FUDMA Journal of Agriculture and Agricultural Technology
ISSN: 2504-9496
Vol. 8 No. 1, June 2022: Pp.283-291

https://doi.org/10.33003/jaat.2022.0801.095

EFFECTS OF FEEDING UREA ENSILED MILLET STOVER BASED DIETS WITH CONCENTRATES ON GROWTH PERFORMANCE AND ECONOMY OF SUPPLEMENTATION IN GROWING YANKASA RAMS

Yusuf, A[1*], Abubakar, M[2] and Muhammad, B. F.[3]
[1]Department of Animal science, Faculty of Agriculture, Federal University Dutsin-Ma, Katsina State, Nigeria
[2]Department of Animal Production, Abubakar Tafawa Balewa University, Bauchi State, Nigeria
[3]Department of Animal Science, Faculty of Agriculture, Bayero University, Kano – Nigeria.
*Corresponding author: aliyuyusuf334@gmail.com phone: +2348065550350

ABSTRACT

Effects of feeding urea ensiled millet stover based diets with concentrates on growth performance and economy of supplementation in growing Yankasa Rams were evaluated. Four kg urea was dissolved in 100 litres of water sprinkled on 100kg of millet stover kept in an airtight, anaerobic condition for 21 days (ensiled) as basal diet, fed ad libitum to thirty Yankasa rams with average initial weights of 16.35 - 18.21 kg replicated 5 times using completely randomized design were allocated to 6 diets; 300g cottonseed cake diet 1, Faidherbia albida diet 2, CSC & maize offal diet 3, FA & maize offal diet 4, CSC & wheat offal diet 5 and FA & wheat offal diet 6, fed twice for 70 days. Findings revealed highest ($p<0.05$) DM intake (756.09g/d) in diet 6. Rams on diet 2 recorded highest average daily weight gain and FCR (75.81g/d & 7.91) than diet 4 (35.02g/day & 17.94) with least. cost of concentrate diets was lower in diet 6 (₦ 35.82) than diet 1 (₦ 109.83), 2 (₦ 46.79), 3 (₦ 66.71), 4 (₦ 68.77) and 5 (₦ 58.50). Supplementation of urea ensiled millet stover based diet improved growth performance and FCR. However, supplementing Faidherbia albida pod meal at 30% with 4kg urea ensiled millet stover gave the highest ADG and FCR with a concomittant reduction in cost of feed, therefore is recommended for growing Yankasa rams.

Key words: cottonseed cake, *Faidherbia albida*, concentrates, maize offal and wheat offal.

INTRODUCTION

Small ruminants' production has been given a pride of place in animal production in Nigeria in view of its multipurpose roles. It contributes immensely to animal protein supply in Nigeria (Aruwayo, 2016). The short generation interval, ability to give multiple births and their small size make sheep adaptable to smallholder mixed crop-livestock production systems where they contribute up to 22 to 63% to the net cash income (FAO, 2004). Most of the sheep feeds are derived from natural pasture and crop residues. However, such feed resources may not fulfil the nutritional requirements of animals, particularly in the dry season, due to their inherent low nutrient content and poor quality (Alemayehu, 2006), in that, the natural pasture which supply the bulk of ruminants, feed becomes dry and of low nutritive value during the dry season leading to a marked decrease in voluntary intake and digestibility Yusuf *et al.* (2013).

Fibrous crop residues are poor sources of fermentable nitrogen as their crude protein is below the level required by rumen microorganism. These crop residues are low in easily degraded carbohydrates, minerals and other nutrients required to balance the products of digestion to requirements, leading to limited intake, poor rumen function and low animal productivity (Anya & Ozung, 2018). The nutritional needs of sheep can thus be addressed through the use of non-conventional feedstuff that are cheap and readily available (Ahamefule & Udo, 2010).

According to Akinola *et al.* (2015), cereal crop residues are given less attention as important livestock feed, where over 40% is used as fuel while only about 27.28% is used as animal feed, as such, ruminant animals in the arid and the semi-arid areas of the Sudan savanna survive almost entirely on drought tolerant pasture species and supplement their nutrient requirements generally from the available fodder trees and shrubs (Buterworth, 2002). The arid and semi-arid areas are home to over 80% of small ruminants and their sustenance is reducing due to dependence on natural pastures (Kosgey *et al.*, 2008) supporting 46-58% of pastoral households..The trend has started changing from the situation in which millet stovers were considered as waste and are now being converted to animal protein for human consumption (Singh *et al.*, 2004 & Singh *et al.*, 2011).

