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PERFORMANCE AND NUTRIENT INTAKE OF GROWING YANKASA RAMS FED GRADED LEVELS OF BAOBAB (*Adansonia digitata*) SEED MEAL AS A REPLACEMENT VALUE FOR COWPEA HUSKS

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ABSTRACT

The research was conducted to evaluate the performance and nutrient intake of growing Yankasa rams fed graded levels of baobab (*Adansonia digitata*) Seed Meal to replace cowpea husks. Four experimental diets were formulated with baobab seed meal to replace cowpea husks at 0, 10, 20 and 30% designated as T1, T2, T3 and T4 respectively. Sixteen growing Yankasa rams with an average weight of 16.93 kg were randomly allocated into four treatments of four animals each in a completely randomized design (CRD). The study lasted for 63days. Data were taken on feed intake and body weight changes. The results showed that animals on T4 had the highest weight gain (107.14g/day) and T1 the lowest (67.46g/day) and the values were significantly ($P<0.05$) different. Animals on T4 utilized their diets more efficiently (7.58) than others. It can be concluded from the results of the experiment that the inclusion of baobab seed meal to replace cowpea husks in the diets of growing Yankasa rams up to 30% level improved growth performance of the animals.

Keywords: Baobab; cowpea husks; Yankasa rams

INTRODUCTION

Studies on baobab seeds in Nigeria and elsewhere in the world have shown its potentials in supplying good quality food proteins for human and livestock (Osman, 2004; Nkafamiya *et al*., 2007). The seeds are readily and cheaply available particularly around the middle-belt and some part of the far north (Nkafamiya *et al*., 2007). The whole seed contain 13-18% protein (DM basis), up to 26% crude fibre and 10-13% oil (Osman, 2004). Dehulled seeds are richer in protein (26-38% DM), poorer in fibre (17%DM) and richer in oil (23-24% DM) (Igboeli *et al*., 1997; Balewu *et al*., 2008). Variation in seed composition can be attributed to soil, climate and variety (Osman, 2004). The seed protein contains 1.5% lysine, 1%methionine and 15% cystine (Osman, 2004). The seeds are however not widely used, the hard epicarp of the seeds seems to have limited its respective use as food and feed ingredients for man and other livestock species, as such a greater percentage of it is wasted (Ezeagu, 2005).

Inadequate nutrition is a major limitation to livestock production in Nigeria and other developing countries (Ngele *et al*., 2010). The extensive mode of production which the animals are exposed to guarantees abundant fodder only during the rainy season (June to October). The dry period especially January to May, characterized by limited and low-quality

fodder, exposes the animals to severe nutritional stress. The decrease in the nutritional quality of natural forages during dry season underscores the importance of supplementary feeding for animals raised under extensive system of management (Abdu *et al*., 2013).

The low intake of meat, milk and eggs is a challenge to the government and researchers in animal production (Adegbola, 1998). It has been estimated that the daily minimum crude protein requirement of an adult Nigeria varies between 65 g and 85 g per person. However, it is recommended that 30 g of this minimum requirement should be obtained from animal products (Oloyede, 2005). Data from FAO shows that the average per capital protein intake for Nigeria i.e. 63 g of which only 10 g came from animal's sources (FAOSTAT, 2013). This observed low level of animal protein intake has its root cause in the high cost of feeding farm animals for optimum growth and production (Asaolu and Odeyinka, 2006). Lawrence *et al*. (2008) had attributed the high cost of animal production in Nigeria and most African countries to high cost of livestock feed which generally accounts for 60-70% of the total cost of production. To reduce this high cost, there has been a worldwide interest in the use of unconventional feed ingredients, which are usually less expensive, for the feeding of livestock (Akinfala and Tewe, 2002).

MATERIALS AND METHODS

Experimental Site

The experiment was conducted at the Abubakar Tafawa Balewa University Bauchi Teaching and Research farm, located at Yelwa along Tafawa Balewa Road, Bauchi. Bauchi State occupies a land area of about 49,119km^2, approximately 5.3% of Nigerian's total land area. The average annual rainfall ranges from 700mm in the north to 1300mm in the southwestern part of the state. The rainy season usually starts in April and ends in October. Minimum temperature of 22^{0}C is usually in December/January while maximum temperature of 40^{0}C is around March/April (BSOD, 2014).

