PERFORMANCE AND NUTRIENT UTILIZATION BY SHEEP FED FICUS LEAVES

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ABSTRACT

Growth and metabolic studies were conducted with 32 sheep (16 rams and 16 ewes) to evaluate *Ficus* leaves (*Ficus thonningia*) as substitute for *Hyparrhenia rufa* (*Hyparrhenia*) in the diets of sheep. *Ficus* replaced 0, 25, 50 and 75% of grass and was offered at 3% of animal body weight as DM. All the sheep received concentrate at 1% of body weight as supplement. Digestibilities of DM, NDF, ADF and N were similar ($P > 0.05$) for sheep on diets containing 0, 25 and 50% *Ficus* except at 75% which was ($P < 0.05$) lower. Nitrogen retention was positive and the values increased with dietary level of *Ficus* up to 50% and then declined. Differences were not however, significant. Intake of *ficus* was significantly ($P < 0.001$) and positively related to both total feed intake ($r = 0.99$) and daily liveweight gains ($r = 0.55$). Average daily liveweight gains (LWG) was 28.75, 33.75, 47.50 and 36.25 g/day for Sheep on 25, 50 and 75% dietary level of *ficus*. Feed efficiency was 11.35, 21.67, 31.84 and 27.89 (g feed DM/g LWG) for sheep on dietary levels of *ficus*. The results showed that sheep on diet containing 50% *Ficus* gained 47.50g/day which represented an increase of about 65.22% higher than value obtained for those on the control diet (0% *Ficus*) but at lower feed conversion efficiency.

Key Words: *Ficus*, Leaves, Performance, Nutrient utilization, Sheep

INTRODUCTION

Rapid lignification with its attendant decrease in nutritive quality is a major constraint to ruminant production in Nigeria. Where concentrate supplement is provided to enhance production the protein sources are the oil seed cakes, which are competitive as

monogastric feedstuffs. The need to search for alternative, less expensive and locally available sources of protein for ruminants becomes important to curtail the rising cost of seed cakes.

Browse plants have potential as sources of protein for ruminants in the tropics. The CP and mineral contents of most browse plants are higher than what obtained in most grasses (Rose-Innes, 1964., Kapu, 1975, Milligan and Sule 1980 and Agishi, 1983) and they could be available for most part of the dry season. Most research focus on the feeding value of browses is limited to dry season due to the low quality of conventionally grazed pasture (De leeuw and Brinckman, 1974; Zemmeling, 1974., Kapu, 1975 and De leeuw, 1978).

Ficus thonningia (Blume) is a palatable tropical browse (Mecha and Adegbola, 1980) mostly found in the savanna zones with high nutritive values (Agishi, 1985). The browse is yet to be given more attention as feed for ruminants in the Northern Guinea Savanna zone of Nigeria. The objectives of the current study were to evaluate *Ficus* as feed for sheep and also to determine its optimum level for replacing *Hyparrhenia* spp. as green feed.

MATERIALS AND METHODS

Site:

This trial was conducted between July and October at the National Animal Production Research Institute (NAPRI), Shika-Zaria. Sub humid zone of Nigeria, (lat. 11° 01' N 7° 44'E).

Animals and Management

A basal diet of freshly cut *Hyparrhenia rufa* (*Hyparrhenia*), was replaced weight for weight (0, 25, 50 and 75%) with *Ficus* leaves. The forage was offered at 3% bodyweight on dry matter basis. Thirty-two Yankasa sheep (16

TABLE 1: PROXIMATE NUTRIENT COMPOSITION (%) OF FICUS THONNINGIA, HYPARRHENIA SPP AND THE CONCENTRATE

Nutrients	Ficus	Hyparrhenia	Concentrate
DM (As fed)	39.76	79.85	----
DM (Residual)	95.58	96.09	92.06
CP	12.85	6.50	16.26
NDF	49.51	76.98	43.89
ADF	37.52	42.54	25.38
ASH	13.48	9.19	3.39

The concentrate ration consisted of 37.73% Maize, 26.20% Maize offal, 34.06% Cotton seed cake, 1.0% Salt and 1.0% bone meal.