Millet Stover is the part of the plant that remains after the grains are harvested, and is a fibrous by-product that contains low nutritive value (Hassanat, 2007). Millet stover can be fed to sheep. According to Subba Rao *et al.* (1995) treating millet stover with 4% urea using maximum of 100 litres of water per 100kg air dry straw in long form, storing it under airtight condition for a period of 1-3 weeks, improves palatabilty, energy and protein content. Due to its high

palatability and nutritive value, farmers use the stovers almost exclusively for feeding cattle (Subba Rao *et al.,* 1995). Treating millet stover with a 5% urea solution increases dry matter (DM) digestibility by 23% dry matter intake by 16% (from 42.6 to 49.2g/kg W0.75) and average daily gain by 12% (from 41 to 51g/kg) in Djallonke rams (Mattoni *et al.,* 2007).

In this study, an attempt was made to evaluate the effects of feeding urea treated and ensiled millet stover based diets with different concentrates.

MATERIALS AND METHODS

The experiment was conducted at Professor Lawal Abdu Saulawa Teaching and Research Farm, Federal University Dutsin-Ma, Katsina State. The State is located between latitudes $12^{\cdot}.985531^{o}$'N and longitudes 7.617144^{o}E and covers an estimated land area of about 24,192 square kilometers (9,341 square miles). Dutsin-Ma Local Government Area lies on latitude 12^{0} 27'16.128'N and longitude 07^{0}29'5544E. It has a land area of about 527, km^{2} (203sq miles). It has an elevation of about 605m (1,985 ft.), with a population of 167,671. The inhabitants are predominantly Hausa and Fulani by tribe. Their main occupation is crop production and animal rearing (Katsina, 2006). The weather varies according to the season of the year. The hottest months are March to May with maximum temperature ranging from 29^{o}C to 38^{o}C. The wind is dry from January to April, signalling the arrival of the rainy season, which lasts from May to September. The mean annual rainfall ranges from 500 to 1500mm (Suleiman *et al.,* 2010).

Source of Test Ingredients: The ingredients used for the formulation of both basal and supplemental diets include: urea, millet stover, wheat offal, maize offal and cottonseed cake. Urea for the experiment was purchased from Katsina metropolis, Katsina State, Nigeria. *Faidherbia albida* pods were purchased in Yandaki town of Kaita Local Government of Katsina State.

Preparation of Experimental Diets

The basal diet was prepared by dissolving 4kg of urea grade fertilizer in 100 litres of water to make a 4% urea solution, then sprinkled on 100kg of crushed millet stover, it was put inside a big plastic bucket sealed on its top with a polythene sheet and then covered firmly to make it subjected to an airtight condition which was kept for twenty one (21) days (fermented). This served as the basal diet of the experiment. The basal diet was fed to the rams, *ad libitum.*

Six concentrate diets were formulated using cotton seed cake, *Faidherbia albida* meal, maize offal and wheat offal. The concentrates were formulated in such a way that each diet contained one or a combination of either of the two protein and energy sources (CSC or FA & MO or WO). The concentrates designated as 1, 2, 3, 4, 5 and 6 contained CSC, FA, CSC/MO, FA/MO, CSC/WO and FA/WO respectively. The ingredients were appropriately weighed using digital and manual scales. All lumps of cottonseed cake and *Faidherbia albida* were broken using mortar and pestle to ensure proper mixing and to avoid toxicity problems when fed to animals.

Plate1: Sprinkling 100litres of Water Containing 4 kilograms of Urea on 100kg of Crushed Millet Stover 1

Plate 2: Placement of Urea Treated Crushed Millet Stover inside a Nylon Coated Big Plastic Bucket to make it Airtight and Ensiled for 21 days.

Plate 3: Finishing Stage in the Ensiling Process to be Kept for 21 Days

Measurement of Weight Change (kg)
The initial live weight of individual ram was measured before the beginning of the feeding trial and subsequently on weekly basis, in the morning around 8:00 to 9:00am after an overnight fasting, before feed was offered to them using a sensitive scale to determine the live weight changes.

Experimental Design

The design of the experiment was a Completely Randomized Design (CRD) with six (6) treatment combination diets of five (5) rams each as a replicate.

