Journal of Agriculture and Agricultural Technology 8(1): 11-18, 2017

GROWTH PERFORMANCE, NUTRIENT UTILIZATION AND BODY CONDITION SCORE OF CATTLE FED SUPPLEMENTAL DIET CONTAINING VARYING INCLUSION LEVEL OF FERMENTED MOLASSES TREATED SAWDUST

D. N. Tsado, I. N. Effiong and T.Z Adama
Department of Animal Production, Federal University of Technology, P.M.B. 65, Minna, Nigeria
Phone: 08037295616 Email: tsadonma@yahoo.com

ABSTRACT
A study was conducted to investigate the growth performance, nutrient utilization, body condition score and cost benefits of Brahman x Sokoto Gudali cattle fed inclusion level of fermented molasses treated sawdust diet. A total of 30 Brahman x Sokoto Gudali cattle aged 12-15 month and weighing averagely 80-110 kg were randomly assigned to five treatment groups designated as T_1, T_2, T_3, T_4, and T_5 each comprising of two replicate, with three animals per replicates. The fermented molasses treated sawdust was included in the cattle diets at 0%, 10%, 20% 30%, and 50% inclusion levels to the five treatments respectively. Feeding regimes were twice daily for all the treatment groups. Supplementary diets were supply to the cattle in the morning and in the evening with clean water given ad-libithium throughout the duration of the study that lasted for 12 weeks. The cattle were also allow to graze at the pasture field comprising of Brachria ruzizienses, Chloris gayana, Digiteria smutci, Stylozanthes hamata and laplap prurience for eight (8) hours. The result obtained showed that crude protein, nitrogen free extract, ether extract, and Methabolizable energy of the fermented molasses treated sawdust were higher than the unfermented sawdust. Cattle fed the control diet showed no significant ($P>0.05$) difference between the group of cattle fed 10 and 20 % (T_2 and T_3) inclusion level of fermented molasses treated sawdust diet. In feed conversion ratio there is statistical similarities between the cattle fed control diet and those fed 10 and 20 % inclusion level of fermented molasses treated sawdust diet. Dry matter digestibility values showed no significant ($P>0.05$) difference between the control and cattle fed 20 and 30 % inclusion level of fermented molasses treated sawdust diet. The feed cost per kg weight gain significantly ($P<0.05$) improved with cattle fed 10% and 20% inclusion level of the diet over the cattle fed control diet. It was concluded that up to 20 % of fermented molasses treated sawdust can be incorporated into the diet of Brahman x Sokoto Gudali cattle for optimum growth.

Keywords: Performance, Nutrient, Utilization, Treated Sawdust

INTRODUCTION
The daily animal protein (4.5g) intake in the diet falls grossly short of the recommended 35g of animal protein per person/day in Nigeria (Ibrahim, 2014). This low animal protein consumption may be as a result of decrease in animal protein production due to increase cost of feeds which generally account for up to 70% of the entire production cost (Olorede *et al*, 1999, as cited by Ibrahim, 2014).

Feed scarcities during the draught and increase cost of conventional feed ingredients are the two major problem affecting the profitability of commercial livestock farming this include both monogastric and ruminants (Hossain *et al.,* 2012). Interest is geared towards cheaper alternative feed stuffs, such as crop residues and industrial by- products to maintain livestock industry in Nigeria (Hossain *et al.,* 2012).

Large quantities of agro forestry and industrial wastes such as sawdust which are not being effectively utilized are produced annually in the tropics, thereby constituting environmental and health hazards (Agboola, 1993).

Sawdust is a product resulting from cutting, grinding, drilling or pulverizing wood with saw or other tool, it is composed of fine particles of wood, it could also be derived by certain animals, birds or insects which live in wood, such as wood pecker and carpenter ant (Hossain *et al.,* 2012) and it is abundant throughout the whole year in Nigeria. Encouraging results were reported when sawdust was included in beef finishing ration (Anthony *et al.*, 1969) and in high concentrate rations for dairy cattle (Cody *et al.,* 1968). Several other reports (Kinsman *et al.*, 1969: Dinius *et al*., 1970 as was cited By El-Sabban *et al.,* 1971) indicate satisfactory result with sawdust and shavings in ration for lambs.

Utilization of sawdust as alternative source of roughages may possibly reduce cost of conventional livestock feed as it does not compete with human being and reduce the challenge of feed scarcity during draught period (Hossain *et al.,* 2012).

