COMPARISON OF SESAME SEED CAKE, *LEUCAENA LEUCOCEPHELA* AND *GLIRICIDIA SEPIUM* AS PROTEIN SOURCES FOR FATTENING RAMS

ABSTRACT

Thirty six intact, trypanotolerant Djalonke rams (West African Dwarf Sheep) with initial liveweights ranging from 18 to 30.80 Kgs (mean of 22.80 Kgs) were blocked according to weight and randomly assigned to six treatment groups as follows: T-1: Groundnut hay (GNH) *ad libitum* plus 100 g Sesame Seed Cake (SSC)/day: T-2: GNH *ad libitum* plus 50 g SSC/day: T-3: GNH *ad libitum* plus 294 g DM *Leucaena leucocephela*; T-4: GNH *ad libitum* plus 147 g DM *L. leucocephela*; T-5: GNH *ad libitum* plus 266 g DM *Gliricidia sepium*; and T-6: GNH *ad libitum* plus 133 g DM *G. sepium*. The higher levels of supplementation provided 50 g CP/day while the lower levels supplied 25 g. Rams in T-4 had significantly ($P < 0.05$) higher GNH intake than the rams in the other treatment groups, but the mean intakes in these groups were not significantly different. GNH intake in T-4 was equivalent to 5.12% of BW while intake in the other treatment groups were less than 5% of BW. The daily liveweight gains attained in this trial were insignificant. The rams supplemented with the higher level of *G. sepium* (T-5) attained the highest daily liveweight gain (83.73 g/day) while those supplemented with the lower level of SSC (T-2) had the lowest daily liveweight gain at 68.25 g/day, however the six treatment means were not significantly different at the 0.05% level. Generally the kind and level of supplementation had similar effects on the intake of GNH and the daily liveweight gain of rams which indicates that all three protein sources were equally effective as supplements.

INTRODUCTION

The fattening of rams for *Tobaski* is increasing in popularity throughout The Gambia. The intensification of the *Tobaski* ram fattening schemes is meant to raise rural income and thus improve the standard of living of the rural producers. Under the fattening schemes farmers within a village are urged to pool their animal, feed and manpower resources together in order to exploit the economics of scale; but in recent years individual small holder sheep farmers, both in rural and urban areas, have adopted the technology and are now raising rams in their backyards.

The fattening scheme is based on feeding groundnut hay (GNH), sesame seed cake (SSC) and cereal brans. Groundnuts is the main cash crop in The Gambia and is produced by almost all rural households, thus GNH is widely available to individual farm families.

Sesame seed cake is produced from small oil extraction plants located in sixteen villages throughout The Gambia. After processing the seeds for oil the producer has an option of either taking the cake to feed his/her animals or poultry, to make soap, or to sell it to the meal operator. The shortage of SSC which often occurs when the extraction plants break down, and the high demand for the cake, could lead to price rises.

In order to broaden the livestock feed base and ensure a regular supply of supplementary feeds fodder trees like *Leucaena leucocephela* and *Gliricidia sepium* could be established in the backyard of small holder sheep producers. The perennial nature of the trees and their ability to produce leaves during the dry season make them reliable supplementary feed sources.

The objectives of this feeding trial were to:

1) Evaluate whether *L. leucocephela* and *G sepium* foliage can replace SSC as sources of protein.

2) Measure the voluntary intake of GNH when rams are supplemented with either SSC, *L. leucocephela* or *G. sepium*.

3) Determine the performance of the rams fed GNH *ad libitum* and supplemented with two levels of either SSC, *L. leucocephela* or *G. sepium*.

