EFFECT OF DIFFERENT PROTEIN SUPPLEMENTS ON FEED INTAKE AND PERFORMANCE OF YANKASA SHEEP FED CONGO GRASS (*Brachiaria ruziziensis*)

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ABSTRACT

The experiment was conducted with Sixteen (16) animals to compare the Feeds intake and performance of Yankasa sheep fed Congo grass (*Brachiaria ruziziensis*) with supplements of Cotton seed cake (CSC), Palm kernel cake (PKC) and Brewer's dried grain (BDG). Feed intake, weight gain were estimated while feed conversion and protein efficiency ratio were calculated. The results obtained placed animals on CSC ahead ($P<0.05$) in almost all the parameters estimated, followed by animals on PKC while those on BDG had the least performance. The dry matter intake (DMI) from supplement and the crude protein intake (CPI) increased from 180g and 39.02g/day in BDG to 227.08g and 62.63g/day in CSC respectively. The weight gain increased ($p<0.05$) from 1.65kg in BDG to 2.05kg while feed conversion ratio reduced from 34.30% in BDG to 29.15% in CSC. It was therefore concluded from the experiment that Yankasa sheep utilized CSC better than PKC and BDG.

Keywords: Congo grass, *Brachiaria ruziziensis*, CSC, PKC, BDG.

INTRODUCTION

One of the major constraints of small ruminant production in Nigeria is nutrition, in which feeding constitutes about 85% of total cost of production. Therefore, feeding strategies are needed in order to increase animal performance using tropical grasses (Eugene *et al.*, 2010). Similarly, ruminants in the tropical and sub-tropical countries are likely to depend almost entirely on pasture and agricultural by-products of relatively poor nutritional status. Improvement in ruminant production will therefore require increased effort in investigating the different possible ways and means of upgrading poor roughages through increasing their digestibility and voluntary intake (Fadel, 2004). Cottonseed meal has long been a popular and economic protein concentrate for animal feeding, Cotton Seed Cake has some anti-nutritional and natural limiting factors that must be considered for safe use, chief among these factors are fibre level, trypsin inhibitor and the gossypol content (NCPA, 1990). These anti-nutritional factors readily undergo physical and chemical change when heated and have been found to be destroyed during processing. The complex processes of rumination and the microbial population of the rumen will efficiently handle any residue from such anti-nutritional factors. (Oladotun *et al.*, 2003). PKC is a medium grade protein feed and with its high fibre content it is often considered as suitable for feeding of ruminants. Its protein is highly degradable in ruminant animals (Carvalho *et al.*, 2005). The nutritive value of PKC varies considerably based on source and methodology of oil removal. Earlier studies showed that cattle and buffaloes fed PKC as supplement resulted in improved growth (Jelan *et al.*, 1991). Brewers' Dried Grain is a major by-product of brewing which in Nigeria is used as manure or disposed as waste. Preston *et al.* (1973) evaluated the energy value of BDG (78% TDN) for cattle and obtained a net energy value comparable to that of maize (80% TDN). Since Cotton Seed Cake, Brewer's Dried Grain and Palm Kernel Cake are readily available and cheaper than other conventional protein sources, it was desirable to evaluate these products as major protein sources in the diets of ruminants. The objective of this study is to determine the feed intake and growth performance of Yankasa sheep fed Congo grass with protein supplements.

MATERIALS AND METHOD

Animals and their management

The study was conducted at SAJ Integrated Farms Limited, Kudungi, Shika-Zaria. Sixteen animals (16) comprising 8 males and 8 females were randomly allotted to 4 treatments diet with 4 animals per treatment (2 males and 2 females) in a Randomized Complete Block Design (RCBD). The treatments diets were: Treatment 1 (Grass *ad libitum* + Cotton Seed Cake 250g), Treatment 2 (Grass *ad libitum* + Palm Kernel Cake 450g), Treatment 3 (Grass *ad libitum* + Brewers Dried Grain 400g) and Treatment 4 (Grass *ad libitum* only). The animals were allowed 14 days to adjust to feed and confinement before the actual start of the experiment. Sixteen (16) Yankasa sheep weighing between 18.5 and 21.5kg and aged 9-12 months were used. During the adjustment period, the animals were de-wormed and were fed supplements at 3% body weight.

Growth study and data collection

The animals were kept in individual pens with sufficient ventilation. Each animal was offered supplement daily in 2 allocations, at 8:00 a.m and at 6:00 p.m. The animals were weighed at the beginning of the experiment and subsequently at weekly intervals up to the 10th week using a Walk in weigh-bridge. Feed and water intake were determined by calculating the difference between quantity offered and the left over.

Statistical analysis

Data collected was analyzed using Analysis of Variance (ANOVA) by General Linear Model (GLM) Procedure of Statistical Analysis System (SAS) version 9 (SAS, 2005). The treatment means were separated and compared using Duncan's Multiple Range Test.

The model of the experiment is;

$X_{ijk} = \mu + \alpha_i + \beta_j + e_{ijk}$

Where X_{ijk}= Any observation, μ= Population mean, α_i= Treatment effect, β_j= Block effect, e_{ijk}= Random error

RESULTS AND DISCUSSION

Table 2 shows the DM and other nutrients intake of Yankasa sheep fed Congo grass with protein supplements. Value for consumption of supplements ranged between 180g for BDG to 227.08g/day for CSC and were significantly different ($P<0.05$). Protein intake from supplement (62.63g) was significantly highest ($P<0.05$) for the animals on CSC followed by intake of animals on PKC supplement (44.64g) and least for those fed BDG supplement (39.02g). The highest crude fibre intake from supplement ($P<0.05$) was recorded for animals on BDG (31.64g) which was followed by those on PKC supplement (29.62g), while the lowest was recorded for animals on CSC (25.83g). According to Topps (1996), fibrosity of forages indicates the extent to which it can be degraded by rumen micro-organisms. Abubakar *et al.*, (1998) reported that increase in protein intake will enhance the intake of other nutrients.