Cattle play major role as a source of animal protein in Nigeria and account for half of the total meat supply from domestic animals (Usman, 2005). Cattle production is from the range cattle of Fulani pastoralists who are accustomed to extensive

system of production in Nigeria. The growing human population and livestock numbers, decreasing pasture availability and the increasing use of grazing land for crop production have made the use of improved feed in animal production systems all the more urgent. Sufficient quantities of high-quality feed are required for profitable livestock production (Bourn *et al*., 1994).

The Brahman breed varies from light gray or red to almost black in colour distinguished by their large hump and droopy ears and has been of great importance in commercial beef production (Cutrer *et al.,* 2010). The adaptative traits which specifically suit the Brahman breed for beef production in temperate, subtropical or tropical areas include: tolerance to internal and external parasites; tolerance to high solar energy, high ambient temperature and humidity and the ability to utilize high fibre forages (Randel, 2000). Therefore the present study was aimed at investigating the growth performance, nutrient utilization and cost benefit analysis of cattle fed diet containing varying inclusion level of fermented Molasses treated sawdust.

MATERIALS AND METHODS

Experimental Location: This experiment was carried out at Massohi Farms and Livestock Development Company, km12 Minna-Bida road of Niger State, Nigeria. Massohi farms specializes in livestock breeding, dairy production and fisheries. Minna is located in the southern Guinean savannah zone on latitude $9^{0}31^{1}$ and $9^{0}42^{1}$ North and longitudes 06^{o} 29^{1} and 06^{o} 41^{1} East with annual rainfall range of 1,200-1300mm and average temperature range of 38^{0}-40^{0}C. The area has an altitude of 1,475m above sea level , and is characterized by two season, the wet season (April-October) and dry season (November-March) (NSADP, 1995 as cited by Shiawoya, *et al*., (2011).

Collection and processing of Fermented Sawdust: Fresh sawdust was collected from timber mill Shango in Minna, Niger State. A 2mm size aluminium sieve was used to sieve the sawdust before fermentation. The process for the fermentation of corn-cob as described by Adeyemi and Familade (2003) as cited and modified by Akinwolere, (2013) was used to ferment the sawdust with the following modifications. A large plastic polythene bag was positioned in a plastic drum to take it's form and the blended mixture of sawdust and molasses in the gauge of 100kg per 10liters of molasses in 40 litres of Borehole water was pack inside the polythene bag. It was then tied securely with rope to make it air tight thus preventing exchange of gases between the fermenting material and the environment for a 15 day anaerobic fermentation period. The fermented sawdust was heated with Model AT-2 Steam Boiler (pressureless cooker) machine at 90^{0} C for 30minutes in order to take care of some bacteria, after which it was sundried to reduce the moisture content.

Experimental diet: The diet were formulated with varying inclusion level of fermented sawdust (0%, 10% 20%, 30% and 40%) as source of roughage for the cattle, other ingredients include: maize, maize offal, GNC, limestone, mineral premixed in their various proportion Table 3 . The prepared diets were administered to the cattle as supplement twice daily (7-9:00 am and 5- 7pm). Clean water was given *ad- libitum* The animals were allowed to graze on the pasture field of the farm for 8 hours within the period of 9:00 am -5:00pm.

Experimental Design: The experimental design used was Completely Randomized Design (CRD). The 30 experimental cattle were randomly allotted to five treatment group (T_1-T_5) comprising of two replicate with three animals per replicate. Treatment one (T_1) were cattle fed diet with 0% fermented molasses treated sawdust, T_2 were cattle fed diet with 10% of fermented molasses treated sawdust, T_3 were cattle fed diet with 20% of fermented molasses treated sawdust, T_4 were cattle fed diet with 30% of fermented molasses treated sawdust, T_5 were cattle fed diet with 40% of fermented molasses treated sawdust Table 3. Feeding trial lasted for 12 weeks.

