



Growth Response of Yankasa Rams to Urea-Treated or Untreated Millet Stover Based Supplements with Feed Additives During Early Raining Season Grazing

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Abstract

This experiment was conducted to investigate the response of growing Yankasa rams to urea-treated and untreated millet Stover based supplements during early raining season grazing on supplement nutrient intake, growth performance and economics of production. A total of twenty (20) growing Yankasa rams were used for the experiment in a completely randomized design with five (5) treatments of four (4) rams each. In the experiments, five different supplements were compounded to contain 12% CP from urea-treated or urea untreated millet stover and other ingredients with or without feed additives. Supplement 1 had untreated millet stover, while 2, 3, 4 and 5 contained urea-treated millet stover at 1, 2, 3, and 4%, respectively with feed additive. Rams were offered their respective supplements at 400 g per head per day (200 g each in the morning and evening) and thereafter allowed to graze the available forages. The experiment lasted for 84 days. The results of the experiment revealed that supplement DMI was significant ($P < 0.05$). The SDMI was higher in rams fed supplement 5 and least in those fed 2 with values of 324.13 and 200.24 g/day, respectively. Better feed utilization (1.65) was recorded in rams fed supplement 2 and the least (2.67) in those fed 5. Rams fed supplement 2 had the lowest cost ₦135.49 per kg live-weight gain and highest feed cost savings of ₦105.07 compared with others. It is therefore concluded that supplements with urea-treated millet stover at 1% gave better results on average daily weight gain, feed utilization and lowest cost in feed per weight gain. It is recommended that; this supplement can be fed to Yankasa rams during the raining season.

Keywords: Urea, millet stover, Yankasa rams, feed additives, raining season

Introduction

Adequate nutrition being an important factor in production is a major necessity that is difficult to meet while rearing livestock in Nigeria. Animal feeds are in short supply thereby leading to a wide gap between demand and supply of feed and fodder. The situation is worse during the long dry season which lasts for about seven months in the semi-arid environment. During such periods, fibre-rich, low protein forages and crop residues are the most abundant feeds for ruminants (Ngele *et al.*, 2009).

Sheep feeds are mostly derived from natural pastures and crop residues. However, such feed resources may not meet the nutritional requirements of animals, particularly in the dry

season, due to their inherent low nutrient content and poor quality (Alemayehu, 2006). Feeding such poor nutritional value feeds results in slow growth rates, poor fertility, and high rates of mortality and consequently reduced productivity of sheep (Getahun, 2001).

Urbanization and other human activities that leads to the destruction of grazing land or available land for forage production for ruminant is increasing day by day. The nutritional evaluation of tropical grasses under grazing during the rainy season indicates an unbalanced energy-to protein ratio exists, with a relative excess of energy (Figueiras *et al.*, 2016). During rainy season, tropical grasses present faster growth and greater nutritive

value compared to the dry season. Improved animal performance and utilization of nutrients from pastures during rainy season is not considered to be optimal without supplementation program (Paulino *et al.*, 2008). Therefore, there is a need to look at alternative way of feeding ruminant apart from the traditional system of sustainability.

Abubakar *et al.* (2010) suggested that alternative feedstuffs to the conventional carbohydrate and protein sources are very important and very timely due to rises in the prices of the locally available feedstuffs most especially the concentrates in Nigeria. Complete feed system improves nutrient utilization that supports higher growth performance and reduces the cost/kg live weight gain, thus is economical in comparison to conventional feeding system. Several studies have observed the beneficial effect of feeding complete ration on the growth performance of animals. Costa *et al.* (2011) reviewed that supplementation programs should focus primarily on the establishment of a dietary balance by increasing protein content in the diet. Dietary adequacy would allow for the utilization of this relative excess of energy from forage and convert it into body weight (BW) gain.

Supplementation during the rainy season should focus primarily on protein feed ingredients (Detmann *et al.*, 2014; Lazzarini *et al.*, 2016). According to FAO (1997), the objective of supplementation is to ensure additional supply of nutritional elements to the animals to allow them develop target performance levels and to increase their feed intake. Animal performance can only be improved through feeding ration with required nutrients and different pattern of supplementation. Supplementation of feed additives in complete feeds promotes rumen fermentation in a favorable direction to enhance animal performance. Nehra *et al.*

(2013). This experiment was therefore conducted to investigate the response of growing Yankasa rams to urea-treated or untreated millet stover based supplements during early raining season grazing on supplement nutrient intake, growth performance and economics of production.