TABLE 3: GROWTH RATE, VOLUNTARY FEED INTAKE, FEED EFFICIENCY AND NITROGEN RETENTION OF SHEEP FED GRADED LEVELS OF FICUS

Parameters	TREATMENTS				SEM
	0	Replacement levels (%) of Ficus		75	
		25	50		
Liveweight					
Initial weight (Kg)	16.49	15.88	15.84	15.94	
Final weight (Kg)	17.85	17.78	18.64	18.08	
Average wt gains (g/day)	28.75 ^c	33.75 ^b	47.50 ^a	36.25 ^b	5.09
Feed efficiency (g feed DM/g gain)	11.35 ^b	22.67 ^a	31.93 ^a	27.87 ^a	9.40
Feed Offered					
Av. Hypa. offered (g/day)	1545.83	1169.60	711.47	406.20	
Av. Ficus offered (g/day)	----	496.83	710.60	1313.58	
Percent intake of feed offered					
Ficus	0.00	96.13	96.64	98.32	1.93
Hyparrhenia	69.21 ^b	95.14 ^a	98.13 ^a	98.94 ^a	4.29
Dry Matter Intake (g·kg^{-0.75})					
Ficus	----	86.43 ^c	129.20 ^b	195.13 ^a	7.83
Hyparrhenia	38.78 ^a	40.52 ^a	27.16 ^b	18.81 ^c	2.60
Concentrate	46.18	45.92	44.35	42.49	2.86
Total	84.96 ^c	172.87 ^b	192.85 ^b	258.28 ^a	9.43
Urine/Faecal output					
Daily Urinary output (ml)	117.25 ^b	118.75 ^b	190.00 ^{ab}	216.25 ^a	78.12
Daily Faecal Output (g)	340.25 ^c	434.00 ^a	325.50 ^{bc}	391.00 ^{abc}	55.02

^{a,b,c} Means on the same row with different superscripts differ significantly (P < 0.05).

rams and 16 ewes) weighing 10.50 to 23.00 kg were dewormed using Fulkazole and used in a randomized block design to study the effect of varying dietary levels of Ficus leaves on performance and nutritive quality. The sheep were equally allotted into four treatment

groups, balanced for sex and bodyweight and kept in individual pens. Weighed concentrate supplement (1% of bodyweight) was offered in the morning and the forage as soon as the concentrate was exhausted. Any left over was collected, weighed, dried, and sampled for

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laboratory analysis. The sheep were weighed every 10 day and feed offered adjusted accordingly. Water was provided ad-libitum. The trial lasted 60 days.

Digestibility study

At the end of the growth study, four rams in each treatment were placed in individual metabolic crates. The rams were allowed an adjustment period of 7 days before the 7-day collection period. Faecal and urinary outputs were collected (Osuji *et al.*, 1993). Samples of concentrate, *Hyparrhenia* and *Ficus* fed and their left overs were collected and oven-dried for each day and sampled for analysis.

Analytical Procedure

A.O.A.C. (1980) methods were used for the determination of DM and proximate contents of the concentrate, *Ficus*, *Hyparrhenia*, left overs, urine and faecal samples. ADF and NDF were also determined (Van Soest and Robertson, 1990).

Statistical Analysis

Data on dry matter intake ($\text{g/kgW}^{0.75}$), digestibility values, N retention were subjected to analysis of variance (SAS 1990) to detect treatment differences. Regression analysis was carried out on *Ficus* intake, total dry matter intake and liveweight gain.

RESULTS AND DISCUSSION

The nutrient composition of the concentrate, *Ficus* and *Hyparrhenia* are presented in Table 1. The CP and ash contents of *Ficus* is within the range reported by Carew *et al.*, (1980). The CP content of *Ficus* is twice that of *Hyparrhenia*. Table 2 shows the feed intake, feed efficiency and liveweight gain of the sheep. Intake of the *Ficus* and total dry matter intake (DMI) of the diet ($\text{g/kgW}^{0.75}$) increased ($P < 0.05$) as the level of *Ficus* increased in the diet. This might be attributed to the palatability of *Ficus* (Carew *et al.*, 1980, Mecha and Adegbola, 1980), and its higher level of protein (Talkamp, 1988). However, the proportions of *Ficus* consumed from the amount offered were similar ($P > 0.05$) among the tested diet. The proportion of *Hyparrhenia* consumed when

compared to the amount offered was lowest ($P < 0.05$) on diet containing zero level of *Ficus*, this indicated that inclusion of *Ficus* aided the intake of *hyparrhenia*. The low DMI of diet containing zero level of *Ficus* was due to its low nitrogen level (Ifut, 1989). This finding is in agreement with those of Muinga, *et al.*, (1992) where inclusion of browse in the diet increased DMI. DMI ($\text{y;g/kgW}^{0.75}$) had a significant ($P, 0.001$) and positive linear relationship with intake of *ficus*, (x;g/day). The equation $y = 86.61 + 0.90x$ ($r = 0.99$; standard error estimate = 0.03; $P, 0.001$) described the relationship. Diets containing 25, 50 and 75% *Ficus* had similar ($P > 0.05$) proportions of intake. DMI ($\text{g/kgW}^{0.75}$), of rams and ewes on the diets containing 0 and 75% *Ficus* were similar (72.37 and 71.55 and 237.60 and 203.69 for rams and ewes on zero and 75% *ficus* levels respectively). However, the rams consumed more ($P < 0.05$) than the ewes on diets containing 25 and 50% *Ficus*.