Experimental Animals and Management: Breed of cattle used for this research work were crosses between the exotic and indigenous breed i.e Brahman crossed with Sokoto Gudali (Bokolo). 30 Brahman X Sokoto Gudali cross bred cattle of 12 to 15 month of age, averaging between 100kg-120kg of weight, consisting of 10 female and 20 male were assign to five experimental treatments (T_1, T_2, T_3, T_4,and T_5). Six (6) cattle were assigned to each experimental treatment in 2 replicate and 3 cattle each per replicate. Three cattle each per replicate were housed in pens with aluminium roofing sheath partitioned with iron bars having the height of about 18 ft, with the length of 12ft and breadth of 12ft. The cattle were managed under semi-intensive system. They were allowed to graze extensively at the 7.5 hectare pasture field of Massohi farms comprising of *Brachria ruzizienses, Chloris gayana, Digiteria smutci, Panicum Maximum* and *Stylozanthes hamata* for 7-8 hours after which 1.5kg of the experimental diet comprising of maize, groundnut cake, corn offal, fermented sawdust, salt, mineral premix, limestone formulated to meet the nutrient requirement of the cattle were given twice daily before and after grazing. Clean water was given *ad-libitum*. Each

cattle was treated against ectoparasites using Amitix (Acaricides) spray; they were dewormed with Albendazol to take care of endoparasites and also injected intra-muscularly with Oxytetracycline 20% -long acting broad spectrum antibiotic as a precautionary measure against bacterial infections, and Samorine injection to take care of Trypanosomiases.

Parameter Measured: The animals were allotted into five treatment groups and fed the experimental diet for a pre-treatment period of two weeks to enable them adapt to the experimental diet before the commencement of the data collection. The parameters measured were feed intake, body weight gain, feed conversion ratio, Nutrient digestibility and cost benefit analysis.

Body condition score: The body condition scores were assessed according to the method proposed by Chest Worth, (1992) as was cited by Tsado (2010). Animals were awarded scores to the nearest one quarter on a scale of 1 to 5, depending on the prominent of the spines and the transverse processes feel visa-visa the fat cover. Score 1-spine prominent (dorsal processes) and transverse processes fill sharp to the touch with no detectable fat cover. Score 2- transverse processes can still be felt with the thumb but there is no detectable fat cover. Score 3- individual transverse processes cannot be felt with firm pressure from the thumb with the fat cover round. Score 4-transvers processes cannot be felt even with firm pressure. Score 5- transverse processes cannot be felt and are obviously covered with a very thick layer of fat.

Apparent Nutrient Digestibility Trial: The digestibility trial was conducted at the end of the feeding trial on two (2) cattle from each treatment to assess the level of the nutrient digestibility. The procedure for digestibility as describe by Tsado, (2010) was used with the following modification. The animals were individually isolated and kept in a metabolic cage with slated floors adapted for faecal collection. Experimental diets fed were the same as those used in the growth study. Feed intake was measured by finding the differences between the amount of feed offered and the amount refused. Feed refused was weighed just before fresh feed is offered. Faeces from animals on each treatment were bulked thoroughly mixed and sub-sampled taken. Feed and faecal sample of the diet collected were oven –dried at 80^{o}C to constant weight and kept in air tight containers until required for analysis. Samples of feed offered and of faecal were pulled from each replicate at the end of 7 days and used for the chemical analysis. Apparent digestibility of the diets was calculated as the difference between nutrient intake and excretion in the faeces expressed as a percentage of the nutrient in take (Maynard *et al*., 1979 .

Apparent nutrient digestibility (%) =

$$\frac{\text{Nutrient in Feed- Nutrient in Faeces}}{\text{Nutrient in Feed}} \times 100$$

Data collection and Statistical analysis: One week adjustment period was allowed before data collection commenced. The mean initial body weight, final body weight, weekly body weight gain, feed intake, nutrient digestibility and body condition score were calculated. Variance (ANOVA) Using General Linear Model (GLM) procedure of SPSS computer package 2016 and significant determination at 5% level of probability. The significant means were separated using Duncan's Multiple Range Test (1995).

RESULTS

Proximate composition of unfermented and fermented molasses-treated sawdust: The result of proximate composition of non-fermented and fermented molasses-treated sawdust are presented in Table 1. The results indicate that crude protein content (3.50), nitrogen free extract (36.64), ether extract (4.33) and metabolizable energy (1420.60) of the fermented molasses-treated sawdust are higher than the unfermented sawdust. However, dry matter (90.20), crude fibre (41.23) and ash content (4.50) of the fermented molasses-treated sawdust are lower than the unfermented sawdust.

Table 1: Proximate composition of fermented molasses-treated sawdust and unfermented sawdust

Parameter (%)	Unfermented sawdust	Fermented molasses-treated sawdust
Dry Matter	92.40	90.20
Crude Protein	2.80	3.50
Crude Fiber	42.27	41.23
Ether Extract	2.33	4.33
Ash	19.00	4.50
Nitrogen Free Extract	26.00	36.64
ME (Kcal/kg)	1361.70	1420.60

Keys:
ME = Metabolizable energy ([ME=36x%CP+81.8x%EE+35.5x%NFE. Pauzenga, (1985).