Materials and Methods

Study Area

The experiment was conducted at Demonstration Farm, College of Education Gumel, Jigawa, Nigeria. The town is situated some 127 km Northeast of Kano State, Nigeria and lies about 26 km south of Nigeria's boarder with Niger Republic. The town is situated at 12°37'51" North latitude, 9° 23'36" East longitude and 361 m elevation above the sea level with average rainfall of 369 mm annually (www.maplandia.com)

Experimental Animals, Management and Design

Twenty (20) growing Yankasa rams each with an average weight of 18.38 kg were used for the experiment. The animals were quarantined for two weeks before adaptation. During this period the animals were fed with groundnut haulms and maize offal, dewormed with Albendazole and injected with Ivermectin for both internal and external parasites followed by broad spectrum antibiotic injected intramuscularly. The animals were randomly allocated to five treatments of four animals each in a completely randomized designed. The animals were housed in individual pens of 2 by 2 meters with slanted concreted floors under a common roof.

Experimental Diets and Animal Feeding

Five supplement diets containing 12% crude protein with Runamix® premix were formulated. The supplements designated as 1,2,3,4 and 5 contained urea treated or untreated millet stover with wheat offal,

sorghum panicle, cotton seed cake, molasses, bone meal and salt as presented in Table 1 with chemical composition. Diet 1 contains urea untreated millet stover while 2, 3, 4 and 5 contain urea treated millet stover at 1, 2, 3, and 4%, respectively. Each ram was offered their respective supplementary diets at 400g per head per day (200g each in the morning and evening) at about 7:00 am; they were allowed to consume the feed for one hour (7:00 am to

8:00 am) and thereafter allowed to graze the available forages at the college grazing area for about six hours (10:00 am to 4:00 pm) in order to obtain their basal diets. Feed refusals were collected and weighed immediately after the rams were released for grazing. On returning from grazing, they were kept in their individual pens. Clean drinking water was provided *ad libitum* for the duration of the experiment.

Tables 1: Ingredients and chemical composition of supplemental diets

Ingredients	Diets				
	1	2	3	4	5
Wheat offal	23.33	29.56	35.78	42.01	48.24
Sorghum panicle	39.15	35.42	31.69	27.96	24.24
Cotton seed cake	10.00	7.50	5.00	2.50	0.00
Millet stover	20.00	20.00	20.00	20.00	20.00
Molasses	5.00	5.00	5.00	5.00	5.00
Bone meal	2.00	2.00	2.00	2.00	2.00
Salt	0.50	0.50	0.50	0.50	0.50
Runamix	0.03	0.03	0.03	0.03	0.03
Total	100.00	100.00	100.00	100.00	100.00
Parameters					
Dry Matter	96.48	96.5	95.71	94.33	93.95
Organic Matter	84.88	87.53	89.59	87.92	88.70
Crude Protein	12.07	12.06	12.03	12.09	12.00
Ash	11.60	8.97	6.12	6.41	5.25
Neutral Detergent Fibre	34.39	33.17	32.51	31.73	30.09
Acid Detergent Fibre	24.47	22.45	19.22	19.8	17.63
Hemicellulose	9.92	10.72	13.29	11.93	12.46

S1=Supplement with urea untreated millet stover, S2= Supplement with urea treated millet stover at 1%, S3= Supplement with urea treated millet stover at 2%, S4= Supplement with urea treated millet stover at 3%, S5= Supplement with urea treated millet stover at 4%

Chemical Analysis

Chemical analyses of feed samples were done according to the procedures of AOAC (2000) and the method of Van Soest *et al.* (1991) was used to determine neutral detergent fiber and acid detergent fiber contents.

Statistical Analysis

Data generated were subjected to analysis of variance (ANOVA) using MINITAB 16 (2014). Where analysis of variance indicates a

significant difference, means were separated using Duncan's multiple range test (DMRT).

Results and discussions

Supplement dry matter and nutrient intake of Yankasa rams supplemented with urea-treated or untreated millet stover based supplements containing feed additive during early raining season grazing were presented in Table 2. There was significant ($P<0.05$) difference in the total supplement intake (TSI g/day),

supplement dry matter intake (SDMI), supplement organic matter intake (SOMI), supplement crude protein intake (SCPI) and supplement neutral detergent fibre intake (SNDFI) across the supplements.