MATERIALS AND METHODS

Thirty six intact, trypanotolerant Djallonke rams (West African Dwarf sheep - WADS) with liveweights ranging from 18 to 30.8 kgs (mean liveweight = 22.8 Kgs) were treated to control external and internal parasites, blocked according to weight and randomly assigned to six treatment groups of six animals each. The six groups were then randomly assigned to one treatment diet as follows

Treatment 1 (T-1): GNH fed *ad libitum* plus 100 g SSC/day

Treatment 2 (T-2): GNH fed *ad libitum* plus 50 g SSC/day

Treatment 3 (T 3): GNH fed *ad libitum* plus 294 g DM/day of *leucocephela* leaves

Treatment 4 T-4 GNH fed *ad libitum* plus 147 g DM/day of *L leucocephela* leaves

Treatment 5 T-5): GNH fed *ad libitum* plus 266 g DM/day of *G sepium*

Treatment 6 (T-6): GNH *ad libitum* plus 133 g DM/day of *G. sepium*

The feed samples were analysed (using standard methods) and their mean nutrient contents are presented in Table 1. The higher levels of supplements offered provided 50 g crude protein (CP)/animal/day and the lower levels provided 25 g CP/animal /day

Table 1. Chemical Composition of Feeds Fed (% Dry Matter

Feed	DM	CP	NDF	ADF	EE
Groundnut hay	95.9	13.5	36.1	32.3	Nil
Sesame Seed Cake	Nil	30.3	Nil	Nil	Nil
L leucocephela	39.4	17.0	28.7	19.2	Ni
G sepium	28.1	18.6	33.9	23.1	Nil

The animals were individually tethered, provided with a mineral block and given water every two hours during the day.

The fodder trees were harvested in the morning, the leaflets separated from the branches and weighed. The fodder leaves and SSC were offered in one meal. The GNH was fed after the animals had eaten all the supplements. The amount of GNH fed was calculated to ensure a 10 to 20% refusal rate. To estimate intake of GNH refusals were weighed every morning and subtracted from the amount offered the previous day.

The animals were allowed a fourteen day adaptation period before measurements began.

The animals were weighed on the same day each week after depriving them of water the night before. Daily liveweight gain (DLWG) was estimated as the difference between the final and initial weights divided by the number of days the experiment lasted - 84 days.

The General Linear Model (GLM) of the SAS computer package was used to analyse GNH intake and DLWG.

RESULTS

There was total consumption of all the supplements offered except in T-5 where one ram consistently ate about half the *G. sepium* leaves fed.

The lighter animals with average initial liveweight of 20.77 kgs had significantly ($P < 0.05$) less GNH intake (1000 g/day) than the animals weighing on average 26.6 Kgs (1300 g/day). The rams in T-4 had significantly ($P < 0.05$) higher GNH intakes than those in the other treatment groups; mean intakes in those groups were however not significantly different. GNH intake was equal to 94 g/Kg $W^{.75}$/day and above in all treatment groups but was less than 5% of body weight (BW) in all but one treatment group (T-4) where intake was equivalent to 5.12% of BW.

Average DLWG of the rams are presented in Table 2 and depicted in Figure 1. The DLWGs attained in this trial were not significant. The rams supplemented with the higher level of *G. sepium* (T -5) attained the highest DLWG at 83.73 g/day while those in T-2 had the lowest DLWG - 68.25 g/day, however the six treatment means were not significantly different at the 0.05% level.

Rams with an average starting weight of 20.77 Kgs attained the highest DLWG of 87.28 g/day while those with the highest mean starting weight (26.6 Kgs) grew at a rate of 67.06 g/day and these differences were highly significant.

Table 2. Daily Liveweight Gain and Groundnut Hay Intake of Rams by Treatment Group

	T-1	T-2	T-3	T-4	T-5	T-6
Initial Weight	22.35	22.63	23.13	23.00	22.90	23.44
Stderr (Kgs)	1.22	1.22	1.22	1.34	1.22	1.34
Final Weight	29.10	28.37	29.27	29.00	29.93	29.48
Stderr (Kgs)	1.25	1.24	1.24	1.36	1.24	1.36
DLWG	80.36	68.25	73.02	71.43	83.73	71.90
Stderr (g)	6.86	6.86	6.86	7.51	6.86	7.51
Groundnut hay intake	1.10	1.10	1.10	1.33	1.10	1.10
Stderr (g)	0.12	0.12	0.12	0.13	0.13	0.13
Intake as % of BW	4.28	4.31	4.20	5.12	4.16	4.16
Intake g/kg $W^{.75}$/ day	96	97	95	113	94	94

