

PERFORMANCE AND SCROTAL MORPHOMETRY OF WEST AFRICAN DWARF GOATS FED SOME BROWSE PLANTS SUPPLEMENTED WITH A CONCENTRATE DIET.

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ABSTRACT.

Sixteen (16) growing male West African dwarf goats were allotted into four (4) treatments of four goats each. The goats were fed leaves from Gmelina (T₁) Tamarind (T₂) (Neem (T₃) and Teak (T₄) at 300g per goat per day and a concentrate supplement at 100g per goat per day for fifty (50) days. to determine the effects of the browse species on the performance and scrotal morphometric characteristics of the Goats. The feed intake and growth of the animals were monitored. The scrotal morphometric measurements were taken before the commencement of the experiment and again on the last day of the experiment. The experiment lasted for 50 days after an adjustment period of 7 days. The experimental design was a completely randomized design, data were subjected to a one –way analysis of variance, significant means were separated using least significant differences contained in SPSS version 16 (2006). Samples of the browse and concentrate were analyzed for their proximate composition using the standard methods of AOAC 1995. The daily browse intake (134.22 – 245.44g), and daily dry matter intake value (225.54 – 339.87g) were both significantly different. The values for daily weight gain ranged from 1.43g – 30.00g. The values for right and left testicular weights as well as right and left testicular lengths were not significant. (P>0.05) The final scrotal circumference (14.40 – 16.50 cm) showed significant P<0.05) difference, values for scrotal weight ranged from 33.30 – 67.60g and showed significant (p<0.05) differences with T₁ having the highest it was there for concluded that T₁(Gmelina) had the best values for feed intake, feed conversion ratio, daily weight gain and scrotal morphometric characteristics., the four browse species were suitable and safe for goat feeding especially during the long dry season. Further research using other breeds and classes of goats as well as other species of ruminants were recommended.

Key word Morphometry, Browse plants, Feed Intake, Weight Gain, West African Dwarf Goats, Supplement Diet

INTRODUCTION

Nutrition is one of the most important factors that determine the development and

expansion of livestock sector in the tropics. The inability of ruminant livestock farmers to feed their animals with high quality forage all year round remains the most wide spread technical constraint facing ruminant productivity in the developing nations (Bawala and Akinsoyinu, 2002). Contemporary ruminant feeding in a developing country like Nigeria is partly geared towards searching for inexpensive readily available feed resources, which can partially or wholly serve as substitute for the scarce expensive feed stuffs and inadequate forage (Okoruwa and Adewumi, 2010).

Since grasses and legume which constitute a major proportion of forage which are the basal feed for ruminants, are usually in short supply during the long dry season, there is need therefore to feed ruminants with leaves (browse) from trees especially those that are evergreen and also do not bear fruit/seeds that are in direct use by man, more over nutrition has effects on the scrotal morphometry of animals. Morphometry has been described as the measurement of external forms especially of living systems or their parts (Merriam-Webster, 2014 ;Wikipedia, 2014) it is a concept that encompasses size, and shape . morphometric analyses are commonly performed on organism and are useful in analyzing developmental changes in form, covariance between ecological factors and shape as well as estimating quantitative genetic parameters of shape. Several studies have shown the relationship between nutrition and reproduction., for instance Shoenian (2012) reported that scrotal circumference was an important indicator when observing animals and an essential part of breeding soundness evaluation, he posited that scrotal circumference measurement gives a good indication of a rams breeding ability.

Consequently this study was therefore designed to study the effects of four (4) browse species (Gmelina, Teak, Tamarind and Neem) on the performance and Scrotal Morphometry of West African Dwarf Goats.

MATERIALS AND METHODS

Location of the Experiment:

The experiment was conducted at the Sheep and Goat unit of Kogi State University, Livestock Teaching and Research farm, Anyigba. Anyigba is

located in the derived Guinea Savannah zone of Nigeria on latitude 7°15' and 7°29' N of the equator and longitudes 7°11' and 7°32'E of the Greenwich meridian. The zone lies in the warm humid climate of the tropics with clearly marked wet and dry season in April to October and November to March respectively with annual rainfall ranging from 1400-1500mm and an ambient temperature of about 25°C with the highest in March and April (Ifatimehin *et al.*, 2009).