Experimental Animals and Management
Thirty (30) growing Yankasa Rams with an average initial weight of 16.35 - 18.21 kg were procured for the study from Batsari and Kaita Local Government Livestock Markets, in Katsina State. Five (5) Yankasa rams were randomly allocated to six (6) diets, in individual cubicles of 2 by 2 metres, housed in the same pen with slanted concreted floors, under a common roof. The house was fully illuminated, well ventilated and has been sanitized periodically. Prior to the arrival of the rams, the cubicles were cleaned and disinfected with Diskol-ES (Tiscol) at the rate of 10mls/4litres of water. Also 10% formalin was used as a fumigant.

On their arrival, the rams were quarantined for two weeks during which their bodies were sprayed with acaricide, using Amitraz® 1ml/litre against external parasites. They were dewormed with Albendazole at 12.5mg/kg^{1} body weight against internal parasites. Antibiotic, i.e Oxytetracycline L. A. (Kepro®) 20%, at 1ml per 10kg body weight were injected intramuscularly. The rams were kept for two (2) weeks, adaptation period prior to the commencement of the experiments. Groundnut haulms and maize offal were offered to the rams during the quarantine period.

Chemical Analysis of the Feed Samples
All samples of the feeds were analysed for proximate composition in accordance with the procedures of AOAC (2000). Crude protein (CP) was calculated as N*6.25. Fibre fractions were analysed using the procedure of Van Soest and Robertson (1985).

Table 1: Gross Composition of Supplements fed to Yankasa Rams in the Experiment

Ingredients (g)	Supplements					
	T1	T2	T3	T4	T5	T6
	CSC	FA	CSC/MO	FA/MO	CSC/WO	FA/WO
CSC	300.00	0.00	150.00	0.00	150.00	0.00
FA	0.00	300.00	0.00	150.00	0.00	150.00
MO	0.00	0.00	150.00	150.00	0.00	0.00
WO	0.00	0.00	0.00	0.00	150.00	150.00
Total	300.00	300.00	300.00	300.00	300.00	300.00

CSC = Cotton seed cake, FA = *Faiderbia albida* meal, MO = Maize offal, WO = Wheat offal

Economy of Supplementation of the Feeds Used
The cost was calculated based on the prevailing market prices of the ingredients at the time of the study as presented in Table 4. Total feed consumed per kilogram per diet was calculated where by total feed consumed was divided by total cost of feed per diet. Total cost of feed was calculated by adding all the prices of ingredients involved in making the supplements Total cost of feed per kilogram per liveweight gain per Naira (₦) was calculated where average total cost of feed per Naira (₦) per diet is divided by average total weight gain in kilogram (Kg) per diet.

Statistical Analysis
The data collected from the study were subjected to Analysis of Variance (ANOVA) using General Linear Model of SAS (2002). Difference among means were compared at ($p<0.05$) using Duncan Multiple Range Test (DMRT) of the same statistical package.

RESULTS
Chemical Composition of the Experimental Diets (DM) fed to Rams in Experiment Basal and Supplementation
The chemical composition of the experimental diets is presented in Table 2. The dry matter contents of the experimental feeds for all the treatment groups were within the range of 90.63 – 94.17%. The result of the analysis of crude protein (CP) content of the diets showed that supplements 3 and 5 had the highest CP values of 31.16 and 27.88% respectively. The lowest CP was obtained in diet 2 with a CP value of 15.1%. Furthermore, the fibre fractions (NDF and ADF) of the supplements were within the range of 50% and below. The highest value was obtained in D2 which had 57.27% NDF and 3 1.15% in D4 ADF respectively. Hemicellulose values were high, with 29.08, 26.77, 18.47 and 16.5% for D1, D2, D3 and D5 respectively. More so, diets 6 and D4 obtained hemicellulose values, 12.87 and 11.65% respectively.

Ash values in this study were within the range of 5.02 – 18.11%.

For the basal diets, urea treated millet stover (UTMS) recorded the highest CP of 33.07% while non-treated millet stover (NTMS) had the highest value of 8.75%. Higher fibre fractions of 40.05% NDF and 30.75% ADF were obtained in non-treated millet stover (NTMS) compared to lower values of 30.90% NDF and 21.34% ADF obtained in urea treated millet stover (UTMS). However, hemicellulose values were similar in both urea treated and non-treated millet stover. The value of ash was higher in urea treated millet stover with 9.75% against 5.2% recorded in non-treated millet stover.

