PERFORMANCE OF WEST AFRICAN DWARF GOATS FED WITH *Panicum maximum* Supplemented With *Newbouldia laevis* LEAVES

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Abstract

Sixteen (16) male West African Dwarf goat (WAD) kids aged 9-12 months were used in a 90 day feeding trial to determine the performance of goats fed Panicum maximum supplemented with Newbouldia laevis leaves. The goats were randomly divided into four groups of four animals per group; each group was randomly allotted to one of the four experimental diets containing 100% PM, 75% PM and 25% NL, 50% PM and 50% NL and 25% PM and 75% NL in a completely randomized design. Significant differences (P<0.05) were observed in Crude protein (CP) and Ether extract (EE) with diet 4 (25%P.M and 75%N.L) having the highest values 16.86 and 19.99, respectively while least values was observed in diet 1 (100%P.M). The treatments significantly influenced (P<0.05) the feed intake and final weight gain. The feed intake and weight gain decreased with increasing level of NL supplementation with no significant (P>0.05) influence observed for initial weight gain and feed conversion ratio. The NL is a promising tree species at it contained high CP more than the recommended level.

Introduction

Small ruminants play a significant role in the food chain and overall livelihoods of rural households, where they are largely the property of women and their children (Lebbie, 2004). These animals can be reared for various reasons such as income generation, religious purpose, household consumption and hobby and as security against crop failure. According to Adu *et al.* (1996) small ruminants in Southern Nigeria are integral component of the household, where they contribute to the cultural, food and socio-economic life of the people.

Improved animal nutrition appears to be a more critical factor in increasing small stock productivity. Native rangelands provide the cheapest source of nutrients for ruminants. It is however an accepted fact that for a greater part of the year, grasslands in the tropics does not supply sufficient nutrients to stock for greater productivity. Otchere *et al.*, (1977) reported that West African Dwarf sheep, on the Accra Plains of Ghana, which received no supplementary feed during the dry season (December to February), lost about 15% of their body weight.

Fodder trees and shrubs represent an enormous potential source of protein for ruminants in the tropics. These feed resources have been generally ignored in feeding systems for ruminants, mainly because of inadequate knowledge on various aspects of their potential use, as well as initiatives associated with the development of more innovative systems of feeding (Devendra and Burns, 1983). However, the limitation of trees and shrubs as a source of food is due to the widespread of tannins and other plant secondary compounds. This study was therefore carried out to investigate the performance of West African Dwarf (WAD) goat fed *Panicum maximum* supplemented with *Newbouldia laevis* leaves.

Materials and Methods

Experimental Site

The experiment was carried out at the small ruminant unit of the Directorate of University Farms (DUFARMS), Federal University of Agriculture, Abeokuta. The university is located on Lat.7°10' N and Long. 3°2' E, Ogun State, Nigeria. The prevailing climatic condition is tropical as it lies in the rainforest region of the country. The area has an annual rainfall of 1037mm and temperature range of 28°C to 36°C in the wet and dry season respectively. (Google earth, 2006).

Experimental Animals and Management

Sixteen (16) West African Dwarf goats within the age of 9 - 15 months were used in the 90 day experimental period. In order to ascertain the health status, the animals were quarantined for four weeks; Ivomec was administered to the goats for the treatment and control of internal and external parasites. The pens was washed, cleaned and disinfected with Morigad. The animals were vaccinated against *peste des petit ruminant using PPR* vaccine.

Preparation of Experimental Diet

The experimental diets consist of *Panicum maximum* supplemented with *Newbouldia leavis* leaves which was fed at different levels. The mature leaves of *Newbouldia leavis* was collected from villages around Odeda local government

area, Abeokuta while *Panicum maximum* was harvested around the University premises. Both were harvested and fed to the animals according to the required composition to meet the treatment as stated below.

Treatment 1: 100% *Panicum maximum*
Treatment 2: 75% *Panicum maximum* and 25% *Newbouldia laevis*
Treatment 3: 50% *Panicum maximum* and 50% *Newbouldia laevis*
Treatment 4: 25% *Panicum maximum* and 75% *Newbouldia laevis*

Measurement of Performance Characteristics

Feed Intake was measured by subtracting the feed refusal from the feed offered to the animals. The goats were weighed at the commencement of the experiment and at 7 day interval throughout the period of the experiment. Weight gain is calculated as the final weight minus the initial weight and the feed conversion ratio was calculated as the quantity of feed taken divided by weight gain. All data generated were subjected to one way Analysis of Variance (ANOVA) using SAS (1999) procedure, in a Completely Randomized Design (CRD). The mean significance was separated using Duncan's New Multiple Range Test (Duncan, 1995).

