

GROWTH PERFORMANCE AND NUTRIENT DIGESTIBILITY OF GRASSCUTTERS FED WITH DIFFERENT INCLUSION OF LOCUST BEANS MEAL AS A REPLACEMENT FOR SOYA BEAN MEAL

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ABSTRACT

The experiment was conducted to evaluate the growth performance and nutrient digestibility of grasscutters fed diets containing different inclusion level of locust beans meal (*Parkia biglobosa*) as a replacement for soya bean meal. In a completely randomized design, four diets containing different inclusion level of *Parkia biglobosa* were formulated to form the four dietary treatments. The Treatment diets contain 0%, 25%, 50% and 75% inclusion of *Parkia biglobosa* as Treatments 1, 2, 3 and 4, respectively. Forty eight grasscutters were randomly allotted into four dietary treatments for growth study which lasted for seventy days while twelve grasscutters were allotted into individual digestibility cage for a 14 day digestibility trial. Data obtained include, final body weight gain, average daily body weight gain, feed conversion ratio, dry matter digestibility, crude protein digestibility. Data were analyzed using ANOVA at 5% level of probability. Both final body weight and daily weight gain of the grasscutters differed ($P < 0.05$) between treatment groups. The final body weight gain ranged between 1.05 Kg (T1) and 2.54 Kg (T4), Average daily weight gain was significantly highest (28.86 g) in T4 and lowest (7.85 g) in T1 while the feed conversion ratio (FCR) was significantly higher (8.28) in T1 compared with grasscutters on other dietary treatments. The same trend was observed for nutrient digestibility as dry matter digestibility and crude protein digestibility were significantly highest (78.11) and (78.44), respectively in T4 and lowest (70.25) and (66.42), respectively in T1

The results obtained in this study show that the inclusion of *Parkia biglobosa* at 75 % inclusion level resulted in improved growth performance and enhanced nutrient digestibility in domesticated grasscutters.

Keywords: Growth performance, Domesticated grasscutters, Weight gain, Nutrient digestibility

INTRODUCTION

Captive rearing of the grasscutter has been identified as a potential source of income and employment and an important source of animal protein for both rural and urban people.

