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

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ABSTRACT

This study compared the feed intake and performance of Yankasa sheep fed Congo grass (*Brachiaria ruziziensis*) basal diet with different protein supplements of Cotton Seed Cake (CSC), Palm Kernel Cake (PKC), Brewer's Dried Grain (BDG) and sole *B. ruziziensis* grass (control). Sixteen (16) Yankasa sheep weighing between 18.5 and 21.5kg and aged 9-12 months were randomly allotted to treatment diets. The total dry matter and crude protein intake were highest ($P<0.05$) in animals on CSC supplement (996.33 & 118.56g) while the control diet had the least feed intake (796.4 & 57.90g).The total live weight gain (TLWG) increased ($P<0.05$) from 0.91kg in animals fed Congo grass grass solely (control) to 2.50kg in those fed Cotton Seed Cake, while feed conversion ratio reduced from 52.50 in Congo grass to 29.15 in CSC treatment. It is concluded from this experiment that Yankasa sheep utilized CSC better than PKC, BDG and *Brachiaria ruziziensis* (control). It is therefore recommended that *Brachiaria ruziziensis* should be supplemented with Cotton Seed Cake at a rate of 250g/d for better intake and live weight in Yankasa sheep production.

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

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. 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 is 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) to block for sex. Sixteen (16) Yankasa sheep weighing between 18.5 and 21.5kg and aged 9-12 months were used. Experimental animals were allowed 14 days to adjust to feed and confinement before the actual commencement of the experiment. During the adjustment period, the animals were de-wormed with *Albendazole* against internal parasites. The animals were fed supplements at 3% body weight, while *Brachiaria ruzizensis* hay, water and mineral *salt lick* were provided *ad libitum*.

The treatments diets were; Treatment 1 (grass *ad libitum* + Cotton Seed Cake 250g), Treatment 2 (grass *ad libitum* + Palm Kernel Cake 450g), Treatment3 (grass *ad libitum* + Brewers Dried Grain 400g) andTreatment 4 (grass *ad libitum* only).

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 supplements were fed 30 minutes before the basal feed was given and thereafter, the basal feed was fed *ad libitum*. The amount of water consumed by each animal daily was also measured and recorded.

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 Dry matter (DM) and other nutrients intake of Yankasa sheep fed congo grass with different protein supplements. The total DMI from both grass and supplement was lowest (796.4g/day) for sheep on congo grass and highest (996.33g/day) for animals on CSC supplement. The total dry matter intake (TDMI) for animals on CSC, PKC, BDG were significantly different from each other ($P<0.05$).The total crude protein intake of 118.56g was significantly highest ($P<0.05$) for the animals on CSC followed by intake of animals on PKC supplement (97.28g), then those fed BDG supplement (90.34g) and lowest for those on the control diet (57.90g) respectively. The total crude fibre intake was significantly influenced by the treatment. The highest crude fibre intake ($P<0.05$) was recorded for animals on BDG (31.64g), which was followed by those on control (318.56g) which was significantly different from PKC (319.33g) while the lowest was recorded for animals on CSC (333.53g). According to Topps (1996), fibrosity of forages indicates the extent to which it can be degraded by rumen micro-organisms. The highest total nitrogen free extract (NFE) intake (541.81g) was obtained in CSC group which subsequently declined to 523.03g in PKC and 476.08g in BDG group, *B. ruziziensis* had the lowest total NFE intake (426.62g). ARC (1984) reported that supplementation of protein based supplement enhances intake and growth performance.

In this experiment, protein intake for animals on CSC was the highest (118.56g) which was followed by PKC (97.28g) and this must have enhanced DMI in both treatments. The highest DMI of CSC supplementation (996.33g) and also 936.64g 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 (885.9g) could be as a result of low crude protein intake (90.34g) and higher fibre content of BDG (15.82%) while lowest intake in control was due to absent of supplement.

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 was due to increased protein intake as a result of protein supplementation which 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 animalsis summarized in Table 1. 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 conditions.

In Table 3, weight gain was highest (P<0.05) in animals placed on CSC (2.50kg), 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 (1.90kg), while animals on control diet had the lowest weight gain (0.91kg). 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. The results of this study 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.

CONCLUSION AND RECOMMENDATION

Congo grass when supplemented with cotton seed cake at 250g/day enhanced performance of Yankasa sheep better than PKC, BDG and congo grass without any supplement. Cotton seed cake should be supplemented in two allocations (morning and evening) at 250g/d for better live weight gain in Yankasa sheep. However, occurrence of photosensitization in few animals feeding Congo grass was observed in the study due to feeding excess congo grass.

REFERENCES

Agricultural Research Council (ARC, 1984). The nutrient requirements of ruminants livestock, supplement No. 1. Common Wealth Agricultural Bureau, Famham Royal, U.K.P.4

Arigbede, O. M., Olatunji, J. E. N., Isah, O. A., Bawala, T. O. and Oseni, K. A. (2006). Performance of West African Dwarf goats fed *Panicum maximum* basal diets with different protein supplements. *J. of Anim. and Vet. Adv.* 5 (10):795-799.