Table 2: Chemical Composition of the Experimental Diets Used in the Experiment

Parameters (%)	Diets						
	UTMS	T1 CSC	T2 FA	T3 CSC/MO	T4 FA/MO	T5 CSC/WO	T6 FA/WO
DM	94.58	92.01	94.17	93.46	91.31	92.87	90.63
OM	84.83	83.53	89.15	75.35	82.06	78.50	83.23
CP	33.07	27.88	15.1	31.16	19.13	27.88	16.95
NDF	30.90	50.39	57.27	39.43	42.80	39.25	43.00
ADF	21.34	21.31	30.50	20.96	31.15	22.75	30.13
Hemicellulos	9.56	29.08	26.77	18.47	11.65	16.50	12.87
Ash	9.75	8.48	5.02	18.11	9.25	14.37	7.40

UTMS = Urea-Treated Millet Stover; T1 = Cottonseed Cake; T2 = *Faidherbia albida* meal; T3 = Cottonseed Cake + Maize Offal; T4 = *Faidherbia albida* meal + Maize Offal; T5 = Cottonseed Cake + Wheat Offal; T6 = *Faidherbia albida* meal + Wheat Offal; DM = Dry Matter; OM = Organic Matter; CP = Crude Protein; NDF = Neutral Detergent Fibre; ADF = Acid Detergent Fibre; Hemic = Hemicellulose

Performance of Yankasa Rams fed Urea Treated and Ensiled Millet Stover Based Diets with Supplementation

The performance of rams fed urea treated and ensiled millet stover based diets with supplementation is presented in Table 3 Supplement intakes were similar ($p>0.05$) across the treatments with values of 300g in all the diets. Basal feed intake (BFI) was also similar ($p>0.05$) among treatment groups, the values ranged from 643.94 – 765.39g/day. Similarly, daily feed intake was similar ($p>0.05$) among the diets and the values ranged from 943.94 – 1065.39 g/day. However, the dry matter intake was significantly ($p<0.05$) different among the treatments with the values ranging from 574.76 – 756.09g/day.

Table 3: Performance of Yankasa Rams fed Urea Treated and Ensiled Millet Stover Based Diets with Supplementation

Parameters	Diets						SEM	P-value
	T1 CSC	T2 FA	T3 CSC/MO	T4 FA/MO	T5 CSC/WO	T6 FA/WO		
SFI (g/d)	300	300	300	300	300	300	0.00	-
BFI (g/d)	643.94	678.14	722.30	765.39	707.46	685.79	38.55	0.3386
DFI (g/d)	943.94	978.14	1022.34	1065.39	1007.46	985.79	38.55	0.3386
DMI (g/d)	574.76^{b}	600.09^{b}	615.96^{b}	628.60^{b}	608.34^{b}	756.09^{a}	25.18	0.3677
IBW (KG)	18.20	17.48	19.52	19.66	17.08	16.30	1.00	-
FBW (KG	20.69^{b}	22.79^{ab}	23.17^{a}	22.11^{ab}	21.83^{ab}	22.03^{ab}	0.66	0.5192
DWG (g)	35.64^{b}	75.81^{a}	52.24^{ab}	35.02^{b}	67.95^{ab}	81.19^{a}	10.54	0.3012
TWG (KG)	2.49^{b}	5.31^{a}	3.65^{ab}	2.45^{b}	4.75^{ab}	5.73^{a}	0.73	0.001
DMI %BW	2.79^{b}	2.65^{b}	2.65^{b}	2.83^{b}	2.78^{b}	3.44^{a}	0.11	0.5192
FCR	16.13^{e}	7.92^{a}	11.79^{d}	17.95^{f}	8.95^{b}	9.31^{c}	2.13	<.0001

T1 = Cotton Seed Cake alone; T2 FA = *Faidherbia albida* meal alone; T3 = Cottonseed Cake + Maize Offal; T4 = *Faidherbia albida* meal + Maize Offal; T5 = Cotton Seed Cake + Wheat Offal; T6 = *Faidherbia albida* meal + Wheat Offal; SEM = Standard Error of Means; LS = Level of Significance; BFI = Basal Feed Intake; DFI = Daily Feed Intake; DMI = Dry Matter Intake; IBW = Initial Body Weight; FBW = Final Body Weight; TWG = Total Weight Gain; DWG = Daily Weight Gain, FCR = Feed Conversion Ratio.

