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PERFORMANCE CHARACTERISTICS OF GROWING RABBITS FED *GLICIDIA SEPIUM* LEAF MEAL AS A REPLACEMENT FOR GROUNDNUT

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The study involved 16 weaner crossbred (New Zealand White and Chinchila) rabbits of about eight weeks of age with initial average weight of 0.69 kg. The animals were offered a measured amount of their respective diets. The level of replacement of groundnut cake with Gliricidia leaf meal (GLM) were 0, 25 50 and 75%, to give four diets which were fed *ad libitum* throughout the experimental period of 35 days. The similar average daily feed intake of the rabbit fed 0, 25 and 50% GLM included diets was significantly ($P < 0.05$) higher than the corresponding daily weight gain of the rabbits fed 25 and 50% GLM diets and those fed 75% GLM diet recorded the least ($P < 0.05$) daily gain. Dry matter intake (DMI) was significantly correlated with daily weight gain ($r = 0.94$, $P < 0.05$) and feed efficiency ($r = 0.90$, $P < 0.05$).

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INTRODUCTION

Over the years, the demand in West Africa for animal production far exceeds the supply. The potentialities of rabbit as a fast growing animal with nutritious meat that is low in fat and fine grained (Komolafe, 1981 and Adegbola *et al.*, 1985) have been recognized. The continued dependence on costly commercial concentrates for rabbit feeding results in increased overhead cost incured in rabbit production as a cheap source of animal protein. *Gliricidia sepium* is among the leguminous fodder trees or multi-purpose trees (MPTs) which contain proteins, minerals and vitamins essential for the growth of livestock. Multi-purpose trees have been identified as potential supplements for concentrates in livestock feeds (Hegarty *et al.*, 1964; Jones, 1979; Onwuka, 1983; 1986; Reed *et al.*, 1990; Siaw et al., 1993; Richards *et al.*, 1994). However, some MPTs also contain secondary plant compounds that may be toxic to the animal (Akin, 1982; Woodward and Reed, 1989; Reed *et al.*, 1990) and quantitative information on sundried MPTs leaf meal fed to livestock is scanty. Our objective was to evaluate the performance of growing rabbits fed diets containing graded levels of sundried *Gliricidia* leaf meal (GLM) as a replacement for groundnut cake (GNC).

MATERIALS AND METHODS

Gliricidia leaves were harvested from the livestock farm of the School of Agriculture, Ikorodu and sundried for about 3 days at a temperature range of 23 -35°C and relative humidity range of 48.4 - 95.3%. The *Gliricidia* leaves were milled in

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a 0.5mm Nulus commercial hammer mill and stored in polythene bags until ready for use. Four diets were formulated as shown in Table 1. *Gliricidia* leaf meal was used to replace groundnut cake at 0, 25, 50 and 75% in diets 1, 2, 3 and 4 respectively.

Sixteen 56-day old crossbred (New Zealand White and Chinchila) rabbits averaging 0.69 kg divided into four groups of similar gender and weight were assigned in a completely randomized design to the dietary treatments with a rabbit per hutch (35 x 45 x 45 cm) and four hutches per dietary treatment. The rabbits had free access to feed and water throughout the study period of 35 days. The amount of feed offered to each of the experimental rabbit was measured and recorded daily. Waste feed, if any, was collected, weighed and substracted from the total feed offered and data were recorded for the calculation of daily intake. Individual rabbits were weighed weekly for the calculation of the average daily weight gain (ADG) and feed to gain ratio (F/G). The values obtained were subjected to statistical anaysis and means separated using the SAS computer software package (1988).

RESULTS AND DISCUSSION

Chemical Composition

The composition of the experimental diets fed to the growing rabbits is shown in Table 1 while the proximate composition of the diets is shown in Table 2. The dry matter content of the four diets were identical and the mean was 90.05%. Groundnut cake (GNC) contained 45% crude protein on dry matter basis whereas GLM contained about 23% crude protein. However the diets were balanced to have 20% crude protein on as fed basis. The gross energy content (on basis of calculation) for the four diets was about 3.5kcal/g. *Gliricidia* leaf meal had more crude fibre (16.6%) than GNC (6.5%). The replacement of GNC with GLM resulted in an increase in crude fibre (CF) and a decrease in ether extract (EE) levels in the diets. Phenolic (Tannin) content of GNC was not determined but GLM contained 1.63% phenolic compound. However, phenolic content of diet 1 (0% GLM) was the lowest (0.31%) while values of 0.33, 0.38 and 0.58% were recorded for diet 2, 3 and 4 respectively.