Bailey, D. W. and Sim, P. L. (1998). Comparison of Eastern Gama grass grain and cotton seed meal as supplements for Sheep fed mature eastern gamagrass hay. *Anim. F. Sci. and Tech.* 76 issues Pp.95-102

Eugene M, Sauvant D, Weisbecker JL, Archimède H. (2010). Effects of defloration on digestion of *Digitaria decumbens* grass and growth of lambs. *Anim. Sci. J.* (2010) 439-445.

Fadel Elseed, A. M.(2004). Effect of supplemental protein feeding on ruminal characteristics and microbial N production in sheep fed treated rice straw.*SmallRuminants Research*,Elsevier57(2005):11-17.

Ferdous, M. R., Khan, M. J., Rashid, M. A., Kamruzzaman, M. (2011). Effect of different levels of concentrate supplementation on the performance of Black Bengal goat. *Bangladesh J. of Anim. Sci.* 40 (1-2): *40-45.*

Jelan, Z.A., Ishak, Y. and Yaakub, T. (1991). Feedlotting of cattle on palm kernel cake in small holder farming system. *Proc. of the 14th Ann. Conf. on Malay. Soc. of Anim. Prod.*, (MSAP'91), Kuala Lumpur,Malaysia,pp.99-102

National Research Council(2007). Nutrient Requirements for various classes of sheep and goat, Update 2007. National Academy Press, Washington, D.C.

NCPA (1990). National Cottonseed Products Association. Gossypol effects in Animal feeding can be controlled.GEAF, August. NCPA, Cordova, TN.USA.*http://www.cottonseed.com.*

Nyako, H. D., Kibon, A. and Yahaya, M. S. (2012). Effect of different supplement on the performance of Yankasa rams fed pangola grass in Adamawa State, Nigeria. P*roc. of the 17th Ann. Conf. of Anim. Scie. Ass.of Nig.* (ASAN), Abuja,Nigeria.9-13

Oladotun, O. A., Aina, A. B., Oguntona, J. (2003). Evaluation of formulated agro-industrial wastes as dry season feed for sheep. *Nig. J. of Anim.Prod.*,30:71-80

Owen E., (1993). The chemical composition of human and animal urine. InSundstøl F andOwen E (eds.) Urine - A wasted, Renewable Natural Resources.*NORAGRIC Occasional Papers Series C. Development and Environment.* 12:3-10.

Preston, R. L., Vance, R. D. &Cahil, V. R. (1973). Energy evaluation of brewers' grains for growing and finishing cattle, *J. of Anim. Sci.* 37:174-178.

SAS (2005). Statistical Analysis System. Guide for personal computers. Version 9. SAS Institute,Inc.Carry,N.C.,U.S.

Topps J.H., Manyuchi B., Deb Hovell F.D., Ndlovu L.R., Tigere A. (1996). Effects of level of napier hay supplement and inclusion of urea in the basal diet on intake and digestibility.*Anim. F. Sci. and Tech.* 63(1-4). p.1

Table1: Chemical composition of experimental diets (%) fed to Yankasa sheep.

	Basal	Supplements		
Component (%)	B. ruzi	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	15.8	12.34	10.33
NFE	58.48	48.9	56.33	51.89
Ash	6.61	9.20	4.53	6.20

CSC= Cotton Seed Cake, **BDG**= Brewer Dry Grain, **PKC**= Palm kernel Cake.
All the treatment diets were balanced for Crude protein to meet the minimum requirement of 14% CP for growing sheep (ARC, 1984).

Table 2: Nutrient intake and utilization of Yankasa sheep fed *B. ruziziensis* with protein supplements.

	Treatments Diets				
Parameters (g/d)	CSC	PKC	BDG	Grass	SEM
Total DMI	996.33^{a}	936.64^{b}	885.9^{c}	796.4^{d}	0.06
Total CPI	118.56^{a}	97.28^{b}	90.34^{c}	57.90^{d}	0.27
Total CFI	333.53^{a}	319.33^{b}	314^{c}	318.56^{b}	0.54
Total NFEI	541.81^{a}	523.03^{b}	476.08^{c}	426.62^{d}	0.10
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: Performance of Yankasa sheep fed congo grass with protein supplements

	Treatments				
Parameter	CSC	PKC	BDG	Congo grass	SEM
Initial weight (kg)	21.63	22.23	22.19	22.19	1.01
Final weight (kg)	23.68	24.13	23.7	23.1	1.01
Total weight gain (kg)	2.50^{a}	1.90^{b}	1.65^{c}	0.91^{d}	0.07
Daily weight gain (g)	41.7^{a}	31.7^{b}	27.5^{c}	15.2^{d}	1.12
Feed conversion ratio	29.2^{a}	29.6^{b}	34.3	52.5^{d}	0.16
Protein efficiency ratio	0.29^{a}	0.33^{c}	0.29^{a}	0.26^{a}	0.01

a, b, c= Means in the same row with different superscripts differ significantly ($P<0.05$), **CSC**= cotton seed cake, **PKC**= Palm kernel cake, **BDG**= Brewer's dried grain, **FCR**= Feed conversion ratio, **PER**= protein efficiency ratio