Average daily liveweight gain increased ($P < 0.05$) with increasing level *Ficus* up to 50% inclusion before it declined. Inclusion of *Ficus* at 25, 50 and 75% level increased the liveweight gains of the sheep by 17.39, 63.22 and 26.09% respectively when compared with the control treatments (zero *Ficus* level). The higher liveweight gains of sheep on diet containing *Ficus* could be attributed to higher nutritive value of *Ficus* and better nitrogen retention on *Ficus* containing diets. This result is similar to those of Chanda and Bhaid (1987). Liveweight gains (y;g/day) was significantly ($P < 0.001$) and positively related to *ficus* intake (x;g/day) by the following relationship $y = 24.89 + 0.11x$, ($r = 0.55$; SD estimate = 0.03; SD intercept = 3.94). The higher liveweight gains of sheep on diet containing 50% *Ficus* is due to better nutrient balance from *ficus* and *Hyparrhenia*. Liveweight gains of rams and ewes were similar on diet containing 0, 50 and 75% *Ficus* but differ significantly ($P < 0.05$) on diet containing 25% *Ficus* (40.00 and 27.50g/day for rams and ewes respectively). The feed efficiency was highest ($P < 0.05$) on diet containing zero level of *Ficus* and became

TABLE 3: NUTRIENT DIGESTIBILITY OF SHEEP FED GRADED LEVELS OF FICUS LEAVES.

Parameters	TREATMENTS				
	Replacement levels (%) of Ficus				
	0	25	50	75	SEM
Digestibility coefficient (%)					
Dry Matter	74.24 ^a	78.44 ^a	76.75 ^a	63.63 ^b	7.72
Nitrogen	69.10 ^{ab}	73.63 ^a	77.85 ^a	56.71 ^b	14.76
ADF	73.37 ^a	75.98 ^a	77.96 ^a	63.15 ^b	9.56
NDF	74.67 ^a	77.76 ^a	76.70 ^a	61.55 ^b	10.65
Nitrogen retention	23.06	28.77	34.48	34.34	15.40

^{a,b,c,d} Means on the same row with different superscript differ significantly ($P < 0.05$).

poorer as the level of Ficus increased in the diet. The efficiency of the diet containing Ficus were similar ($P > 0.05$). Feed efficiency of the rams and ewes within the same treatments were also similar ($P > 0.05$).

Nutrient digestibility coefficient on dry matter basis and nitrogen retention values are presented in Table 3. Daily faecal output ranged between 325.50 to 391.00g/day, the highest was on diet containing 25% Ficus but similar ($P > 0.05$) to diet containing 75% Ficus. Faecal output was lowest in diet containing 50% Ficus. However, sheep on 0 and 75% Ficus had similar faecal output to those on 50% Ficus. Urine output ranged between 117 and 261mls. Increased urine output observed in this study can be associated with Ficus intake, this is however, attributed to increased nitrogen intake as the proportions of ficus increased in the diet. A similar effect has been reported by Tyagi and Kishan, (1983) in sheep and goat when the protein level of the diets was increased. DM Digestibility was highest ($P < 0.05$) in diet containing 25% Ficus, this is similar to the control (0% Ficus) and diet containing 50% Ficus diets. Digestible DM was however, lowest ($P < 0.05$) in 75% Ficus diet. Digestibility of nitrogen was highest ($P < 0.05$) in diet containing 50% Ficus, and similar to those ($P > 0.05$) containing 0 and 25% level of Ficus. The lowest digestible nitrogen was recorded on diet containing 75% Ficus, this was similar to the control diet. At 50% inclusion level of Ficus in the diet, digestibility of ADF was ($P < 0.05$) highest, this

was not different from those containing 0 and 25% Ficus. Inclusion of Ficus at 75% resulted in the lowest ($P < 0.05$) ADF digestibility. NDF digestibility was highest ($P < 0.05$) on diet containing 25% Ficus and similar to the diet containing 0 and 50% Ficus while the lowest NDF digestibility ($P < 0.05$) was recorded in diet containing 75% Ficus. Nitrogen retention was positive in all the diets and ranged between 23.06 and 34.48%. Sheep on highest Ficus level retained more ($P > 0.05$) nitrogen. The low level of both nitrogen digestibility and nitrogen retention recorded for sheep fed diet containing zero level of Ficus are in agreement with the result reported by Mosi and Butterworth (1985).

The higher CP content of diets containing 25 and 50% Ficus help to play a significant role in the digestibility of the nutrient. Similar observation was reported by McDonald, *et al.*, (1988). The low digestibility of the diet containing zero level of ficus is due to higher fibre content (Silva and Orskov, 1988) which reduced the rate of microbial colonization of the feed. The reduced digestibility of nutrient on diet containing 75% ficus could be due to insufficient diet. The possibility of anti-nutritional factor from Ficus contributing to the low nutrient digestibility is suspected, but this was however, not analysed for.

The result of this study shows that suitable proportion for maximum utilization of feed was ensured when Ficus replace up to 50% of Hyparrhenia in the diet of Sheep. This resulted in liveweight gain of up to 47.50g/day

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which represents an improvement of about 65.22% over the control. Further increase in the proportion of Ficus leaves (75%) in the diet of the sheep resulted in a decline of about 23.68% in the liveweight gains. The need to investigate the very poor feed efficiency of diets containing Ficus leaves is suggested.

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