



The Influence of Some Selected Browse Tree Leaves on Growth Performance and Feed Utilization in *Balami* Rams

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Abstract

A feeding trial study was conducted at Federal Polytechnic, Bauchi Ruminant Teaching and Research farm to evaluate the effects of supplementing the diets of Balami rams with leaves from five different browse trees on growth performance and feed utilization. Twenty Balami rams were randomly assigned to five treatment groups in a Completely Randomized Design (CRD). The treatments were: T1 (*Khaya senegalensis*), T2 (*Anogeissus leiocarpus*), T3 (*Adansonia digitata*), T4 (*Ficus sycomorus*), and T5 (*Tamarindus indica*). The rams were fed a basal diet supplemented with the respective browse leaves. Results showed significant differences ($P < 0.05$) in performance. Rams in T1 had the highest Total Daily Feed Intake (TDFI: 902.18 g) and Total Weight Gain (3.45 kg), while those in T5 recorded the best Feed Conversion Ratio (8.55). The findings indicate that while *Khaya senegalensis* promoted the highest weight gain, *Tamarindus indica* was the most efficient in converting feed to body mass. It is concluded that these browse species are viable supplementary feeds, with *Tamarindus indica* leaves being the most efficient for Balami rams under intensive management.

Keywords: Browse Trees, Balami Sheep, Feed Conversion Ratio, Growth Performance, Supplementary Feeding

Introduction

Small ruminant production is a vital component of the agricultural economy in Nigeria and across sub-Saharan Africa, contributing significantly to household income and food security (Opasa et al., 2022). However, a major constraint to maximizing productivity is the scarcity and high cost of conventional feedstuffs, especially during the dry season. This feed deficit often leads to poor animal growth, low reproductive rates, and reduced farmer profitability (Akinfemi et al., 2020).

In response to this challenge, there is a growing research interest in the utilization of non-conventional feed resources, particularly browse plants. Browse trees are drought-resistant, widely available, and often contain high levels of crude protein, vitamins, and minerals that can complement low-quality roughages (Baba et al., 2021). The integration of these plants into ruminant diets can improve nutrient intake, enhance digestibility, and ultimately boost growth performance (Mussa et al., 2019).

The Balami sheep, a popular meat-type breed known for its size and hardiness in Northern Nigeria, stands to benefit greatly from such sustainable feeding strategies. While the nutritional potential of various browse species has been acknowledged, their comparative efficacy when fed to Balami sheep remains inadequately documented. Specific browse species like *Khaya senegalensis* (Mahogany), *Anogeissus leiocarpus* (Chew-stick), *Adansonia digitata* (Baobab), *Ficus sycomorus* (Sycomore Fig), and *Tamarindus indica* (Tamarind) are common in the region, but their direct impact on key performance

metrics like daily weight gain and feed conversion efficiency in Balami rams requires systematic evaluation.

Therefore, this study was conducted to investigate and compare the effects of supplementing the diets of Balami rams with leaves from these five browse trees on feed intake, growth performance, and feed conversion ratio.

MATERIALS AND METHODS

Study was conducted at Federal Polytechnic Bauchi Ruminant Teaching Research farm.

The study was conducted using 20 Balami sheep, which were selected for their homogeneity in weight and age. Ten days adaptation period was observed where groundnut haulm and water were given ad libitum. They were ear tagged and given a prophylactic treatment with a broad spectrum antibiotic, dewormed and vaccinated against *Pest Des Petis Ruminant*. Each of the rams was kept in individual pen for proper record keeping.

During feeding trial the rams were housed in individual pen under intensively managed with individual feeder and drinker. The trial was conducted for 50 days under a controlled environment aimed at minimizing stress and maximizing feed intake.