Experimental Animals, Management, Feed preparation and Experimental procedure:

A total of 16 growing male West African dwarf goats were sourced from Anyigba and its environs. The animals were housed individually and treated with Ivomec, for endo and ecto parasite control at 0.3ml each and oxytetracycline, hydrochloride and procaine penicillin at 2.0ml each to take care of scouring and nasal discharge and to provide a common health status. The browse species used for this experiment were collected from within Kogi State University Campus, Anyigba. Browse species

were collected and wilted for 24hours to reduce the moisture content before feeding. The cashew nutshell was collected from Kogi State University cashew processing plant and was pounded and mixed thoroughly with other feed ingredients such as Maize offal (MO), Bambara nut offal (BO), Fish offal (FO), Rice offal (RO), Wood ash (WA), Bone meal, Table salt and ground to desired texture.

The goats were allotted in a Completely Randomized Design (CRD) into four (4) treatments. Each treatment had four (4) goats. Each goat was fed 100g of the supplement diet per day.

The browse species (*Gmelina*, *Tamarind*, *Teak* and *Neem*) were fed at 300g/day for each treatment (T₁, T₂, T₃ and T₄ respectively) of which the browse were fed first, (8am) then the supplement one hour later.

Feed offered to the goats was weighed daily and the left over was also weighed and subtracted from the quantity of feed served to determine the feed intake of the animals. The experiment lasted for fifty (50) days after seven (7) days preliminary feeding period.

Table 1: Composition of Experimental Diets (%) Dry matter

FEED INGREDIENTS	COMPOSITION
Cashew nut shell (CNS)	10.00
Maize offal (MO)	27.00
Bambara nut offal (BO)	48.00
Fish offal (FO)	5.50
Rice offal (RO)	5.00
Wood ash (WA)	1.00
Bone meal	2.00
Table salt	1.50
Total	100

Calculated nutrient content

Nutrient Composition

Crude protein	18.00
Crude fibre	14.00
Gross energy (Kcal/kg diet)	3083.00

Scrotal Morphometric Measurements: The scrotal morphometric measurements were taken at the beginning of the experiment and on weekly basis thereafter up to the last day of the experiment. The scrotal circumference was taken by placing a measuring tape around the scrotal sac, the scrotal length was taken by placing a measuring tape vertically on the scrotal sac, measurements were in centimeters (cm). The scrotal weight was determined by cutting off the scrotum of each slaughtered goat and weighing. The scrotum was sectioned and both testicles were removed and severed from the vas deference, and their weights and lengths were measured

Chemical Analysis: Samples of browse species and the supplement diet were analyzed for their proximate composition using standard procedure (AOAC, 1995).

Experimental Design and Statistical Analysis: The experimental design was a completely randomized design (CRD). Data were subjected to a one-way analysis of variance (ANOVA); treatment means that were significantly different were separated using least significant difference (LSD) with the aid of SPSS version 16. (2006)

RESULTS AND DISCUSSION

Table 2: Proximate Composition of browse and supplement (% Actual basis)

Nutrients	Treatments				
	T ₁	T ₂	T ₃	T ₄	Concentrate
Crude Protein	9.98	11.55	8.68	9.64	18.23
Crude Fibre	17.20	19.50	20.66	18.88	13.60
Nitrogen Free Extracts	30.12	32.06	34.01	32.23	53.75
Ether Extracts	2.10	1.89	2.05	2.35	7.50
Ash	6.10	5.80	6.60	5.25	3.40
Moisture	33.50	30.20	30.00	32.65	4.52

Performance Characteristics of Experimental Goats:

The Performance Characteristics of Experimental Animals are presented in Table 3.

Supplement and browse intake were significant ($p < 0.05$) with T₁ having the best (i.e 94.43g and 245.44 g). This was in line with the report of Tolera *et al.*, (2000) who stated that supplementation of forages with concentrate feed stuff is a necessity in improving goats' productivity. Treatment effect on daily feed intake was significant ($p < 0.05$). With T₁ (Gmelina) having the highest value (245.44g). The values obtained for daily feed intake, total feed intake (225.53-339.87 g) were less than 235.91-388.32g obtained by Ifut *et al.*, (2011) but higher than 216.75 – 261.61g reported by Ocheja *et al.*(2020a) This difference could be due to the

supplements fed to the goats as well as the breeds and class of goats used for the feeding trials.

