UTILIZATION OF UNTREATED OR UREA TREATED SOYA BEANS HUSK WITH SUPPLEMENTS BY GROWING YANKASA RAMS

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ABSTRACT

A 10 weeks (70 days) experiment was carried out to evaluate nutrient intake, digestibility, and growth performance of Yankasa rams fed untreated or urea treated soybean husks with supplementation. In the study 16 Yankasa rams with an average weight of 17.20 kg were randomly allocated to four (4) dietary treatments with four (4) animals per treatment in Completely Randomized Design (CRD). The two (2) basal feeds were untreated soya beans husk (USBH) and urea treated soya bean husk (UTSBH). The supplements were maize bran with cotton seed cake (50:50) and maize bran with groundnut cake (50:50). Animals on treatments I and II were fed USBH while those on treatments III and IV fed urea treated soybean husks. Treatment I and III were supplemented with 300 g of maize bran with cotton seed cake (50:50), while those on treatments II and IV were also supplemented with 300g of maize bran with groundnut cake (50:50). Significant differences ($P<0.05$) were observed in total weight gain (TWG), average daily weight gain (ADWG), feed intake (FI) and dry matter Intake (DMI) with treatment IV having the highest values (4.88 kg, 69.71 g, 489.71 g/d and 442.01 g/d, respectively). Significance variations ($P<0.05$) were observed in all the nutrient intake parameters. Similarly, nutrients digestibility significantly ($P<0.05$) differed across the treatments except for dry matter. The study concluded that feeding Yankasa rams with untreated or urea treated soybean husks with supplements did not have any adverse effect on the performance of growing Yankasa rams. It was recommended that, urea-treated soybean husks supplemented with 300 g of groundnut cake/head/day should be used for feeding growing Yankasa rams.

Key words: Yankasa rams, Soya bean husk, Maize offal, Cotton seed cake, Groundnut cake

Introduction

Ruminant production occupies a bride of place in livestock production in Nigeria. Ruminants form a significant proportion of the livestock production in Nigeria and possess obvious advantage over other livestock. They are found in most rural households and can be established with lower capital compared to other livestock like cattle; it contributes immensely to animal protein supply in Nigeria (Aruwayo, 2018). However, the supply of feed and feeding stuffs has been recognized as one of the main challenges to the production of these animals. Adebowale (1982). Dayo *et al.* (2009) reported that feeding which constitutes 65% of the total cost of animal production in Nigeria remains a challenge since the ruminants depend majorly on pastures whose supply fluctuates with seasonal variations. Aruwayo *et al*. (2019) reported that non-conventional farm residues such as soybean husk, millet husk and sorghum husk are gaining prominence in feeding ruminants and that this relieved the farmers of the excruciating feeding challenge experienced during the dry season of the year.

Farmers in the rural areas depend on crop residues to feed livestock during the period of feed scarcity (Fall *et al*., 1987). Estimates revealed that over one billion metric of tonnes of crop residues are produced worldwide, of which more than 34 million tonnes were in Africa (Umunna and Iji,1993) and over 111.5 milion tonnes in Nigeria annually (Lufadeju,1990). These provide much of the feed resources for ruminants in developing countries (Owen and Jayasuriya, 1989).

On-farm production of improved forages such as grases and herbaceous legumes at cropping areas is often impractical by most of the farmers due to increased input costs, scarcity of land and higher degree of managemant it requires (Dayo *et al.*, 2009) . On the other hand, the potential for increasing digestibility and intake of locally available crop residues through treating with alkali has been widely researched and reviewed (Ibrahim and Schiere, 1989; Sundstol and Coxworth, 1984). In this regard urea treatment has most practical significance in the tropics acting as alkali and source of nitroen, and is effective in improving nutritive values of roughages. Treating poor quality roughages using chemicals such as urea may support animal performance little above maintenance requirement (Kayouli, 1996).

This study was therefore designed to determine the nutrient intake, digestibility and performance of yankasa rams fed untreated or urea treated soya bean husks with supplements.

