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Performance of Yankasa Rams Fed *Andropogon gayanus* (Gamba Grass) Hay Supplemented with *Faidherbia albida* (Acacia) Pods

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Abstract

A 91-day feeding trial was conducted to determine the effect of supplementing gamba grass (*Andropogon gayanus*) hay with acacia (*Faidherbia albida)* pods on the performance of Yankasa rams. Twelve yankasa rams, aged between 6 – 8 months with average live weight of 17kg were subjected to four dietary treatments, each consisting of three replicates in a randomized complete block design. The four dietary treatments were T_1 (Gamba grass hay + 0% acacia pods), T_2 (Gambas grass hay + 10% acacia pods), T_3 (Gamba grass hay + 20% acacia pods) and T_4 (Gamba grass hay + 30% acacia pods). The result showed that rams fed T_1 recorded the least feed intake and weight again than T_2, T_3 and T_4 which were supplemented with acacia pods. The live weight gain of Yankasa rams in the supplemented diets were not significantly ($P<0.05$) different. The water intake of the rams was not significantly ($P<0.05$) affected by the acacia pods supplementation. The nutrient digestibility was significantly ($P<0.05$) affected by the acacia pods supplementation. Rams fed supplemented diets had significantly ($P<0.05$) improved nutrient digestibility than those fed the unsupplemented diet. The study revealed that gamba grass hay when supplemented with acacia pods at 20% DM intake would significantly ($P < 0.05$) lead to increased live weight gain of Yankasa rams.

Keywords: Performance, Yankasa rams, Gamba grass hay, Acacia pods

Introduction

One of the major factors limiting the productivity of small ruminants in developing countries is over dependence on low digestibility feeds which during the dry season cannot meet even the maintenance requirements of these animals (Schoenian, 2011). Jayasuriya (2002) categorized these feeds resources as high fibre low protein feeds having organic matter digestibility between 30-45% and they include native grasses, crop residues and fibrous agro-industrial waste products. They form the bulk of feeds consumed by small ruminants in tropical countries because they are produce in large quantities and are relatively cheap since they are not competed for by man or monogastric animals

According to Leng (1997), the poor condition of livestock in the tropics si more likely as a result of inefficient digestion in the rumen and inefficient utilization of the nutrients absorbed from low quality feeds. Several attempts which have been made to improve the nutritive quality of this class of livestock feeds include physical, chemical and biological treatments, use of feeds additives as well as supplementation with non-protein nitrogen sources such as urea and molasses (Adegbola, 2002). The possibility of using urea as a cheap readily available source of nitrogen in ruminant diets led to the expectation of rapid improvement in ruminant productivity in developing countries. However, for various reasons these technologies have not been widely adopted as expected (Owen and Jayasuriya, 1989).

In recent years there has been a growing interest in many tropical countries to identify potentially important feeds sources among shrubs and trees for inclusion in the ruminant diet to provide browse (shoots, fruits and pods) that is high in protein to supplement the available low protein forage. This has been recognized as one of the most effective means of improving animal performance in small holder livestock production (Gworgwor *et al*., 2006). Acacia (*Faidherbia albida*) is one of the browse plants that provide valuable forage resources especially in the arid and semi –arid savannah of Nigeria with a long dry season between 6- 7 months. The crude protein content of *Faidherbia albida* and other species of acacia is in the range of 13-24.94% and crude fibre is in the range of 11.84-38.90% (Mohammed and Kibon, 2004; Mohammed, 2006; Alexander, 2002).

The use of appropriate supplements and basal diets is a fundamental component of the feeding strategy in order to balance nutrients for improved performance (Ndlovu, 1991).

Thus, this research investigates the effects of graded levels of *Faidherbia albida* pods supplementation on the performance of yankasa rams fed basal diet of *Andropogon gayanus* hay.

Materials and Methods

The study was conducted at the Research and Teaching Farm of the Department of Animal Science and Range Management, Modibbo Adama University of Technology, Yola, Adamawa State. Twelve (12) Yankasa Rams which were within the age range of 6 -8 months with an average live weight of 17.5kg were used for the study, which lasted for 91 days. A Randomized Complete Block Design (RCBD) was used comprising of four (4) dietary treatment groups to which the animals were assigned to give three rams per treatment.