Experimental Materials

The experimental materials used were baobab seed meal, cowpea husks, maize offal, cottonseed cake, molasses, bone meal and salt. Baobab seed meal used in the experiment was purchased in a local factory in Kano State. It was milled and used to compound the experimental diets. Other ingredients used to formulate the experimental diets were bought from Mararraba Market, Bauchi State. Four diets containing 16% CP were formulated such that baobab seed meal replaced cowpea husk at 0, 10, 20 and 30% levels and designated as diets 1, 2, 3 and 4 respectively.

Experimental Animals and their Management

Sixteen (16) growing Yankasa rams of an average weight of 16.93 kg were purchased from livestock Markets (Durun and Mararraba) in Bauchi State. The rams were transported to Abubakar Tafawa Balewa University Teaching and Research Farm Bauchi. The rams were quarantined, dewormed with *albendazole* at the rate of 10mlg/kg body weight and injected against ectoparasites with *ivemectine,* a broad-spectrum antibiotic at the rate of 1ml/kg body weight administered subcutaneously.

The rams were group fed and managed intensively during a 2-week adaptation period prior to the commencement of the experiment.

Experimental Design and feeding procedure

Completely Randomised Design (CRD) was used in the experiment as outlined by Steel and Torrie (1980). Sixteen (16) growing Yankasa rams were assigned to four (4) dietary treatments coded as T1, T2, T3 and T4 respectively with four (4) animals per treatment. Each animal was offered *ad libitum* of the respective diet twice every day at about 7am and 2pm. The left over for each animal was measured the following morning before serving the day's feed to ascertain feed intake per day. Ingredients and chemical composition of the experimental diets were shown in Tables 1 and 2 respectively.

Table 1: Ingredient composition of the experimental diets

Ingredients (%)	Treatments			
	1	2	3	4
Maize offal	42.00	45.00	48.00	51.00
Cowpea husks	30.00	20.00	10.00	0.00
Baobab seed meal	0.00	10.00	20.00	30.00
Cotton seedcake	20.50	17.50	14.50	11.50
Molasses	5.00	5.00	5.00	5.00
Bone meal	2.00	2.00	2.00	2.00
Salt	0.50	0.50	0.50	0.50
Total	100.00	100.00	100.00	100.00

Table 2: Chemical composition of experimental diets

Components (g)	Treatments			
	1	2	3	4
Dry matter	89.81	89.26	88.93	88.64
Organic matter	82.12	81.73	80.82	80.49
Crude fibre	17.10	16.40	16.39	17.16
Neutral detergent fibre	31.19	31.28	32.23	31.63
Acid detergent fibre	22.31	24.16	24.19	23.29
Hemicellose	08.88	07.12	08.04	08.34

Chemical Composition of Experimental Diets

Proximate composition of the experimental diets was carried out to determine crude protein (CP), crude fibre (CF), ether extracts (EE) and total ash according to (AOAC, 2005). Fibre fraction such as neutral detergent fibre (NDF), acid detergent fibre (ADF) was analysed according to Van Soest *et al.* (1991).

Feed Intake

Feed intake was recorded every day by subtracting left over from the amount of feed offered for each animal.

Live Weight Changes

The animals were weighed at the beginning of the experiment and thereafter on a weekly basis throughout the experimental period using a 50 kg hanging weighing scale.

Data Analysis

Data generated in this study were subjected to analysis of variance (ANOVA) according to Steel and Torrie (1980) using SPSS version 20, and means were compared and separated using Least Significant Difference (LSD) Test.