MATERIALS AND METHODS

Location of the study

The experiment was carried out at the Department of Animal Health and Production, college of Agriculture small ruminant farm Bauchi. Bauchi is located within latitude 90^0 30" north of the equator and longitude 8^0 50" East. The state has a prominent climate marked by dry and wet seasons. The rain starts in April and ends in October. The average rainfall is 700mm in the northern part and 1300mm in the southern parts. The wettest months are July, August and September. The dry season start in November and ends in April.

Experimental animals and management

Sixteen (16) yankasa rams with average body weight of 17.2kg were sourced from Durum market Bauchi, Bauchi state. They were quarantined for 14 days, during this period; they were tagged and treated with Albendazole and Ivermectin against endo and ecto parasites respectively. They were housed individually in well-ventilated disinfected pen with slated floor and randomly allotted to 4 treatments of 4 rams per treatment. They were allowed to adapt to the diets and housing before the commencement of data collection.

Preparation of experimental diets

Soya bean husk was collected from Badaromo farm along Gombe raoad, divided in to 2, half of it left as it is, while the remainig half was crushed and ensiled using 5kg of urea dissolved in 100L of water. The dissolved mixture was sprinkled over 100kg of crushed soya bean husk and packed in a polythene bag for 21 days. After 21 days the content was opened and spread on a mat for the content to dry and also for the ammonium gas to escaped. Two supplements were formulated, maize bran and cotton seed at the rate of 50:50 and maize bran and groundnut cake at 50:50.

Experimental animal

The diets used were as follows; Treatment one (T1) untreated soybean husk (USBH) supplemented with 300 g of Maize bran + cotton seed cake (50;50), treatment two (T2) untreated soybean husk (USBH) supplemented with 300 g of Groundnut cake (50;50), treatment 3 urea treated soybean husk (UTSBH) supplemented with Maize bran + cotton seed cake (50;50) and treatment 4 urea treated soybean husk supplemented with Maize bran + groundnut cake (50:50).

All the supplements were fed at 300g/head/day. The supplements were fed at 150 g in the morning (8:00am) and the remaining 150 g in the afternoon (2:00 pm).

Digestibility procedure

Two animals were randomly selected from each treatment one week to the termination of the experiment and placed in an individual metabolic cage with slatted floors adapted for faecal collection. The faecal sample collected from each animal were bulked, oven dried, and for each treatment, weighed and samples analyzed for their proximate constituents and thereafter used to compute dry matter and nutrient digestibility using the following formula;

$$\text{Nutrient digestibility (\%)} = \frac{\text{Nutrient in feed} - \text{Nutrient in faeces}}{\text{Nutrient in feed}} \times 100$$

Chemical analysis of experimental and faeces

Samples of untreated soya bean husk, urea-treated soya bean husk, mixture of maize bran and cotton seed cake at 50:50, mixture of maize and groundnut cake at 50;50 and the faecal samples were dried at 65^0c for 24 hours and analyzed for proximate composition. Both the basal diets and the supplements are presented in table1.

Statistical analysis

Data generated in the experiment were subjected to analysis of variance using the general linear model (GLM) of the statistical analysis System (SAS,2000). Where significant differences existed between means, least significant (LSD) was used to separate them (Steel and Torrie,1990).

RUSULT AND DISCUSSION

Chemical composition of the experimental diets

The result of the chemical composition of the experimental diets is shown in table 1: the resuls indicated that the dry matter (DM) values ranged from 89.93 – 91.16 %. These values had showed the good driedness of the test diets. The reported high values of dry matter may be due to the fibrous nature of soya bean husk. The values recorded for DM in the current study is below than the 93.0 – 95.0 % reported by Omotosho *et al,* (2015) who evaluated the chemical copmposition of rice straw which with soyabean meal and garlic oil. The disparity could be due to the inclusion of garlic in the ensiling process.

Table 1: **Chemical composition of the experimental diet (%)**

Parameters	USBH	UTSBH	MB + CSC	MB + GNC
Dry matter	91.16	89.93	90.26	90.23
Organic matter	95.43	93.89	92.51	91.71
Crude protein	4.59	14.69	16.58	16.38
Neutral detergent fibre	58.93	61.24	29.64	32.68
Acid detergent fibre	49.54	52.16	21.69	23.19
Hemicellulose	9.39	9.08	7.95	9.49

UTSBH= Urea treated Soybean husk, USBH= Untreated Soybean husk, MB= Maize bran, CSC= Cotton seed cake, GNC= Groundnut cake.