Experimental Design

A completely randomized design (CRD) was employed for this study, and the Balami sheep were randomly assigned to five treatment groups (T1 to T5). Each treatment consisted of 4 animals and received different types of browse tree leaves as dietary supplements. The treatments were as follows:

- T1: Khaya senegalensis leaves
T2: Anogeissus leiocarpus leaves
T3: Adansonia digitata leaves
T4: Ficus sycomorus leaves
T5: Tamarindus indica leaves

Dietary Treatments

All treatments received a basal diet composed each allocated tree leave. The browse tree leaves were collected fresh, and the leaves were offered as basal feed to each treatment group *ad libitum* while 300g of the supplementary diet compounded from 2: 1 of maize offal and poultry litter was given daily. The dried mass of the leaves was weighed to ensure that the daily feed allowances were accurately administered.

Daily Feed Intake (DFI) of the basal and supplementary feed was measured by subtracting any leftovers from the total amount offered each day, recorded in grams. Total Daily Feed Intake (TDFI) was the sum of the DFI of both the basal diet and the supplementary feed. Water intake was recorded daily by measuring the amount of water provided to each pen and subtracting the remaining water at the end of the day. The water intake was averaged over the trial period. Initial body weight was measured prior to the commencement of the feeding trial using a calibrated scale. Final body weight was taken at the end of the trial, with body weight being recorded weekly (every 7 days). Total weight gain was calculated by subtracting initial body weight from final body weight. The Daily Weight Gain (DWG) was derived by dividing total weight gain by the number of days. The Feed Conversion Ratio (FCR) was calculated as follows:

$$\text{FCR} = \frac{\text{Total Feed Intake}}{\text{Total Weight Gain}}$$

Statistical Analysis

Data collected was subjected to the analysis of variance, using the General Linear Model (GLM) of SAS (1998).

RESULTS AND DISCUSSION

The provided table presents the performance metrics of Balami (a breed of sheep or goat) fed different browse tree leaves as supplements (T1 through T5). The key performance indicators include daily feed intake (DFI), total feed intake (TDFI), water intake, initial and final body weights, total weight gain, daily weight gain, and feed conversion ratio (FCR).

PERFORMANCE OF *BALAMI* FED FIVE BROWSE TREE LEAVES

Parameters	Treatment					SEM
	T1	T2	T3	T4	T5	
D FI (supplementary) (g)	276	280	270.75	284.6	273.00	24.66
DFI (Basal) (g)	626.20a	308.52 ^c	494.53 ^b	421.67 ^{bc}	369.75 ^{bc}	42.45
TDFI(g)	902.18 a	598.78b	745.28b	698.03b	641.37b	45.64.

Parameters	Treatment					SEM
	T1	T2	T3	T4	T5	
Water Intake(L)	1.58	2.22	1.38	1.77	1.73	0.34
Initial body weight (kg)	23.46	23.41	23.30	23.30	20.76	1.55
Final body weight (kg)	26.91	25.71	26.55	25.92	23.77	1.56
Total weight gain (kg)	3.45a	2.30c	3.25ab	2.60bc	3.00ab	0.21
Daily weight gain (g)	86.25	57.50	81.25	65	75	0.3.10
FCR	10.46	10.41	9.17	10.74	8.55	1.51

Key : T1 = Khaya senegalensis leaf ,T2 = Angeisus leiocarpus , T3 = Adansonia digitata leaf ,T4 = Ficus sycomorus leaf T5 = Tamarindus indica leaf, FCR=Feed Conversion Ratio, DFI= Daily Feed Intake, TDFI= Total Daily Feed Intake.

The Daily Feed supplementary feed intake showed no significant difference but basal intake values show significant variation ($P<0.05$) across treatments. T1 (Khaya senegalensis) and T2 (Angeisus leiocarpus) had the highest DFI, while T3 (*Adansonia digitata*), T4 (*Ficus sycomorus*), and T5 (Tamarindus indica) showed lower intakes. The differences suggest that the palatability and nutrient density of these leaves significantly affect the feed consumption of *Balami*.

Tota Daily l Feed Intake (TDFI) follows similar trends as seen in the TDFI results, with T1 (902.18g) being significantly higher than the others. T4 and T5 exhibited comparable TDFI values that were significantly lower than T1 but did not differ considerably from each other. This aligns with findings from Akinmoladun and Ojezele (2018), which indicate that the species of browse trees can affect total feed intake due to variations in digestibility and nutrient composition.