The experimental diets consisted of gamba grass hay supplemented with graded levels of acacia pods as follows T_1(Gamba grass hay +0% acacia pods),T_2 (Gamba grass hay + 10% acacia pods), T_3(Gamba grass hay +20% acacia pods and T_4 (Gamba grass hay +30% acacia pods).The rations were given at 8:00am and 4:00pm daily. Water was provided *ad libitum*. Feed intake was determined by the difference between the amount of feed offered and that which was left over the next day. Rams were weighed weekly. Digestibility study was conducted after the feeding trial in improvised metabolic crates which allow for separate collection of faeces and urine. The data was analysed using Analysis of Variance (ANOVA) of a Randomised Complete Block Design (RCBD) experiment (Steel and Torries, 1980), using a computer package-Genstat Release 10.3DE (PC/Windows7).

Results and Discussions

The proximate composition of the basal diet (*Andropogon gayanus* hay) and the supplement (*Faidherbia albida* pods) is presented in table 1.

Table 1: Chemical Composition of the Basal Diet and Supplement Diet

Constituent (%)	Basal Diet (Gamba grass hay)	Supplement (Acacia pods)
Moisture	8.95	9.00
Dry matter (DM)	91.05	91.00
Crude protein (CP)	9.48	16.65
Crude Fibre (CF)	47.80	20.00
Ether Extract (EE)	0.71	0.55
Ash	16.91	5.71
Nitrogen free extract (NFE)	25.10	57.09
Calcium	0.27	0.38
Phosphorus	0.07	0.05
ME (Kcal/kg)*	1299.32	2669.17

*Metabolizable Enegy (ME) = 37 x %CP+81x%EE+35.5x%NFE (Panzenga, 1985)

The result showed that the basal diet (gamba grass hay) contain 8.95% moisture, 91.05% DM, 9.48% CP, 47.80% CF, 0.71% EE, 16.91% ash, 25.10% NFE, 0.27% Ca, 0.07% P and ME of 1299.32Kcal/kg while the supplement (acacia pods) contain 9.0% moisture, 91.0% DM, 16.65%CP, 20.0% CF, 0.55% EE, 5.71% ash, 57.09%NFE, 0.38% Ca,0.05% P and ME of 2669.17Kcal/kg. The DM of 91.05% of the basal diet was closed to the value (92.40%) obtained by Ibrahim (2007).The author obtained a higher CP (11.06%) than the value of 9.48% obtained in the present study. This may be due to the lower CF (33%) value of the gamba grass compared to the higher CF (47.8%) obtained in the present investigation. The NFE (25.10%) value was lower than the value (50.20%) reported by Nyako (2010). The values for DM, CP and CF (91.05%,9.48% and 47.8%) obtained for the chemical composition of the gamba grass hay were generally higher than the values (88.5% DM, 6.1%CP and 35.1% CF) earlier reported by Toledo *et al.* (1990). The ME value (1299.32Kcal/kg) of the gamba grass hay was close to the value (1261Kcal/kg) reported by Wilson (2001).

The values for DM, CP, CF and NFE (91%, 16.65%, 20% and 57.09% respectively) obtained for the chemical composition of the acacia pods were lower than the values (97.93%DM,18.0%CP and 64.40% NFE) reported by Gworgwor *et al* (2006). The DM value of 91% for the supplement was the same with the value (91%) reported by Nyako (2010). However, the CP (15%) and NFE (50.0%) were lower than the values for CP (16.65%) and NFE (57.09%) obtained in the present study. The CP (16.65) of the acacia pods was similar to the value (16%) reported by Gohl (2002) and falls within the range (13-24.94%) earlier reported by Mohammed (2006). Similarly, the CF value (20%) was within the range (11.84-38.9%) reported by Mohammed and Kibon (2004). The higher crude fibre in the basal diet and its low content in the supplement are in consonance with the findings of Mohammed (2006). The author reported that the crude fibre content of grasses is generally higher than those of browse plants even when harvested at the same time. The ME value (2669.1Kcal/kg) of the acacia

pods was lower than the value (2956Kcal/kg) reported by Wilson (2001). The high energy and protein values of the acacia pods clearly shows that it is a good supplement to a basal feed of gamba grass hay.

Table 2 shows the feed intake, water consumption and average live weight gain of yankasa rams fed *Andropogon gayanus* (Gamba grass) hay supplemented with *Faidherbia albida* (Acacia pods).