Total weight gain also was significantly ($p<0.05$) different across the treatments. Rams fed diet 6 (5.73kg) and 2 (5.31kg), recorded the highest means, while the rams on diet 1 and 4 recorded the least (2.49kg) and (2.45kg), respectively. There was significant ($p<0.05$) difference observed in the feed conversion ratio among the diets. Rams fed diet 2 (7.92) and 5 (8.95) recorded the best FCR values followed by rams fed diet 6 (9.31).

Economy of Supplementation of Yankasa Rams Fed Urea Treated and Ensiled Millet Stover Based Diets with Supplementation.

The economy of supplementation of millet stover based diets with different supplementary diets is

shown in Table 4. Total weight gain in kg was significantly ($p<0.05$) different among the treatments, which ranged from (2.45 – 5.68kg). Treatment 6 (5.68kg) recorded highest value while treatment 4 (2.45kg) had lowest. Total feed intake was significantly ($p<0.05$) different among the treatments, highest value was recorded in treatment 4 (3.76 Kg) and lowest value of 2.20 Kg was recorded in treatment 5. The total cost of feed was significantly ($p<0.05$) different among the treatment groups throughout the experimental period which ranged from ₦ 153.50 to ₦ 278.50 observed in treatment 2, and treatment 5 as lowest and highest values respectively. Similarly, cost of feed in naira per kilogram live body weight gain were significantly ($p<0.05$) different among the treatment groups. ₦ 35.82 was recorded in treatment 6 as the lowest value, while the highest value of ₦ 109.83 was recorded in T1.

Table 4: Economy of Supplementation of Yankasa Rams Fed Urea treated and Ensiled Millet Stover with Supplementation

Parameters	Diets					
	T1 CSC	T2 FA	T3 CSC/MO	T4 FA/MO	T5 CSC/WO	T6 FA /WO
Total Weight Gain (Kg)	2.49	3.28	3.65	2.45	4.76	5.68
Total Feed Intake (kg)	2.29	3.93	2.55	3.76	2.20	2.88
Total Cost of Feed (₦)	273.50	153.50	253.50	168.50	278.50	203.50
Cost of Feed/Kg/WG /₦	109.83	46.79	66.71	68.77	58.50	35.82

a, b, c, d, e = Means with the same superscripts are statistically the same; WG (₦) = Cost of Feed per Kilogram per Weight Gain in Naira. T1 = Cottonseed Cake alone; T2 = *Faidherbia albida* meal alone; T3 = Cottonseed Cake + Maize OffaL; T4 = *Faidherbia albida* meal + Maize OffaL; T5 = Cottonseed Cake + Wheat Offal; T6 = *Faidherbia albida* meal + Wheat Offal.

DISCUSSION

Chemical Composition of the Experimental Diets

Table 2 showed that crude protein content of the basal diet, i.e urea treated millet stover in this study was higher than the values reported by Sabo (2012) who reported CP ranges of 9.6- 11.7 % for ensiled maiwa millet with tropical legumes, 11.50% CP in natural pasture grass (Bogoro *et al.*, 2006 & Abebe, 2015), 12.4 percent in urea treated rice straw reported by Ngele (2008), the value was also higher than 6-15% reported by Aregherore (2005) when corn stover was treated with 0 and 7 feed grade urea. However, Golmahi *et al.* (2006) found a small increment (4%) in CP of barley straw treated with urea at 0 and 4%. Adegbola (2002) reported that addition of urea to rice straw increased the crude protein content to 13.6%, also a significant (<0.05) increase in total dry matter intake was observed. The value was also higher than the content of 7-7.5% required to satisfy ruminal microbial demands for nitrogen that would provide enough CP for the maintenance requirement of the rams. The NDF values for the basal diet reported in this study are comparable to the 41% recommended value that favours the growth of cellulolytic microbes, which increase salivation through eating and rumination (Jane, 2008). The ADF values obtained in this study (21.31 %) were below the range of 38 – 42% ADF recommended for all ruminants as reported by Ranjhan (2001). The possible reasons for differences in values of chemical composition in this study when compared with previous studies might be due to soil fertility and post-harvest managerment as reported by Alhassan *et al.* (1987) that crop residues when allowed to stay in the field long after harvesting the primary produce results in the decline in their nutritive value. Also these differences may be due to method of accessing, stage of growth and method of processing the plant.