Table 1
Composition of experimental diets fed to the growing rabbits

	% Replacement of groundnut cake by Gliricidia leaf Meal			
Ingredients[a]	**0**	**25**	**50**	**75**
Maize	46.50	46.50	46.50	46.50
Wheat offal	16.0	16.0	16.0	16.0
Groundnut cake	15.0	11.25	7.50	3.75
Gliricidia leaf meal	0.0	3.75	7.50	11.25
Palm kernel cake	16.0	16.0	16.0	16.0
Blood meal	2.0	2.0	2.0	2.0
Bone meal	1.0	1.0	1.0	1.0
Oyster shell	2.0	2.0	2.0	2.0
Vitamin premix*	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Starch binder	1.0	1.0	1.0	10.0
Total	100.0	100.0	100.0	100.0

[a] As fed basis
*Vitamin premix as recommended by NRC (1979) contained the following per kg diet: Vitamin A, 3,086,440 IU; Vitamin D3 440,920 IU; Vitamin E 6,614 IU; Vitamin B12 10.6 mg; B2 2.205 mg; Menadione 1.96 mg; Folic acid 285 mg; Pyridoxine 882 mg; Thiamine 442 mg; d-Biotin 44mg; Antioxidant and anti-caking agents.

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Table 2
Chemical composition of experimental diets, groundnut cake and *Gliricidia* leaf meal

	% Replacement of groundnut cake by Gliricidia leaf Meal					
Nutrients (%)	**0**	**25**	**50**	**75**	**GNC**	**GLM**
Dry matter	90.04	90.06	90.05	90.07	96.08	95.06
Crude protein	20.58	20.56	20.23	20.31	45.00	22.50
Crude fibre	5.31	6.25	6.33	6.38	6.50	16.60
Ether extract	4.50	4.21	4.15	4.09	6.00	4.90
Nitrogen free extract	50.54	50.78	50.89	50.90	35.28	37.56
Ash	8.11	9.26	9.55	9.67	4.80	9.50
Gross Energy*	3.55	3.53	3.53	3.53	2.64	2.20
Phenolic (tannins)	0.31	0.33	0.38	0.58	ND	1.63

* = Calculated; GNC = Groundnut cake; GLM = Gliricidia leaf meal; ND = Not determined

Reynolds and Adeoye (1986) and Glover (1989) reported that crude protein (CP), crude fibre (CF) and ether extract (EE) of GLM were between 18-30%, 13-30% and 4-8% respectively. Also works by Lowry *et al.* (1992) and Glover (1989) indicated that GLM was rich in inorganic matter (6-10%). Reynolds and Adeoye (1986) also reported that NFE of GLM was 44.4%, while Porter *et al.* (1986) and Hagerman (1987) observed that *Gliricidia sepium* is relatively low in extractable tannin as noticed in this study.

Feed intake and Feed efficiency

The effect of replacing GNC and GLM on feed intake is shown in Table 3. Average daily feed intakes of rabbits fed diets containing 0, 25 and 50% GLM were similar and the mean value (77.06 gd^{-1}) was higher ($P < 0.05$) than 74.94 gd^{-1} of the rabbits fed 75% GLM. The rabbits fed diet 4 (75% GLM) consumed about 3% less feed as compared to those fed 0, 25 and 50% GLM replacement levels. The similar ($P > 0.05$) feed intake of rabbits fed 0, 25 and 50% GLM in this study was similar to the observation of Onwudike (1995) on growing rabbits fed *G. sepium* in mixture with concentrates. However Lowry *et al.*, (1992) and Dharia *et al.*, (1993) had earlier reported animals' reluctance to consume diets containing *G. sepium*. These earlier workers reported that palatability appears to be more of a problem for *G. sepium* in some parts of the world than in others. Acceptability of GLM at 50% inclusion may have been enhanced by sundrying, milling and mixing with other feed ingredients. In conformity with this practice Merkel *et al.*, (1994) who reported that palatability of *G. sepium* was improved by wilting the leaves for several hours thereby reducing the coumarin content before feeding. Coumarin has been identified as a secondary compound contributing to the characteristic smell of the leaves of *G. sepium*.