Table 2: Feed Intake, Water Consumption and Average Live Weight Gain of Yankasa Rams Fed *Andropogon* gayanus (Gamba Grass) Hay Supplemented with *Faidherbia albida* (Acacia) Pods

Parameter	Treatment				
	T1 0%	T2 10%	T3 20%	T4 30%	LSD
Total feed intake (g/d/h)	303.58	384.00	429.80	428.90	69.8*
Daily water intake (ltr)	2.37	2.40	2.44	2.46	NS
Initial live weight (kg)	17.67	17.67	17.50	17.50	NS
Final live weight (kg)	18.68	21.63	21.88	21.75	0.098**
Average daily live weight gain (kg)	0.011	0.044	0.048	0.046	0.009**

T_1 = Gamba grass hay only
T_2 = Gamba grass hay + 50 grammes acacia pods.
T_3 = Gamba grass hay + 100 grammes acacia pods.
T_4 = Gamba grass hay + 150 grammes acacia pods.
LSD = Least significant difference
NS = Not significant.
* = Significant ($P < 0.05$)
** = significant ($P < 0.01$)

The result shows that the daily feed intake of rams was significantly ($P<0.05$) different among the treatments. Rams fed T_3 and T_4 diets had significantly ($P<0.05$) higher dry matter intake than those on the control (T_1) .The feed intake increases as the supplementation level increase from 0-150grammes. This finding is in agreement with Ibrahim and Tibin (2003) that feeds supplemented with acacia pods generally improves dry matter (DM) intake than un-supplemented diet. The result of feed intake clearly demonstrated that supplementation of acacia pods to gamba grass hay significantly ($P<0.05$) increase feed intake.

The live weight gain of rams in the supplemented diets (T2, T3 &T_4) were significantly ($P<0.05$) higher than the un-supplemented diet (T_1). The study clearly demonstrated that supplementation of acacia pods to gamba grass hay has an advantage in weight gain of yankasa rams over feeding gamba grass hay alone. This finding is also in agreement with Ibrahim (2007) in an investigation on the effect of level of cowpea vines supplementation to yankasa sheep fed a basal diet of gamba grass and observed that rams fed supplemented diets had significantly ($P<0.05$) higher daily weight gain of between 80-93 grammes than rams fed only gamba grass which recorded the least daily weight gain of 51.4grammes.The performance of the rams on the supplemented diets agrees with the assertion of Vazquez *et al*(2000) that energy-protein balance of a ration enhances live weight gain.

The daily water intake of the rams showed no significant ($P<0.05$) difference across the treatments. The result agrees with the water intake range of 1.75-2.65 litres reported by Osuhor *et al* (2004) for rams fed a basal diet of maize stover-lablab mixture supplemented with different levels of concentrates. The average daily water intake of 2.37-2.46 litres per day of the rams was also within the range of 2-3l/d reported by Miller *et al* (2006).
Table 3i shows the nutrient digestibility of yankasa rams fed Andropogon gayanus (Gamba grass) hay supplemented with Faidherbia albida (Acacia) pods.

Table 3: Nutrient Digestibility of Yankasa Rams Fed *Andropogon* gayanus (Gamba Grass) Hay Supplemented with *Faidherbia albida* (Acacia) Pods

Parameter	Treatment				
	T1 0%	T2 10%	T3 20%	T4 30%	LSD
Dry Matter digestibility (%)	49.78	50.82	50.86	50.75	0.537*
Crude protein digestibility (%)	39.07	40.17	47.86	45.56	0.307*
Crude fibre digestibility (%)	52.70	56.89	57.79	56.98	0.574*
Nitrogen free extract digestibility (%)	48.52	51.05	51.86	51.89	0.287**

The result showed that the dry matter digestibility (DMD),crude protein digestibility(CPD), crude fibre digestibility (CFD) and nitrogen free extract digestibility (NFED) were significantly ($P<0.05$) different across the treatments. The digestibility values shows that ram fed supplemented diets (T2, T3 &T4) had better digestibility than rams on the un-supplemented diet (T_1). Digestibility increases as the level of supplementation increases from 0-150grammes with the acacia pods. Quala *et al*. (2011) reported that the activity of ruminal microbes is improve by nitrogen in supplemented diets leading to high digestibility. Also Tolera and Sundstol (2000) reported that digestibility increases as the supplementation level increase for sheep fed a basal diet of maize stover supplemented with different levels of *Desmodium intortu* hay. The improved digestibility in this study may be attributable to the incorporation of acacia pods with a high NFE (57.09%) and CP (16.65%).

In conclusion, supplementation of gamba grass hay with acacia pods generally gave a significantly ($P<0.05$) higher dry matter intake and live weight gain than the un-supplemented diet. Therefore, it is recommended to feed gamba grass hay with 20% supplementation of dry matter intake to yankasa rams. This will improve the nutritive value of gamba grass hay in the dry season when roughages are of poor quality and in short supply.

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