For the supplemental diets, the dry matter, organic matter, crude protein, fibre fractions (NDF, and ADF) hemicellulose and ash vary across the diets. A supplemental diet containing *Faidherbia albida* meal, cotton seed cake, wheat offal, maize offal and urea treated millet stover may be considered as having adequate protein for small ruminants depending on the level of inclusion (NRC, 1985).

Performance of Yankasa Rams Fed the Urea Treated and Ensiled Millet Stover Based Diets with Supplementation

Table 3 result of dry matter intake for Yankasa rams fed with urea treated and ensiled millet stover based diets with supplements shows that dry matter intake (DMI) of the feed recorded the highest values for D4, D3, and D5 against the lowest value observed in D1. This could be as a result of utilisation of mixed supplements, as reported by Ngele (2008) that better dry matter intake is often achieved when rams are fed with mixed supplements (protein & energy) than single supplements (protein or energy).

Lower value of total dry matter was obtained for rams on CSC alone. This could be as a result of utilization of single supplement as earlier reported by Ngele (2008). The values were similar with report of Abebe (2011) 670.63, 694.03 and 740.25g/d, when Yankasa rams were fed graded levels of broiler litter in replacement of cotton seed cake.

However, the values of dry matter intake obtained in the present study were lower than the values 1152.44 to 1171.41g/d reported by Ikyume *et al.* (2021) for comparative effect of garlic (*Allium sativum*) and ginger (*Zingiber officinale*) and their combination on growth, rumen ecology and apparent nutrient digestibility of sheep. Also the values were lower than 10190.00 to 1195.00g/d reported by Abdurrahman *et al.* (2021). The values obtained in this study were higher than the values 500.07 to 581.70g/d reported by Adekambi *et al.* (2021) when West African Dwarf Goats were fed graded levels of malted sorghum sprout with enzyme supplementation.

Similarly, the values in the present study were higher than 330 - 400 g/d reported by Abebe (2011) for sheep fed urea treated millet stover based diets, and rams of Ukanwoko and Ibeawuchi (2009) (310.03, 291.55 and 313.42g/d), and Yusuf *et al.* (2013) (351.17, 507.06, 536.88 and 356.72g/d), 41.9, 45.1, 49.3, 51.1 and 52.8g/d for Konkan kanyal goats fed millet stover based diets reported by AbdulWaheed *et al.* (2016) and 513.64, 557.79 and 558.35 reported by Omotoso *et al.* (2020).

It has been observed that daily weight gains in this study were highest in D6, D2 and D5 D3 compared to D4. The higher daily body weight gains of D6, D2, D5 and D3 rams compared to rams in other diets may be attributed to the higher feed and dry matter intake observed in these treatment groups, hence dry matter intake is an important factor in the utilization of feed by ruminants (Jiwuba *et al.*, 2016). The daily weight gain values in the present study (35.02 – 81.19g) were similar to 65.48, 74.40, 77.38 and 86.31g/day reported by Inuwa *et al.* (2020), 57.46, 65.39, 75.39 and 78.89 reported by Mijinyawa *et al.* (2020) for Yankasa Rams. However, the values were higher than 16.07, 20.48, 21.43 and 30.95 reported by Omotoso *et al.* (2020) for Yankasa Rams. Similarly, the values were higher than 23.97, 33.25, 63.46, 62.29 and 55.57 reported by AbdulWaheed *et al.* (2016) for Konkan kanyal goats fed millet stover based diets. The values however similar with the values 118.57, 111.71, 87.71 and 47.71g/d for D2, D4, and D3 reported by Girgiri (2017) for Yankasa rams. The results of the present findings were above the range of 25.33, 25.17, 26.00, and 25.83g/d for Yankasa rams fed maize husk basal diet reported by Jokthan *et al.* (2013).

Feed Conversion Ratio (FCR) in this study varies significantly among the diets. The feed conversion ratio in the present study showed that D2 (7.92) is the best converter of feed to flesh followed by D5 (8.95) while D4 (17.95) was the least feed converter. The superior feed conversion ratio of D2 and D5 over other diets is a reflection of the observed higher feed utilization and higher growth rates of rams fed the respective diets also this signified that these rams fed dietary diets in these groups were more efficient in feed utilization. The best feed conversion ratio value in this study were similar and in agreement with the findings of Okunade *et al.* (2018), 7.26 feed conversion ratio reported by Odeyinka *et al.* (2020).