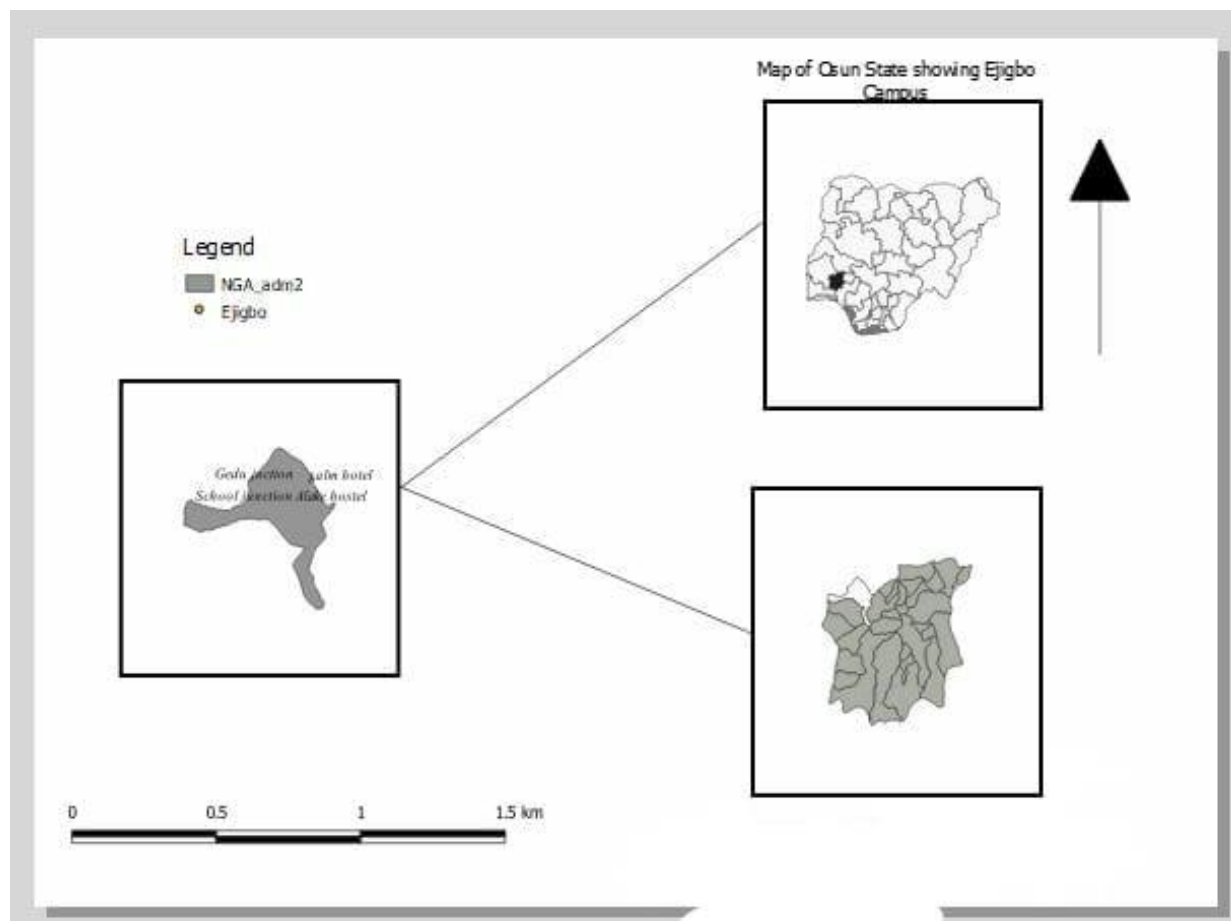
However, feeding the grasscutter still remains a challenge since farmers apparently find it difficult to feed them especially during the dry season [1]. Feeding them during this critical period of the year requires extra attention, therefore, there is need to supply adequate feed that will meet their nutrient requirements even under domestication. [2] recommended the nutrient requirements for various classes of livestock and based on their metabolic activities but there is little information on the nutrient requirements of wild animals in captivity. Moreover, many research findings have advocated for the use of unconventional feed stuffs in livestock feeds as a way reducing the cost of production as feed take up 70% of the cost of production in livestock enterprise [3]. [4] reported that *Parkia biglobosa* (locust bean) is edible and non-toxic plant product. The nutritional adequacy of the African locust bean seeds with a proximate composition of 30.00% protein, 15.0 and 49.00% carbohydrate was reported by the same author. Although, its use as food has been well established in human, there is paucity of information concerning its use as feed component for domesticated wildlife animals. The present study therefore focused on the growth performance and nutrient digestibility of grasscutters (*Thrynomys swinderianus*) fed diet containing different inclusion locus beans meal as a replacement for fish meal.

MATERIALS AND METHODS

Experimental site

The study was carried out at the Grasscutter Domestication Unit of the College of Agriculture, Osun State University, Osogbo, Ejigbo Campus, Osun State, Nigeria.

Plate 1: Map of study area



Experimental animals and Management

Forty eight weaned grasscutters were purchased from a reputable farm in PortoNovo, Republic of Benin for this study. The animals were acclimatized for two weeks prior to the commencement of the experiment. After the two week of acclimatization, the grasscutters were weighed and randomly allocated to the four dietary treatments on weight equalization basis weighed with twelve grasscutters per treatment and each grasscutter constituted a replicate. The grasscutters were housed individually in three cages (2-tier cages) with the dimension 1.60m (length) x 1.60m (height) x 0.06m (width).

Growth study

This experiment lasted for 10 weeks. Four experimental diets were formulated at different inclusion rate as replacement for soya bean meal

Treatment 1 - 0% *Parkia biglobosa* inclusion level,

Treatment 2 - 25% *Parkia biglobosa* inclusion level,

Treatment 3 - 50% *Parkia biglobosa* inclusion level, and

Treatment 4 - 75% *Parkia biglobosa* inclusion level

The grasscutters were fed two times daily: 7:00 hours, the animals were served with the experimental diets served at 5% metabolic body weight in the morning and 400g of elephant grass (*Pennisetum purpureum*) in the evening around 17:45 hours, respectively. Cool and clean water was adequately provided all through the period of experiment.