In this experiment, protein intake for animals on CSC was the highest (62.63g) which was followed by PKC (44.64g) and this must have enhanced DMI in both treatments. The highest DMI of CSC supplementation (227.08g) and also 212.64 for PKC can be explained by the fact that CSC and PKC did not only provide essential nutrients to maintain optional rumen activity but was also more rapidly degraded in the rumen. Low feed intake in animals on BDG (180g) could be as a result of low crude protein intake (39.02g) and higher fibre content of BDG (15.82%). Supplementation of poor quality forages was reported to increase dry matter intake and performance of animals. The increase in dry matter intake by the animals due to increased protein intake as a result of protein supplementation gave higher live weight gain (Ferdous *et al.*, 2011). Also, Bailey and Sim (1998) reported a significant ($P<0.05$) increase in organic matter intake (OMI) of sheep supplemented with cotton seed meal than sheep fed only hay. Daily water intake of experimental animals is summarized in Table 2. The results of water intake (1.92-2.27litres) obtained in this study was similar in all the treatments and within the range reported by NRC (2007) and Owen (1993) for water intake of rams under varying environments. In Table 3, weight gain was highest ($P<0.05$) in animals placed on CSC (2.55kg), this could have been due to the highest protein intake obtained from CSC. The live weight gain obtained for CSC in this study was however lower than 3.7kg obtained by Nyako *et al.*, (2012) when CSC was fed in combination with *Digitaria decumbens* (pangola grass). Animals on PKC were second in live weight gain (1.9kg), while animals on BDG had the lowest

weight gain (1.65kg). This agrees with Ferdous *et al.*, (2011) who reported that higher levels of concentrate supplementation increases live weight gain. ARC (1984) reported that supplementation of protein based supplement enhances intake and growth performance. For feed conversion ratio, the lower the better and in this study the feed conversion ratio was significantly lowest in animals on CSC (29.15) and highest in BDG (34.30), this indicates better efficiency of converting feed to flesh. Cotton Seed Cake contained higher quality protein and crude protein content than the other protein supplements.

CONCLUSION AND RECOMMENDATIONS

Congo grass when supplemented with cotton seed cake at 250g/day enhanced performance of Yankasa sheep better than PKC and BDG and was similar to the result obtained by Arigbede *et al.* (2006) when CSC, PKC and BDG supplement was fed in combination with *Panicum maximum* basal diet to West African dwarf goats. Cotton seed cake should be given in two allocations (morning and evening) for better live weight gain in Yankasa sheep. However, Congo grass should not be fed in excess to prevent the occurrence of photosensitization in the animals (Magalhaes *et al.*, 2005).

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Table 1. Proximate composition of experimental diets (%) fed to Yankasa sheep

	Basal	Supplements		
Component (% DM)	Congo grass	BDG	PKC	CSC
Dry matter (%)	90.5	90.00	88.6	90.83
Crude protein	7.58	19.51	18.6	25.05
Ether extract	2.13	6.50	8.20	6.53
Crude fibre	36.2	15.82	12.34	10.33
Nitrogen free extract	58.48	48.97	56.33	51.89
Ash	6.61	9.2	4.53	6.2

CSC= Cotton Seed Cake, **BDG**= Brewer Dry Grain, **PKC**= Palm kernel Cake

Table 2. Feed and Nutrient intake of Yankasa sheep fed Congo grass with protein supplements

	Treatment				
Parameters	CSC	PKC	BDG	Grass	SEM
DMI from supplement	227.08^{a}	212.64^{b}	180^{c}	-	1.18
CPI from supplement	62.63^{a}	44.64^{b}	39.02^{c}	-	0.32
CFI from supplement	25.83^{c}	29.62^{b}	31.64^{a}	-	0.03
NFEI from supplement	129.73^{b}	135.19^{a}	97.94^{c}	-	0.01
Water intake (litres/d)	1.92^{b}	2.27^{b}	2.0^{b}	2.0^{b}	0.20

$^{a, b, c}$ Means in the same row with different superscripts differ significantly ($P<0.05$). **DMI**= Dry matter intake. **CPI**= Crude protein intake, **CFI**= Crude fibre intake and NFEI= Nitrogen free extract intake

Table 3. Growth performance of Yankasa sheep fed Congo grass with protein supplements

	Treatments					
Indices/parameter	CSC	PKC	BDG	*B. ruziziensis*	SEM	Initial
live weight (kg)	21.63	22.23	22.19	22.16	1.01	Final
live weight (kg)	23.68	24.13	23.74	23.07	1.01	Total
Live weight gain (kg)	2.50^{a}	1.9^{b}	1.65^{c}	0.91^{d}	0.07	Daily
live weight gain (g)	41.67^{a}	31.66^{b}	27.5^{c}	15.17^{d}	1.12	Feed
conversion ratio	29.15^{a}	29.58^{b}	34.30^{c}	52.50^{d}	0.16	Protein
efficiency ratio	0.29^{ab}	0.33^{c}	0.29^{ab}	0.26^{a}	0.01	

$^{a, b, c}$ Means in the same row with different superscripts differ significantly ($P<0.05$).