The FCR values in this study were higher than the results of Abebe (2011) who reported a highest FCR (9.0) with highest daily weight change of (55.67g/d), the findings of Girgiri (2017) who reported a highest FCR (18.60) with lower daily weight change (47.71), 3.36 with 78.10g/day reported by Audu *et al.* (2019) 9.71with 57.46g/day reported by Mijinyawa *et al.* (2020). The good feed conversion ratio obtained in the present study might be associated with the pleasant taste, high dry matter and protein intake that encouraged the digestibility of the diet (Adebisi *et al*., 2015).

Economy of Supplementation of Yankasa Rams Fed Urea Treated Millet Stover Based Diets with Supplementation.

Total feed intake (3.93kg) was significantly ($p<0.05$) higher in D2, which contradicted the findings of Audu *et al.* (2019) who reported 19.93 kg as higher total feed consumed and 1429.06 as higher total cost of feed. Cost of feed per kilogram liveweight gain was higher for D1 and D4 because the rams had lower weight gain this is in total agreement and supported earlier report by Muhammad *et al.* (2016) as observed by Maigandi *et al.* (2002) who reported that cost of feed per kilogram liveweight gain is an indicator of economics of sheep production. Least cost per (₦) per kg weight gain was obtain in D6 against D1 may be due to high cost of cotton seed cake (Mubi *et al.*, 2013) and because rams in the diet had higher live weight gain which agreed with findings of Audu *et al.* (2020) as supported by similar observations made by Maigandi *et al.* (2002).

CONCLUSION

Supplementation of urea ensiled millet stover based diet improved growth performance and feed conversion ratio.

RECOMMENDATION

Supplementing *Faidherbia albida* pod meal at 30% with 4kg urea ensiled millet stover gave the highest ADG and FCR with a concomittant reduction in cost of feed, therefore is recommended for growing Yankasa rams.

REFERENCES

Adebisi, I. A., Ajibike, A. B., Adams, T. O.& Amusa, H. O. (2015). *Performance characteristics of West African Dwarf goat fed Panicum Maximum Supplement with Felina arborea Leaves*

Mixture. Animal Science Association of Nigeria (ASAN - NIAS) Proceedings of the joint annual meeting. The increasing demand for animal products by a Hungrier World, the challenge of animal. International conference centre, University of Ibadan, September 6 – 10th, 2015. ISSN: 978 – 3477722.

Adegbola, T. A. (2002). Nutrient Intake, Digestibility and Rumen Metabolites in Bulls Fed Rice Straw with or Without Supplements. *Nigerian Journal of Animal Production,* 29 (1) 40 – 46.

Adekanbi, A. O., Onwuka, C. F. I., Oni, A. O., Jinadu, K. B., Adebayo, B. J., Odetola, O. M., Akingbade, A. O. Adedeji, O. Y. & Saka, A. A. (2021, March). *Performance and blood indices of West African Dwarf Goats fed graded levels of malted sorghum sprout with enzyme supplementation*. Proceedings of 45th conference, NSAP Federal University, Dutsinma, Nigeria. Pp. 210 – 218.

Alemayehu M (2006). Country Pastures /Forage resource profile/ Ethiopia. In: Francis. J.M. Suttie and S.G. Reynolds (eds.).

Anya, M. I. & Ozung, P. O. (2018). Performance and carcass characteristics of West Dwarf (WAD) goats fed cassava peel meal based diets supplemented with African yam bean concentrate. *International Journal of Advances in Agricultural Science and Technology,* 5 (7): 95-108.

Aregheore, E. M. (2005). Effect of Yucca schidigera saponin on the nutritive value of urea ammoniated maize stover and its feeding value when supplemented with forage legume (*Calliandra calothyrsus*) for goats. Small ruminants research, 56:95-102.