Nutrient intake

The nutrient intake values for Yankasa rams fed untreated or urea treated soya bean husk wit supplements is presented in table 2. All the parameters measured under nutrient intake were significantly (P<00.5) affected by the experimental diets except feed conversion ratio.

The dry matter intake of 330.50 – 440.25 % obtained in this study were higher than the 118.84 – 127.74 % reported by Adamu *et al,* (2015) for yankasa rams fed cowpea husk urea and molasses treated maize cobs, this is in agreement Abdel-hameed *et al,* (2013) who reported that, lambs fed treated groundnut

shell compare to the untreated groundnut shell had increased feed intake. This may be as a result of increased palatability of the diets due to ammoniation and protein which improved nutritive value of the feed (Melaku *et al*, 2004).

The crude protein intake values in the current study (15.00 – 64.50 g/day) which was close to 69.59 g/ day reported by Lamrot *et al.,* (2018) who fed farta sheep urea-treated rice straw supplemented with dried *Sesbania sesban* leaves. The value of CPI (32.9 g/day) obtained by Getahun *et al*., (2014) fed urea-treated wheat straw supplemented with *Leucaena leucocephala* foliage. However, higher value of CPI (128.56 g/day) was obtained by Adamu *et al*., (2017) who fed Yankasa rams cowpea husk, urea and molasses maize cobs .The difference of the CPI in the two studies could be as a result of different feeding pattern used in both experiments.

Table 2: Nutrient intake and growth performance of Yankasa rams fed untreated or urea treated soybean husk with supplements

	Treatments					
Parameters	1	2	3	4	SEM	LOS
DMI (g/day)	420.29^{a}	330.50^{b}	435.50^{a}	440.25^{a}	27.38	*
OMI (g/day)	401.08^{a}	315.39^{b}	408.89^{a}	413.35^{a}	24.27	*
CPI (g/day)	19.19^{b}	15.00^{b}	63.75^{a}	64.50^{a}	2.64	*
NDFI (g/day)	247.59^{a}	194.75^{b}	266.46^{a}	269.75^{a}	16.71	*
ADFI (g/day)	208.20^{ab}	163.75^{b}	197.82^{ab}	231.50^{a}	16.32	*
FI (g/d)	461.00^{a}	362.50^{b}	484.25^{a}	489.75^{a}	35.59	*
ADWG (g)	52.85^{b}	39.00^{c}	55.42^{b}	69.71^{a}	6.67	*
FCR	7.87	8.35	7.96	6.35	0.09	NS

SEM= standard error means, LOS= least of significance, FI= feed intake, CPI= Crude protein intake, CFI= Crude fibre intake, NDFI= Neutral detergent fibre, ADFI= Acid detergent fibre,

Nutrient digestibility

The nutrients digestibility value for Yankasa rams fed untreated or urea treated soyabean husk is presented in table 3.

The dry matter digestibility was 53.08 – 65.79.The results showed that animals fed treatment 4 (urea treated soya bean husk supplemented with MB + groundnut cake) recorded the highest

value of 65.79 % while the least 53.08% was recorded among animals in treatment 2, while T_1 61.10% and T_3 65.63%. this implies that ensiled urea treated fibrous materials with fermentable carbohydrate could increase digestibility of the feed, Nisa *et al*, (2004).

Organic matter digestibility of (41.3 %) in the current study was recorded in animal fed diet 3 which is lower than (65.10 %) reported by Ahmed *et al*. (2002). Omotosho *et al*. (2015) reported OMD of 69.30 % in Yankasa rams fed urea-treated rice straw supplemented with soybean meal and garlic oil which is higher than that of the current study. OMD of 51.9 % was reported by Jokthan *et al*., (2013) when Yankasa rams fed maize husk supplemented with broiler litter to replace cotton seed cake.

The CPD recorded in this study (70.1 and 85.02 %) in animals fed diet 4 and 3 which is similar to (70.97 %) as reported by Omotosho *et al*., (2015). Lamrot *et al* (2018) reported CPD of 72.44 % which is in agreement with that reported in the current study. On the other hand, Jokthan *et al*., (2013) reported CPD of 63.59 % which was lower than that of the current study. Similarly Adamu *et al.* (2015) reported CPD of 56.72 % which was also lower than that of the current study.