The reason for the significantly ($P < 0.05$) reduced feed intake observed at 75% replacement GNC by GLM in this present study is not known. Similarly, Mishra *et al.* (1977) observed a depression in intake of chicks at a higher level of inclusion and attributed it to comparin- a low molecular weight phenolic compound that occurs in fresh leaves.

Feed conversion ratio in rabbits fed 0% GLM, 6.38g of feed per g of gain was better than the similar ($P > 0.05$) mean of 9.14 of rabbits fed 25 and 50% GLM inclusion and 11.41 for rabbits fed 75% GLM inclusion was the least ($P<0.05$). However, dry matter intake (DMI) was significantly correlated ($r = 0.90$, $P < 0.05$) with feed to gain ratio (F/G) as shown in Table 5.

Table 3

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Performance characteristics of rabbits fed the experimental diets

	% Replacement of groundnut cake by GLM				
Parameters	**0**	**25**	**50**	**75**	**SE**
Experimental period (days)	35	35	35	35	
Ave. initial wt./rabbit (kg)	0.69	0.73	0.68	0.65	0.08
Ave. final wt./rabbit (kg)	1.11a	1.02b	0.98b	0.88c	0.12
Ave. daily wt. gain/rabbit (kg)	12.0a	8.35	8.57b	6.57c	3.43
Ave. daily feed intake/rabbit (kg)	76.54a	76.9a	77.66a	74.94b	2.92
Feed to gain ratio	6.38a	9.22b	9.06b	11.41c	2.26
Mortality	Nil	Nil	Nil	Nil	

a, b, c, Means in the same row with identical superscript are not significantly (P >0.05) different

Table 4
Correlation between DMI (g, X) rate of gain, feed to gain ratio (Y)

	Regression equation	Correlation coefficient (r)
DMI (g) Vs. DG (g)	Y = 1115.83 - 1.46X	0.94*
DMI (g) Vs. F/G	Y = - 3.17 + 0.009X	0.90*

* = Significant (P < 0.05); DMI = Dry matter intake; DG = Daily gain; F/G = Feed to gain ratio

Growth Rate

The average initial, final and daily weight gain of the rabbits fed the experimental diets is presented in Table 3. The average initial weights of the rabbits were similar and the mean value was 0.69± 0.08 kg. At the end of the study the average final weight 1.11 ± 0 25 kg of rabbits fed the control diet (diet 1) was higher (P < 0.05) than the corresponding average final weight 1.0± 0.12 kg of rabbits fed 25 and 50% GLM. The rabbits fed 75% GLM diet recorded the least (P < 0.05) final weight gain (0.88± 0.12 kg). Average daily weight gain of the rabbits followed the same pattern as the average final weight gain. Rabbits fed the control diet (diet 1) had the highest (P < 0.05) mean daily weight gain of 12.0 ± 3.43 and the similar (P >0.05) mean daily weight gain 8.46 ± 3.43 of rabbits fed 25 ad 50% GLM was higher (P < 0.05) than 6.57 ± 3.43 for the rabbits fed 75% GLM diet. Dry matter intake (DMI) was correlated with average daily gain (r = 0.94, P < 0.05). The observed feed intake and weight gain in this study are similar to the results of Onwudike (1995) on growing rabbits fed *G. sepium* in mixture with concentrates. However, Cheeke and Raharjo (1987) reported poor performance when *G. sepium* was included in the diets of chickens and rabbits. The encouraging growth rate of 8.5gd^{-1} observed with rabbits fed 50% of concentrate without loss of production in livestock but only in isoenergetic diets (Liyanage and Wijeratue., 1987; Richards *et al.*, 1994,).
It is therefore concluded that it appears that up to 50% of GNC in the diet of growing rabbits could be replaced with sundried GLM without any adverse effect on performance.

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