Results and Discussion

The results of proximate composition of the experimental diets are presented in Table 2. Significant differences ($P<0.05$) were observed in Crude protein (CP) and Ether Extract (EE) with diet 4 (25% P and 75%N) having the highest values 16.86 and 19.99, respectively while least values was observed in diet 1 (100%PM). However, the Dry matter, Ash, and Tannin were not significantly influenced ($P>0.05$) across the diets.

The results of performance characteristics of the experimental goats are shown in Table 3. The treatments significantly influenced ($P<0.05$) the feed intake and final weight gain. The feed intake and weight gain decreased down the treatment (T1>T2>T3>T4). No significant influence was observed for initial weight gain and FCR. The tannin intake increases down the treatment. The reduced weight gained observed for treatments can be attributed to the fact that *Panicum* can only meet the maintenance need of ruminants. Also, as stated earlier, the widespread of tannins and other plant secondary compounds in tree species are the most limiting factor as source of feed for ruminant. The reduced intake may have resulted from reduced acceptability and increased forage quality. Minson (1990) reported that depression of forage intake with supplementation is greater with high-quality forages than low-quality forages. The reduced intake in substituted feed rations may also be as a result of increased tannin content in the feed which reduces palatability and therefore reduction in palatability could be caused through a reaction between the tannins and the salivary mucoproteins, or through a direct reaction with the taste receptors, provoking an astringent sensation (McLeod, 1974).

Until fairly recently, most researchers believed that the consumption of tannins reduced voluntary feed intake. Although, tannins are beneficial to ruminants, depending on which (and how much) is consumed, the compound's structure and molecular weight, and on the physiology of the consuming species (Hagerman and Butler, 1991). The reduced feed intake can be attributed to the fact that consumption of plant species with high CT contents (generally > 50 g kg-1 of dry matter, DM) significantly reduces voluntary feed intake, while medium or low consumption (< 50 g kg-1 DM) seems not to affect it (Barry and Duncan, 1994; Barry and Manley, 1984).

Three main mechanisms have been suggested to explain the negative effects of high tannin concentrations on voluntary feed intake: a reduction in feed palatability, the slowing of digestion, and the development of conditioned aversions.

The reduced performance can be attributed to the considerably low intake and to the fact that the tannin content in diets 3 and 4 is higher than those reported to be beneficial to ruminant (Spencer *et al.*, 1988).

Conclusion

Although the results of this study revealed poor performance of the experimental goats which may be due to the fact that the leaves were offered fresh, and without processing or reducing the particle size. Also, it might be due to increasing level of tannin in the experimental diet. However, since *Newbouldia laevis* contains high CP, CF and EE, it should be further subjected to processing (pelletizing or fed along with concentrate) in other to access its nutritional quality.

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Table 1: Chemical Composition of *P. maximum and N. laevis*

	P. maximum	*N. laevis*
Dry Matter	97.14	92.80
Crude Protein	11.75	18.72
Crude Fiber	30.72	32.46
Ether Extract	5.87	24.70
Ash	8.94	8.38

Table 2: Proximate composition of *P.maximum* substituted at different levels with *N. laevis*

Parameters	*100% PM*	*75% PM: 25%NL*	*50% PM:50%NL*	*25%PM:75%NL*
DM	97.14	96.06	94.97	93.89
CP	11.75^{b}	13.49^{ab}	15.24^{ab}	16.86^{a}
CF	30.72	31.16	31.59	32.03
EE	5.87^{c}	10.58^{b}	18.22^{a}	19.99^{a}
Ash	8.94	8.8	8.66	8.53
Tannin	-	28.75	57.5	86.25

$^{a, b, c}$ = means on the same row with different superscripts are significantly different ($p>0.05$).

Table 3: Growth performance characteristics of goats fed *N. laevis*

Parameters	T1 100PM	T2 75PM:25NL	T3 50PM:50NL	T4 25PM:75NL	SEM
Feed Intake (g/day)	56.03^{a}	43.20^{b}	35.12^{c}	36.80^{d}	5.372
Initial weight(kg)	8.900	9.600	9.700	9.200	0.573
Final Weight(kg)	6.200^{a}	5.800^{b}	4.800^{c}	4.200^{d}	0.3018
Weight gain (g/day)	-2.700	-3.800	-4.900	-5.000	0.6472
FCR	-0.03	-0.01	-0.07	-0.08	0.6472
Tannin Intake (g)	ND	1.242	3.169	3.174	

$^{a, b, c}$ = means on the same row with different superscripts are significantly different ($p>0.05$).