Total supplement intake (TSI) figure of 345.00 g/day obtained in this study was contrary to the value of 270 g/day obtained by Assefa *et al.* (2015) and 237g/day reported by Ayele *et al.* (2017). Teklehaymanot *et al.* (2019) reported supplement intake of 389.06 g/day, which was higher than the range obtained in this study. Meseret *et al.* (2016) reported TSI of 269.46 g/day for grazing Abera sheep, which was lower than the figure obtained in this study. Hirut *et al.* (2011) reported TSI of 314.10 g/day, which is lower than the reported value in this study. Abdullahi *et al.* (2021) documented TSI of 282.53 to 295.87 to g/day that was in accordance with the value in this study. Adegun and Aye (2013) reported

supplement intake of 336.00 g/day that is lower than the value reported in this study.

The DMI figure of 324.13 g/day obtained in this study was higher than 104.10 g/day reported by Hirut *et al.* (2011), but lower than 382.88 g/day reported by Mulugeta and Gebrehiwot (2019) for sheep on Teff straw and supplemented with different sesame seed cake. The OMI figure of 287.50 g/day obtained in this study was higher than 253.97 g/day reported by Meseret *et al.* (2016) and 95.80 g/day reported by Hirut *et al.* (2011). The CPI figure of 38.90 g/day recorded in this study was lower than 13.8 g/day reported by Hirut *et al.* (2011) and lower than 53.64 g/day reported by Meseret *et al.* (2016). The NDFI figure of 97.53 g/day obtained in this study was lower than 106.66 g/day reported by Meseret *et al.* (2016). The range of 44.95 to 57.14 g/day ADFI recorded in this study was lower than 86.05 g/day reported by Meseret *et al.* (2016).

Table 2: Supplements dry matter and nutrient intake of growing Yankasa rams during early raining season grazing

Parameters	Supplements					SEM
	1	2	3	4	5	
TSI (g/day)	235.00 ^b	207.50 ^c	265.00 ^{ab}	280.00 ^{ab}	345.00 ^a	14.20*
SDMI (g/day)	226.73 ^b	200.24 ^c	253.63 ^{ab}	264.12 ^{ab}	324.13 ^a	13.09*
SOMI (g/day)	192.45 ^c	175.27 ^c	227.23 ^b	232.22 ^b	287.50 ^a	11.80*
SCPI (g/day)	27.37 ^c	24.15 ^c	30.51 ^b	31.93 ^b	38.90 ^a	1.57*
SNDFI (g/day)	77.97 ^{bc}	66.42 ^c	82.46 ^b	83.81 ^b	97.53 ^a	3.75*
SADFI (g/day)	55.48	44.95	48.75	52.30	57.14	2.22 ^{NS}

^{a,b,c} Means within each row with different superscripts are significantly different* ($P < 0.05$), S1= Supplement with urea untreated millet stover, S2= Supplement with urea treated millet stover at 1%, S3= Supplement with urea treated millet stover at 2%, S4= Supplement with urea treated millet stover at 3%, S5= Supplement with urea treated millet stover at 4%, TSI= Total supplement intake, SDMI= supplement dry matter intake, SOMI= supplement Organic Matter Intake, SCPI= supplement Crude Protein Intake, SNDFI= supplement Neutral Detergent Fibre Intake, SADFI= supplement Acid Detergent Fibre, SEM= standard error mean, NS= Not significant mean, NS= Not significant

Growth performance and feed conversion ratio of growing Yankasa rams supplemented with urea-treated or untreated millet stover based supplements containing feed additive are presented in Table 3. Total weight gain (TWG) value of 7.53 kg recorded in this study was contrary to the TWG of 6.63 kg reported by Meseret *et al.* (2016) and 5.4 kg reported

by Ayele *et al.* (2017). Teklehaymanot *et al.* (2019), reported TWG of 9.60 kg for sheep that was higher than the value obtained in this study. Average daily weight gain (ADG) value of 108.14 g/day recorded in this study was higher than 73.75 g/day and 59.80 reported by Meseret *et al.* (2016) and Ayele *et al.* (2017). The ADG in this study was also higher than

47.80 g/day reported by Assefa *et al.* (2015). Jokthan *et al.* (2010) reported ADG of 160.67 g/day, which was higher than the values obtained in this study. Adegun and Aye (2013) reported ADG of 48.57g/day, which was

lower than the value obtained in this study. Teklehaymanot *et al.* (2019) obtained ADG of 106.67 g/day below the value obtained in this study. Better utilization of feed recorded in rams fed diets with 2% treated millet stover.