Data Collection

Data collected during this study were daily feed intake, average weekly weight changes, percentage mortality, dry matter intake while feed conversion ratio was calculated as ratio of total feed consumed to total weight gain,

Table 1: Compositions of Experimental Diets

Parameters (kg)	Treatments			
	T ₁	T ₂	T ₃	T ₄
Maize	47.00	47.00	47.00	47.00
Fish Meal	1.00	1.00	1.00	1.00
Soya Bean Meal	13.00	9.75	6.50	3.25
<i>Parkia biglobosa</i>	-	3.25	6.50	9.75
Groundnut Cake	7.50	7.50	7.50	7.50
Wheat Offal	15.30	15.30	15.30	15.30
Bone Meal	2.00	2.00	2.00	2.00
Salt	0.50	0.50	0.50	0.50
Oyster Shell	8.00	8.00	8.00	8.00
Premix	0.25	0.25	0.25	0.25
Methionine	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10
Total	100.00	100.00	100.00	100.00

Digestibility Study

Following the growth study trial, 3 grasscutters per treatment were transferred into individual digestibility cages for a 14 days digestibility trial. The cages were designed in such a way that it facilitates easy collection of faeces and urine. A known quantity of feed was given to each experimental animal and the left over feed was measured and deducted from amount of meet offered to estimate the quantity consumed by the animal. Furthermore, the faecal output of each animal was taken and measured to determined the amount digested by the animals. The feed samples were measured and taken to the laboratory for proximate analysis. The total faecal sample for each animal was bulk together and 200gram each of the bulked samples were also taken to the laboratory for proximate animals. The total urine sample of each animal was measured and poured inside plastic container and few drops of dilute Hydrochloric acid was added to trap the air inside it for Nitrogen (N) determination. Nutrient digestibility was then estimated as

$$\text{Nutrient digestibility} = \frac{\text{Nutrient in feed} - \text{Nutrient in faeces}}{\text{Nutrient in feed}} \times 100$$

Nutrient in feed

The digestibility trial lasted for fourteen days which included seven days of adjusted period and seven days of data collection.

Experimental design and Statistical Analysis

Completely randomized Designed (CRD) was used for this study. Data collected were subjected to analysis of variance (ANOVA) with procedure of SAS [5]. The least significant difference (LSD) was used to separate significant mean differences between treatments at the 5% significant level.

RESULTS

Tables 2 shows the proximate composition of experimental diets showing varying inclusion levels of *Parkia biglobosa* as partial replacement for soya bean meal. There were so significant differences ($p>0.05$) in the percentage dry matter (DM %), Percentage ether extract (EE %) and percentage ash (Ash %) of dietary treatments as it was range between 92.08 % (T3) and 93.14 (T4) for DM % and between.

Table 2: Proximate Compositions of Experimental diets containing different inclusion level of *Parkia biglobosa* as partial replacement for soya bean meal.

Parameters (%)	Treatment				SEM
	T ₁	T ₂	T ₃	T ₄	
Dry matter	92.14	92.35	92.08	93.14	1.04
Crude Protein	17.02 ^a	16.89 ^a	16.04 ^a	12.52 ^b	0.64
Crude fibre	12.67 ^c	15.39 ^b	15.44 ^b	18.02 ^a	0.28
Ether extract	4.09	3.97	4.12	4.36	0.08
Ash	2.25	2.21	2.37	2.34	1.21
Nitrogen Free extract (NFE)	63.97	61.54	62.03	62.76	8.92

b, c, d: Means within the same row with different superscript are significantly ($p < 0.05$) different

Growth Performance of Grasscutters fed Experimental Diets

The initial body weights, final body weights, weight gain, weight gain/day, total feed intake, average daily feed intake and feed conversion ratio of grasscutters fed varying inclusion of *Parkia biglobosa* in their diets are presented in Table 3. There were no significant differences in the initial body weight, total feed intake and average daily feed intake, however, there were significant differences in the other parameters measured. The final body weight was significantly highest (2.52 kg) in T₄ and significantly lowest (1.05 kg) in T₁. The weight gain were 0.55 kg, 1.39 kg, 1.44 kg and 2.02 kg in T₁, T₂, T₃ and T₄ respectively, while the daily weight gain ranged between 7.85 g (T₁) and 28.86 g (T₄). The feed conversion ratio was significantly highest in T₁ (8.28) and significantly lowest in T₄ (2.26).

Table 3: Growth Performance of Grasscutters fed diet containing different inclusion level of *Parkia biglobosa* as partial replacement for soya bean meal.