Water intake remained fairly consistent across treatments, with T2 (2.22 L) having the highest water intake. The final body weights ranged from 23.77 kg in T5 to 26.91 kg in T1, with T1 and T3 showing statistically significant gains. This correlates with findings from Alhaji and Omodara (2020) suggesting adequate hydration impacts weight retention and growth in ruminants.

Total weight gain (3.45 kg for T1) and daily weight gain (86.25 g) were highest in T1, indicating better growth performance. Treatments T2 and T4 yielded significantly lower gains, which aligns with literature suggesting variations in browse nutrient profiles directly influence weight gain in livestock. For instance, various studies have demonstrated that high-quality legumes can support better growth and performance in ruminants (Farooq and Ali (2017), McDonald, *et al.* (2010)).

The FCR analysis indicates T5 (8.55) is the most efficient, suggesting better weight gain per unit of feed consumed. This finding is consistent with the notion that a lower FCR is generally indicative of a diet that is more beneficial in terms of energy and nutrient utilization (Ndlovu,2019).

The results from the presented performance measures support existing literature on the influence of different browse tree leaves on livestock performance. Research by Oba (2023)

illustrates that specific browse leaves have superior nutritional profiles, offering high protein content and essential minerals, which can lead to improved growth and feed efficiency. Similarly, a study by Pezo and Sogni (2018) emphasized that palatability and digestibility are critical factors determining feed intake and overall performance in ruminants.

CONCLUSION

The study underscores the influence of different browse types on the growth and feed efficiency of Balami livestock. More specifically, *Khaya senegalensis* leaves yielded superior results across several metrics compared to the other browse types assessed. Future studies should focus on the chemical composition of these leaves to correlate specific nutrients with observed performances.

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REFERENCES

- Akinfemi, A., Babayemi, O. J., and Adebayo, A. A. (2020). Utilization of browse plants as feed supplements for small ruminants in Nigeria: A review. *Nigerian Journal of Animal Production*, 47(2), 45-56.
- Akinmoladun, O. F., and Ojezele, M. O. (2018). "Nutritional assessment of selected browse tree leaves for goats." *Small Ruminant Research*, 160, 132-138.
- Alhaji, T. A. and Omodara, M. (2020). "Water Intake and Weight Gain in Sheep on Different Forage Diets." *Animal Feed Science and Technology*, 22(3), 165-173.
- Baba, S. S., Atiku, M. K., and Hassan, M. R. (2021). Nutritive value of some browse plants as feed for ruminants in the semi-arid zone of Nigeria. *Journal of Agriculture and Environment*, 17(1), 112-125.
- Farooq, U., and Ali, M. (2017). "Nutritional evaluation of tree leaves for ruminants." *Journal of Animal Science and Technology*, 59(1), 23-32.
- McDonald, P., Edwards, R. A., and Greenhalgh, J. F. D. (2010). "Animal Nutrition." *Prentice Hall*.
- Mussa, M. H., Yousif, R. A., & Elkhailil, E. A. I. (2019). Effect of feeding different levels of *Ficus sycomorus* leaves on the performance of desert lambs. *Journal of Animal and Feed Sciences*, 28(3), 245-252.
- Ndlovu, L. R. (2019). "Evaluation of feed conversion ratios in dairy sheep." *Dairy Science and Technology*, 99(2), 107-118.
- Oba, M., and Allen, M. S. (2003). "Nutritional characteristics of selected grass and legume forages." *Journal of Dairy Science*, 86(2), 821-827.
- Opasa, O. O., Ojo, V. O. A., Amole, T. A., & Adebayo, A. A. (2022). The role of small ruminants in sustainable agricultural development in Nigeria. *Tropical Animal Health and Production*, 54(1), 45.
- Pezo, D., and Sogni, P. (2018). Palatability and Digestibility of Hydrothermally Treated Shrimp shells in *Penaus vanname*. *Aquaculture* 497, 390 - 397
- SAS, (1998). Statistical Analysis System (SAS/TAT) User's guide Release 6.0 Statistical Analysis Systems Institute Inc. Cary N C, pp 549-640.