Aruwayo A, Yahaya MA & MG Garuba (2016). Biochemical and haematological characteristics of growing Sokoto red kids fed untreated and urea treated rice milling waste in Katsina State. *Int'l. J. Adv. In Agric. & Environ. Eng. (IJAAEE)3(2): 2349-1531.*

Bamikole, M. A., Akinsoye, A., Ezenwa, I., Babayemi, O. J., Akinlade, J. and Adewumi, M. K. (2006). Effects of six weekly harvests on the yield, chemical composition and dry matter degradability of *Panicum maximum* and *Stylosanthes hamata* in Nigeria. grs. Forg. science, 59: 357 363. *African Journal of Agricultural Research* volume 7, (12), Pp. 1944 – 1949.

Bogoro, S., Kalla, D. J. U. & Fomukong, B. (2006a). Chemical composition and in situ rumen degradability of blood meal and urea treated crop residues Nigeria. *Journal of Experimental and Applied Biology,* 7 (1):27 – 35.

Choudary, Marthur S., Ajay O. P., Singh (2004). Nutritional evaluation of urea treated millet stalks in rams more options. *Indian Journal of Animal Nutrition*. 21 (2): 115- 117.

Egbu, C. F. (2014). Effect of feeding urea treated maize stover and *Centrosema pubescens* on grazing N'dama calves m.sc thesis Department of Animal Science Faculty of Agriculture University of Nigeria, Nsukka.

FAO (2004). Livestock sector brief: Ethiopia livestock information, sector analysis and policy branch (AGAL), Rome.

Jane, A. P. (2008). Fibre in beef cattle diet. Publication 49 – 55. Missisipi University Extens Service 2489. www.edu.org.missisipi.html.

Jane, A. P. (2008). Fibre in beef cattle diet. Publication 49 – 55. Missisipi University extens service 2489. www.edu.org.missisipi.html.

Kosgey IS, Rowlands GJ, van Arendonk JAM & Baker RL (2008). Small ruminant production in smallholder and pastoral/extensive farming systems in Kenya. Small rum. res. 77: 11-24.

Maigandi, S. A., Tukur, Malami, H. M., & Daneji, A. I. (2002). Fore-stomach digesta in the diet of growing sheep. Performance and economics of production. *Sokoto journal of veterinary science.* 4 (2): 16 – 21.

Ngele, M. B. (2008). Fermentation and metabolic trends in rams fed roughages with various supplements. PhD dissertation, Abubakar Tafawa Balewa University, Bauchi-Nigeria.

Okunade, S. A., Olafadehan, O. A., (2018). Fodder value of three browse forage species for growing goats. *Journal of the Saudi Society of Agicultural Sciences.* Volume17, Issue 1, 43 – 50Pp.

Singh BB, Larbi A, Tabo R, Dixon AGO (2004, Nov.19-21). *Trends in development of crop varieties forimproved crop-livestock systems in West Africa*, pp. 371-388. In: Williams TO, Tarawali SA, Hierneux P, Fernandez- Rivera S (eds.). Sustainable crop-livestock production for improved livelihoods and natural resource management in West Africa. Proc. of Intl. Conference, held at IITA, Ibadan, 2001. Published by ILRI, Nairobi and CTA, The Netherlands. 2004

Singh, B. B. Musa, Ajeigbe A. H. A. & Tarawali S. A. (2011). Effect of feeding crop residues of different cereals and legumes on weight gain of Yankassa rams *International Journal of Livestock Production* Vol. 2 (2), pp. 017-023 http://www.academicjournals.org/ IJLP ISSN 2141-2448.

Ukanwoko, A. I. & Ibeawuchi, J. A. (2009). Nutrient Intake and Digestibility of West African Dwarf Bucks fed Poultry Waste Cassava Peels Based diets. *Pakistanof Nutr.* 8 *Journal*, 1461 1464.

Yusuf, K. O., Isah, O. A., Onwuka, C. F. I., Olanite, J. A., Oni, A. O. & Anderinboye, R. Y. (2013). Effects of Enzymes Additive on Nutrient Intake, Digestibility and Rumen Metabolites of Yearling Cattle fed Grass Hay Based Diet. *Nigerian Journal of Animal Science.*15: 155 – 167

Yusuf, K.O., Isah, O. A., Onwuka, C. F. I. Olantie , J.A,,Oni,A.O & Aderinboye, R.Y.(2013). Effects of enzyme additive on nutrient intake, digestibility and rumen metabolites yearly of cattle fed grass-hay based diet. *Nigerian J. Anim. Sci*.2013, Vol.15:155-167

.