Parameters	Treatment				
	T ₁	T ₂	T ₃	T ₄	SEM
Initial Body Weight (kg)	0.50	0.50	0.50	0.50	0.02
Final Body Weight (kg)	1.05 ^c	1.89 ^b	1.94 ^b	2.52 ^a	0.64
Weight Gain (kg)	0.55 ^d	1.39 ^c	1.44 ^b	2.02 ^a	0.28
Daily Weight Gain (g)	7.85 ^c	19.86 ^b	20.57 ^b	28.86 ^a	3.72
Total Feed Intake (g)	4556	4557	4556	4570	83.99
Average Daily Feed Intake (g/day)	65.00	65.10	65.08	65.29	8.92
Feed Conversion Ratio	8.28 ^a	3.27 ^b	3.16 ^b	2.26 ^c	1.08

a, b, c, d: Means within the same row with different superscript are significantly ($p < 0.05$) different

The nutrient digestibility of grasscutters fed feed containing varying inclusion of *Parkia biglobosa* as partial replacement for soya bean meal is presented in Table 4. There significant differences in dry matter (DM), crude protein (CP) and ether extract (EE) digestibility of grasscutters across the dietary treatments. Dry matter digestibility was significantly higher (78.11) in T₄ compared to T₁ (70.25), T₂ (70.78) and T₃ (75.02), respectively. The same trend was observed for crude protein and ether extract digestibility of grasscutters across the dietary treatments. However, no significant difference ($p > 0.05$) was observed in the crude fibre, ash and nitrogen free extract (NFE) digestibility of grasscutters across the dietary treatments.

Table 4: Nutrient digestibility of Grasscutters fed diets containing different inclusion level of *Parkia biglobosa* as partial replacement for soya bean meal

Parameters (%)	Treatment				
	T ₁	T ₂	T ₃	T ₄	SEM
Dry matter	70.25 ^c	70.78 ^c	75.02 ^b	78.11 ^a	5.02
Crude protein	66.42 ^c	67.04 ^c	72.23 ^b	78.44 ^a	7.64
Crude fibre	39.23	38.41	38.87	38.24	6.28
Ether extract	7.85 ^c	19.86 ^b	20.57 ^b	28.86 ^a	3.72

Ash	3.05	2.99	3.04	3.56	83.99
Nitrogen free extract	65.00	65.10	65.08	65.29	8.92

b, c, d: Means within the same row with different superscript are significantly ($p < 0.05$) different

DISCUSSION

The proximate composition of the experimental diets as shown in Table 2 revealed that the crude protein in all the feeds was above the crude protein level of 12% recommended for ruminants by NRC [6] while the ash content of the feeds shows that the amount of inorganic element in the feed was at minimal level and the range of nitrogen free extract (NFE) indicates the amount of energy in the feed which is sufficient enough for grasscutter domestication. Table 3 shows the growth parameters of grasscutters fed diets containing varying inclusion level of *Parkia biglobosa* as partial replacement for soya bean meal. The average daily body weight gain increased with increased level of *Parkia biglobosa* in the diet, this might be due to adequate protein and fibre content of the feed. The high amount of crude fibre in T4 will help the grasscutters on T4 to have a longer period feed retention in their gut. [7]. The higher feed conversion ratio value observed in T1 than those on other treatments did not translate into higher final body weight, weight gain or daily weight gain. This trend agrees with the reports of [7] who evaluated the effect of varying levels of *Parkia biglobosa* yellow fruit pulp (YFP) on the performance of Uda rams. It was noted that the lowest feed conversion ratio recorded for Uda rams on YFP indicated better weight gain.

[8] reported that an efficient utilisation of nutrients supplying energy and protein ensure optimum growth performance in ruminants and pseudo-ruminants. Increased level of *Parkia biglobosa* inclusion further indicated better weight gain and daily weight gain of the animals. These confirm to the report of [9] and [10] that the *Parkia biglobosa* contain high soluble carbohydrates. Daily weight gain reported in this study was above the range reported by [11] when they fed graded levels of *Moringa oleifera* leaf meal and/or soybean meal to grasscutters. It was also higher than the one which was reported by [12] when they fed leaf and stem fractions of Guinea grass (*Panicum maximum*) to grasscutters.

CONCLUSION AND RECOMMENDATION

Conclusion

The results obtained in this study show that the inclusion of *Parkia biglobosa* at 75 % level resulted in improved growth performance and enhanced nutrient digestibility compared with other dietary treatment under study.

Recommendation

Based on the results of this finding, *Parkia biglobosa* can be incorporated into the diets of domestic grasscutters when used at 75 % inclusion level to replace soya bean meal because it improve their growth performance and thus considered adequate for feeding grasscutters under domestication.

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