RESULTS AND DISCUSSION

The result on growth performance is shown in Table 3. The initial weight was not significantly ($P>0.05$) affected across the treatments and ranged from 17.25 to 16.50 kg. However, the final weight differed significantly ($P<0.05$) among treatments with T4 (23.50 kg) been the highest and T1 recorded the lowest value (21.50 kg). This may suggest higher feed conversion ratio in T4 than others. There were significant differences in total weight gain (TWG). T4 was significantly higher (6.75 kg) than others (4.25, 5.62 and 4.50 kg) for T1, T2 and T3 respectively. The TWG recorded in this study ranged from 4.24 to 6.75 kg. This result is in line with the report of Salisu *et al*. (2018) who recorded 4.94 to 6.75 kg for Yankasa rams fed total mixed ration containing groundnut haulms and maize stover. The average daily weight gain (ADWG) in the current study increased with increase in inclusion level of baobab seed meal with T4 having a significantly ($P<0.05$) higher value (107.14 g/day) than those of treatments 1, 2 and 3 (67.46, 89.21 and 71.43 g/day) respectively. The lowest value was recorded in T1 (67.46 g/day). However, it was higher than 94.60 g/day reported by Nyako (2015) in rams fed groundnut hay supplemented with 300g maize bran. Differences in the composition of the experiment materials, location and weight of the animals in the two experiments could have been responsible for the variation in ADWG. A lower ADWG is as a result of lower feed conversion ratio. The feed intake (FI) of animals in this study decreased with increase in the levels of Baobab seed meal. T1 recorded the highest value (985.31 g/day) and is significantly ($P<0.05$) higher than those in treatments 2,3 and 4 which were statistically similar. This may suggest that diet of T1 was more palatable than others. T4 recorded the least FI (917g/day). The FI in the current study was higher than 328.75 g/day reported by Abdullahi *et al*. (2016) for Yankasa rams fed urea treated sorghum chaff as a basal diet supplemented with maize offal. Mubi *et al*. (2008) reported a higher FI value (1661.12 g/day) for Yankasa sheep fed sorghum stover supplemented with dried poultry litter. The differences may be due to difference in palatability of the experimental diets. The values of feed conversion ratio (FCR) were significantly ($P<0.05$) affected by the dietary treatments with T1 having a higher value (13.11) than others. T2 and T3 were statistically similar (9.44 and 11.95 respectively). T4 recorded the least value (7.59). The result of FCR in this study was lower compared to a value of 14.21 to 22.81 reported by Nayawo *et al*. (2017), indicating that the diets in the current study were much more utilized than those in the study of Nayawo *et al*. (2017). Animals on T1 were much less efficient in utilizing their diets compared to those on treatment 4, but comparable to those on the other treatments.

Table 3: Growth performance of growing Yankasa rams fed experimental diets

Parameters	Treatments				SEM
	T1	T2	T3	T4	
Initial weight (Kg)	17.25	16.50	17.25	16.75	1.22
Final weight (Kg)	21.50^{c}	22.12^{ab}	21.75^{b}	23.50^{a}	1.37
Total weight gain (Kg)	4.25^{c}	5.62^{ab}	4.50^{b}	6.75^{a}	0.56
Average daily weight gain (g)	67.46^{c}	89.21^{ab}	71.43^{b}	107.14^{a}	11.57
Feed intake (g/day)	985.31^{a}	943.25^{ab}	960.12^{ab}	917.34^{b}	12.84
Feed conversion ratio	13.12^{a}	9.44^{ab}	11.95^{ab}	7.59^{b}	1.66

^{abc}=Means in the same row with different superscripts differ significantly (P<0.05), NS=not significant, SEM=standard error of mean.