The highest feed intake observed in this study with animals on treatment 3 and 4 (489.71 and 484.07 g/d) is in line with that of Gunun *et al.,* (2013), who found that the dry matter of treated rice straw improved the intake of dairy cows related to untreated rice straw. The high feed intake in the animals received urea-treated soybean husks diets of this study also is similar to the findings of Abdel Hameed *et al.*, (2013) and Kade, (2020) who reported that, Lambs fed treated groundnut shell compared to the untreated groundnut shell had increased feed intake. This may also be as a result of the increased palatability of the diet due to ammoniation and protein which improved nutritive value of the feed (Melaku *et al.,* 2004).

All the animals increased in weight, which indicated that, the intake of the protein and energy was above maintenance requirement. The highest Average daily weight gain of 69.71 g/day observed in this current study was similar to the ADWG of 66.67 g/day reported by Alli-Bologun *et al*,. (2018) who fed urea-treated gamba hay to Yankasa rams. The average daily weight gain values of 39.00 – 69.71 g/day in the current study had a close range and was similar with those of Omotosho *et al*., (2015) reported ADWG of 57.50 – 77.5 g/day. On the other hand, ADWG values of 86.56 – 115.78 g/day were observed by Adamu *et al*., (2015) fed Yankasa rams Cowpea husk, urea and molasses treated maize cobs. The values were higher than those of this study, this could be as a result of using molasses in addition to urea when treating the maize cobs. Also ADWG values of 10.00 – 25.77g/d reported by Lamrot *et al*., (2018) fed farta sheep urea-treated rice straw supplemented with graded levels of dried *susbenia sesban* leaves which were lower than those of the current study 39.00 – 69.71 g/d, this may be attributed to the use of leaves as supplements unlike the current study which concentrates were used as supplements.

Better feed utilization was recorded in animals diet 4 (6.35) in this study, and is comparable with the work of Kade , (2020) who fed treated groundnut to ram-lambs and observed least FCR in the animals received lime treated diets (8.94). The efficacy of feed use for growth is affected by energy loss as heat, or heat augmentation (McDonald *et al*., 2010). The higher the heat loss the less the feed utilization thus reduced growth and vice versa. The growth performance of ruminants is influenced positively when more gross energy is converted as a result of lower methane emission (Ansah *et al.*, 2017). In this study methane was not quantified, but may be contributor to differences in utilization of nutrients.

Table 3: Nutrient digestibility of Yankasa sheep fed Untreated or urea-treated soybean husk with supplements (%)

	Treatments					
Parameters	1	2	3	4	SEM	LOS
DMD	61.10	53.08	65.63	65.79	1.51	NS
OMD	25.66^{b}	19.16^{b}	41.30^{a}	37.96^{a}	2.17	*
CPD	75.74^{b}	75.07^{bc}	70.41^{c}	85.02^{a}	1.16	*
CFD	71.58^{b}	61.25^{c}	79.51^{a}	81.42^{a}	1.69	*
NDFD	73.67^{b}	75.19^{b}	62.80^{c}	77.62^{a}	0.95	*
ADFD	76.52^{a}	77.58^{a}	66.74^{b}	74.74^{a}	1.16	*

^{Abc} means on the same row with different superscripts differ significantly (*=p<0.05), DMD= Dry matter digestibility, OMD= Organic matter digestibility, CPD= Crude protein digestibility, CFD= Crude fibre digestibility, EED= Ether extract digestibility, ASHD= Ash digestibility, NDFD= Neutral detergent fibre, ADFD= Acid detergent fibre, NS= Not significant.

Conclusion

From the results obtained in this research, it was concluded that feeding urea treated soya bean husk to Yankasa rams with supplements improved dry matter intake which resulted to increased daily weight gain of the animals. Therefore, It may be recommended from this study that Yankasa rams fed urea-treated soybean husks and supplemented with 300g maize bran and groundnut cake (50:50) /head /day gave the best result in terms of ADWG of 69.71g and FCR value of 6.35. Therefore this diet can be recommended for growing Yankasa rams.

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