The values obtained for the final weight gain, total weight gain and daily weight gain differ significantly ($p < 0.05$). The values did not follow a definite trend. Although the total weight gain (0.10 to 1.05kg) and daily weight gain (1.43 to 30g) obtained in this study were lower than 4.5-5kg and 84.9-94g respectively reported by Olomola *et al.*, (2008)but higher than 0.50 – 1.30kg and 5.0 – 13g reported by Ocheja *et al* (2020a). These discrepancies may be due to experimental diets used, as well as breed and age of goats used. The values obtained for Feed conversion ratio(11.33 – 157.71) did not follow any definite trend but were significantly ($P < 0.05$) different with T₁ having the best.

Table 3: Performance Characteristics of Experimental Goats

Parameters	Treatments				SEM
	T ₁	T ₂	T ₃	T ₄	
Number of goats	4	4	4	4	-
Duration (days)	50	50	50	50	-
Total weight gain (kg)	1.05 ^a	0.10 ^b	0.50 ^b	0.20 ^b	0.25
Daily weight gain (g)	30.00 ^a	1.43 ^b	12.86 ^b	5.72 ^b	7.14
Daily supp intake (g)	94.43 ^a	91.30 ^a	75.33 ^b	82.40 ^b	3.66
browse intake (g)Daily	245.44 ^a	134.22 ^c	180.44 ^b	175.24 ^b	17.98
Total daily feed intake(g)	339.87 ^a	225.53 ^b	255.76 ^b	257.63 ^b	18.56
Feed conversion ratio	11.33 ^a	157.71 ^d	12.84	19.89 ^b	45.04 ^c

a, b, c = Treatment means on the same row with different superscripts differ significantly ($p < 0.05$)

SEM = Standard error of means

Scrotal Morphometric Characteristics:

The final scrotal circumference of 14.40 – 16.50cm obtained in this study was lower than 26.97 – 30.45 cm reported by Santos and Simplicio (2000). This discrepancy could be due to the experimental feeds as well as age and breeds of the goats used. , final scrotal length values were not significant ($P < 0.05$), the values also did not follow any definite trend. . The scrotal weight ranged from 23.30 – 67.60g and

differed significantly ($P > 0.05$) with T1 (Gmelina) having the highest (67.60g) , these values were lower than 50 – 85g reported by Ocheja *et al* (2016) for growing West African Dwarf Goats fed graded levels of steam-treated cashew nut shell and comparable with 48.90 – 66.80g reported by Ocheja *et al* (2020b) for yearling West African dwarf goats fed cashew nut shell based diets and Bamboo leaves. The right and left testicular lengths were not significantly

($P < 0.05$) different. The right and left testicular weights range of 28.60 – 30.50g and 27.50 – 28.10g were not significant ($P < 0.05$) these values were lower than 35.00 – 64.10g and 35.10 – 58.40 g reported by Nasir *et al* (2014) for red Sokoto bucks

fed cotton seed cake meal ,the observed discrepancies could be attributable to differences in the diets fed as well as the breeds of the Goats used in the experiments

Table 4; Scrotal Morphometry of Experimental Goats

Parameters	Treatments				SEM
	T ₁	T ₂	T ₃	T ₄	
Right Testicular Length (cm)	19.80	19.60	18.70	18.50	.1.23
Left Testicular Length (cm)	19.50	19.40	18.60	18.30 ^b	1.35
Final Scrotal length (cm)	16.50 ^a	14.40 ^b	14.60 ^b	14.56 ^b	0.38
Final Scrotal Circumference (cm)	8.50 ^a	6.90 ^b	6.40 ^b	6.75 ^b	0.33
Right Testicular Weight (g)	30.50	30.20	28.60	27.80	2.90
Left Testicular Weight (g)	28.10	27.50	28.00	27.80	2.67
Scrotal Weight (g)	67.60 ^a	40.95 ^b	40.15 ^b	23.30 ^c	6.71

a,b,c Treatment means on the same row with different superscript differs significantly ($p > 0.05$)

SEM = Standard error of means

CONCLUSION AND RECOMMENDATIONS

Conclusion

300g of Gmelina (T₁) per goat per day with supplement diet at 100g per goat per day produced the best results in terms of feed intake, growth performance and Scrotal morphometric characteristics of goats. All the browse species evaluated in this study had good array of nutrients adequate for goat feeding

Recommendations:

The four browse species are recommended for goat feeding ,especially during the long dry season - Further research should also be carried out on the browse species (*Tamarind*, *Gmelina*, *Teak* and *Neem*) using other classes and breeds of goats as well as other species of ruminants. This work should be repeated for a longer duration to further confirm the results obtained

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