DISCUSSION

Liveweight, kind and level of supplementary feed offered are some of the factors which affect the intake of a particular animal. In a review of the feeding value of *G. sepium* it was stated that *G. sepium* supplementation does not improve intake of the basal diet because the bulky leaves distends the rumen (Smith and van Houtert, 1987). In this study the intake of the basal diet was apparently similar in the two treatments receiving a low and high level of *G. sepium* supplementation; any effect in GNH intake could only have been detected if there was a control or GNH only group.

Feeding 3 g *L. leucocephela* DM/Kg LW/day to sheep was reported to be the optimum level of supplementation of maize stover, (Kimambo *et al*, 1991). The lowest level of *L. leucocephela* supplementation in this trial was equivalent to about 5.65 g DM/kg BW/day and the animals in this group (T-4) had the highest level of GNH intake. By doubling the amount of *L. leucocephela* supplementation (T-3 group) the level of GNH consumption was decreased, but this level of intake was equal to those in the SSC and *G. sepium* groups. The fact that the T-4 animals had higher *ad libitum* GNH intake could have been due to individual animal differences - two animals in this group consistently consumed all the GNH offered.

The high GNH intakes recorded in this trial are above the values of 3 to 3.7% DM/Kg BW indicated for sheep fed rice and maize stalks and various combinations of supplements (Fomunyam and Mbomi, 1989); the 2.29 to 2.75% DM of BW reported for WADS fed *Cynodon* plus either a concentrate mixture or whole maize grain (Adu and Olaluko, 1976); and the values for goats fed groundnut haulms - 3.4% of BW (Alhassan, 1986). The values of over 90 g DM/Kg $W^{.75}$/day are even higher than the 66.98 to 75.98 g DM/Kg $W^{.75}$/day reported for WADS in Cameroon (Njwe and Godwe, 1989). These high intakes may have been due to the GNH's high nutritive value and palatability.

The overall DLWGs were affected by differences in the rate of gain by individual animals within a treatment group. For example in T-1 DLWG values ranged from a low of 35.70 g/day to a high of 103.60 g/day and a similar trend was observed in all treatment groups. The average DLWG values for the six treatments were below the 100 g/day DLWG reported from an on farm trial conducted in The Gambia (Njie and Reed, 1991) and 118 g/day for lambs fed *Cynodon* and a concentrate mixture (Adu and Olaloku, 1976).

The availability, the opportunity cost, the cost of alternative feeds and the market value of the fed animal should all be considered when developing feeding systems for small holders. Groundnuts, cultivated by most farmers, has a hay yield of 1.5 tonnes/Ha and has a farm gate price of D450/tonne. Sesame Seed Cake now sells at D0.50/Kg excluding transport. Fat rams attract a premium price of D30 to D40/Kg liveweight one week before the feast of *Tobaski*. Feed gardens require initial capital investment but once established will need low recurrent cost. In order to establish the economic advantages of depending on feed gardens rather than purchased supplements to fatten rams, the establishment and maintenance costs of the feed gardens need to be determined.

CONCLUSIONS

The results of this trial show that generally the kind and level of supplementation had similar effects on the intake of the basal diet (GNH) and the DLWG of rams which indicates that all three protein sources were equally effective as supplements. An added feed is considered a supplement if the addition does not result in reduced intake of the basal diet (Ndlovu, 1991).

The lighter animals performed better in terms of DLWG even though their daily GNH intake was significantly lower than the heavier animals

Sheep producers who cannot have SSC either because of the price or lack of access could establish feed gardens and use the foliage as an alternative protein source. However, the economics of establishing and maintaining the intensive feed gardens and the use of the foliage to replace SSC should be determined.

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Table 2: Daily Liveweight Gain of Rams