 2) increased with the Leucaena and the level at which it was supplemented in A, Band C groups. The rate of increase was 30% and 50% in B and C, respectively over A.

In previous reports, Blaxter (1962) and Devendra (1993) have noted that the more digestible the feed is, the greater is the rate at which it is consumed by ruminants. The greater dry matter intake as shown in Table (2) resulted in a similar response in total digestible nutrients (TDN) in groups Band C as affected by Leucaena .The overall effect of the higher digestibility, greater dry matter intake and abundant total digestible nutrients associated with Leucaena supplementation to basal sorghum stover feeding was associated with a wide range for the response in live weight change in the lambs under investigation. While lambs in-group a lost weight at -34.9 g/day those in group Band C gained at +12.6 and +49.0 g/day, respectively. Thus the actual difference in live weight was -34.9 -12.6 (47.5 g/day) in BA and was -34.9 -49.0 (83.9 g/day) in C-A. The present live weight performance is higher than that of Atta-Karh *et al.* (1988) who, similarly supplemented similar lambs with 40 g/kg Leucaena leaves.

The improved performance observed with dried Leucaena leaves supplementation in this study could be mainly due to the general improvement of the nutritional side which was directly affected by the elevation of crude protein in the rations leading to a more balanced diet. It is recommended Leucaena leucocephala leaves could be further involved in similar studies.

ACKNOWLEDGEMENT

The authors are grateful to the members of staff of the Faculty of Animal Production, Department of Animal Nutrition (University of Khartoum) for their help during the Course of study. The authors are also grateful to Prof. Adam H. Sulieman Ex Vice Chancellor University of Nyala for his kind and valuable advices.

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