Table 3: Growth performance of growing Yankasa rams supplemented with urea-treated or untreated millet Stover based supplements with feed additives

Parameters	Supplements					SEM
	1	2	3	4	5	
Initial body weight (kg)	18.75	18.50	18.13	18.38	18.13	0.64 ^{NS}
Final body weight (kg)	26.88	27.00	25.70	27.38	26.63	0.73 ^{NS}
Total weight gain (kg)	8.13	8.50	7.57	9.00	8.50	0.26 ^{NS}
SDMI (g/day)	226.73 ^b	200.24 ^c	253.63 ^{ab}	264.12 ^{ab}	324.13 ^a	13.09*
ADG (g)	116.14	121.43	108.14	128.57	121.43	3.72 ^{NS}
Feed conversion ratio	1.95 ^{ab}	1.65 ^a	2.35 ^c	2.05 ^b	2.67 ^d	0.17*

^{a, b, c, d}Means within each row with different superscripts are significantly different* (P<0.05), S1=Supplement with urea untreated millet stover, S2= Supplement with urea treated millet stover at 1%, S3= Supplement with urea treated millet stover at 2%, S4= Supplement with urea treated millet stover at 3%, S5= Supplement with urea treated millet stover at 4%, SDMI= supplement dry matter intake, ADG=Average daily weight gain, SEM= standard error mean, NS= Not significant mean, NS= Not significant

Feed cost per kg gain (₦) of growing Yankasa rams supplemented with urea-treated or untreated millet Stover based supplements with feed additives during early raining season grazing was presented in Table 4. The highest feed cost per kg (₦ 84.67) in this study was lower than ₦107.55 reported by Adegun and Aye (2013) for West African Dwarf Sheep fed *Moringa oleifera* and cotton seed cake as protein supplement. Abdullahi *et al.* (2021) reported highest cost of feed/kg of ₦100.86 for supplement and basal fed to sheep, which is higher than the value reported in this study. It was also lower than 179.35 (₦/kg) reported by Muhammad *et al.* (2008) who evaluated the economics of sheep production with varying levels of rice milling waste. Highest total feed cost of ₦2044.78 in this study was lower than the values of ₦3256.37 to 3515.26 obtained by Abdullahi *et al.* (2021). It was also lower than the value of ₦2584.3 to 3959.2 reported by Uguru and Ngalori (2019) for sheep fed varying levels of cotton seed cake as replacement for groundnut cake. Lowest feed cost of ₦135.49 per kg live-weight gain in this

study was lower than (₦433.63) reported by Yerima *et al.* (2019). Feed cost/kg gain of ₦ 428.40 reported by Abdullahi *et al.* (2021) was higher than the value reported in this study. Highest cost of saving (₦105.07) was recorded in animals with the lowest cost of feed per kg gain in this study.

Conclusion and Recommendation

- Supplement 2 with urea-treated millet stover at 1% with feed additives yield a better result on feed utilization (1.65), low cost in feed per weight gain (₦ 135.49) and high cost (₦ 105.07) of saving in supplements
- Supplements with urea-treated millet stover with feed additives at 1% in experiment 4 yield better results on average daily weight gain, feed utilization and low cost in feed per weight gain. It is recommended that; this supplement can be fed to Yankasa rams during raining season.

Table 4: Economics of production of growing Yankasa rams supplemented with urea-treated or untreated millet Stover based supplements with feed additive

Parameters	Supplements				
	1	2	3	4	5
Total supplement consumed (kg)	16.45	14.53	18.55	19.60	24.15
Cost of supplement (₦ /kg)	76.65	79.26	81.05	82.86	84.67
Total supplement cost (₦)	1260.89	1151.65	1503.48	1624.06	2044.78
Weight gain (kg)	9.75	7.38	8.00	9.50	10.68
supplement Cost/kg gain (₦)	155.09	135.49	198.61	180.45	240.56
supplement Cost Savings (₦)	85.47	105.07	41.95	60.11	-

S1=Supplement with urea untreated millet stover, S2= Supplement with urea treated millet stover at 1%, S3= Supplement with urea treated millet stover at 2%, S4= Supplement with urea treated millet stover at 3%, S5= Supplement with urea treated millet stover at 4%

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