The results on dry matter and nutrient intake is shown in table 4 below. The DMI decreased with increase in levels of Baobab seed meal across the treatments. T1 was significantly (P<0.05) higher (884.91 g/day) but statistically similar with T2 and T3 (841.94 and 853.82 g/day). While T4 recorded the least value (813.12 g/day). The DMI in this study was higher than the value of 735.5 g/day DMI reported by Garba and Jinjiri (2013) for growing Yankasa rams fed graded level of *Tamarindus indica* leaves in diets. Yadete (2014) reported DMI of 567 g/day for sheep fed urea treated wheat straw and *Leucaena leucocephala* foliage hay supplementation which was lower compared to the DMI obtained in the current study. Also, the report of Aliyu *et al.* (2021) showed a lower DMI that ranged between 755.50-760.37 g/day for growing Yankasa rams fed urea treated and untreated acha straw with supplementation. The high DMI in this study may be attributed to high total feed intake. The values for organic matter intake (OMI) differed significantly (P<0.05) across the treatments. A significantly (P<0.05) higher value was recorded for treatment 1 (726.69 g/day), and the least for treatment 4 (654.48 g/day). Treatments 2 and 3 were statistically similar (688.12 and 690.06 g/day respectively). Higher OMI may result in more consumption of minerals by the animals. OMI in this study fell within the range of 520.00 to 760.00 g/day reported by Hirut *et al*. (2011) for rams fed diets containing stover treated with urea. The values for crude protein intake (CPI) differed significantly (P<0.05) across the treatments. The CPI value for treatment 1 was higher (151.32g/day) than those for the other treatments. Hence, the values for treatments 2, 3 and 4 were 138.08, 139.94 and 139.53g/day respectively. The CPI in this study (138.08 - 151.32 g/day) were higher than 72 g/day recorded by Assefa *et al*. (2015) fed urea treated wheat straw with supplementation of 300 g/day of atelle cake and 76.8 g/day reported by Gebreselassie *et al*. (2014) fed barley straw *ad libitum* a with 100 g wheat bran and 200 g *Acacia seyal* leaf. Higher CPI could be obtained with higher dietary crude protein levels as obtained with the diets in the present study (16%CP). However, the results in present study showed lower CPI compared to the value of 174.87 g/day reported by Aliyu *et al.* (2021) for growing Yankasa rams fed urea treated and untreated acha straw with supplementation. Neutral detergent fibre intake (NDFI) values differed significantly (P<0.05) among the treatments. The NDFI values for treatments 1,2 and 3 were statistically similar (276.00, 263.36 and 275.19 g/day respectively). Treatment 4 recorded the lowest value of 257.19g/day. The NDFI in this study was lower than the range of 356.94 to 386.67 g/day as reported by Aliyu *et al.* (2021) for growing Yankasa rams fed urea treated and untreated acha straw with supplementation. NDFI would depend on total DMI which was lower in the current study (884.91 g/day) and higher (386.67 g/day) for Aliyu *et al*. (2021). The values for acid detergent fibre (ADFI) differed significantly (P<0.05) across

the treatments. A significantly (P<0.05) higher value was recorded for treatments 3 and 2 (206.54 and 203.41g/day respectively) and the least value for treatments 4 and 1 (189.38 and 197.42g/day). The ADFI in this study ranged between 189.38 and 206.54 g/day. This was lower than the range of 272.58 to 283.81 g/day and 236.05 to 306.81 g/day reported by Aliyu *et al.* (2021) and Gebreselassie *et al.* (2014) respectively. This could be as a result of the higher DMI obtained in the later studies compared to that in the current study.

Table 4: Dry matter and nutrient intake of growing Yankasa rams fed experimental diets

Parameters	Treatments				SEM
	T1	T2	T3	T4	
Dry Matter Intake(g/day)	884.91^{a}	841.94^{ab}	853.82^{ab}	813.12^{b}	11.44*
Organic Mater Intake	726.69^{a}	688.12^{b}	690.06^{b}	654.48^{c}	6.36*
Crude Protein Intake (g/day)	151.32^{a}	138.08^{b}	139.94^{b}	139.53^{b}	2.13*
Neutral Detergent Fibre Intake (g/day)	276.00^{a}	263.36^{ab}	275.19^{a}	257.19^{b}	4.03*
Acid Detergent Fibre Intake (g/day)	197.42^{bc}	203.41^{ab}	206.54^{a}	189.38^{c}	3.06*

*Means in the same row with different superscripts differ significantly (P<0.05), SEM=standard error of mean

CONCLUSION

It can be concluded from the results of this study that inclusion of baobab seed meal (BSM) to replace cowpea husks (CPH) in the diets of growing Yankasa rams up to 30% level improved growth performance of the animals. Diet 4 (0% CPH / 30% BSM) which gave the best result in terms of average daily weight gain (107.14g) and a better feed conversion ratio (7.58) can therefore be recommended for growing Yankasa rams.

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