Table 2. Proximate composition of the experimental diets fed to Brahman x Sokoto gudali cattle.

	Treatments				
Parameters	T1	T2	T3	T4	T5
Dry Matter	90.20	90.40	90.80	90.80	91.00
Crude Protein	12.15	11.50	10.50	10.15	9.05
Crude Fibre	12.66	14.66	16.66	18.10	19.33
Ether Extract	16.00	16.00	15.00	14.00	14.00
Ash	10.50	9.00	8.33	8.00	7.50
Nitrogen Free extract	38.89	39.24	40.31	40.55	41.12
Energy (Kcal/kg)	3138.95	3126.60	3035.50	2958.50	2920.96

Keys

ME = Metabolizable energy ([ME=36x%CP+81.8x%EE+35.5x%NFE. Pauzenga (1985), T_1 = 0 % Inclusion of Fermented molasses-treated sawdust, T_2 = 10 % Inclusion of Fermented molasses-treated sawdust, T_3 = 20 % Inclusion of Fermented molasses-treated sawdust, T_4 = 30 % Inclusion of Fermented molasses-treated sawdust, T_5 = 40 % Inclusion of Fermented molasses-treated sawdust

Table 3 Percentage composition of supplemental diet diets fed to Brahman x Sokoto Gudali cattle.

	Percentage Composition				
Ingredient	**T_1**	**T_2**	**T_3**	**T_4**	**T_5**
Maize	30	30	30	30	30
GNC	20	20	20	20	20
Maize offal	45	35	25	15	5
Sawdust	-	10	20	30	40
Limestone	4.5	4.5	4.5	4.5	4.5
Salt	0.25	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100
Calculated analysis					
Crude protein	17.40	16.65	15.98	14.85	13.96
Energy (kcl/kg)	2336.60	2330.80	2234.90	2219.10	2172.70
Fibre	8.01	11.18	14.42	17.87	20.83

keys

T_1 = 0 % Inclusion of Fermented molasses-treated sawdust, T_2 = 10 % Inclusion of Fermented molasses-treated sawdust, T_3 = 20 % Inclusion of Fermented molasses-treated sawdust, T_4 = 30 % Inclusion of Fermented molasses-treated sawdust, T_5 = 40 % Inclusion of Fermented molasses-treated sawdust, GNC = Groundnut cake

Table 4. Growth performance of Brahman x Sokoto gudali cattle fed diets containing graded levels of fermented molasses-treated sawdust

	Treatment						
Parameters	T1	T2	T3	T4	T5	SEM	LS
Initial body weight(Kg/hd)	100.34	100.50	99.67	100.50	100.17	6.32	NS
Final body weight (Kg/hd)	118.84	119.84	116.34	114.50	114.17	6.35	NS
Total weight gain (Kg/hd)	18.84ab	19.67a	16.67b	13.8c	13.50c	0.86	*
Weekly weight gain (Kg/hd)	1.57a	1.64a	1.38b	1.15c	1.12c	0.09	*
Total feed intake (Kg/hd)	124.83	124.75	124.75	124.42	124.50	0.06	NS
Weekly feed intake (Kg/hd)	10.400	10.395	10.395	10.370	10.380	0.00	NS
Feed conversion ratio	4.99a	4.77a	5.61ab	6.74b	6.92b	0.30	*

Mean with different superscript (a, b) are significantly ($P<0.05$) different

Keys

T_1 = 0 % Inclusion of Fermented molasses-treated Sawdust, T_2 = 10 % Inclusion of Fermented molasses-treated sawdust, T_3 = 20 % Inclusion of Fermented molasses-treated sawdust, T_4 = 30 % Inclusion of Fermented molasses-treated sawdust, T_5 = 40 % Inclusion of Fermented molasses-treated sawdust, Kg/hd = Kilogram per head (animal), SEM = Standard Error of Mean, LS = Level of Significance, NS = No Significance, * = Significant

Table 5 Body Condition Score of Brahman x Sokoto gudali cattle fed diets containing varying levels of fermented molasses-treated sawdust.

Treatment Parameter	T_1	T_2	T_3	T_4	T_5	SEM	LS
Initial Body Condition Score	2.17	2.17	2.17	2.17	2.17	0.06	NS
Final Body Condition Score	4.00^{a}	4.00^{a}	3.84^{ab}	3.67^{ab}	3.50^{b}	0.07	*
Total Body Condition Score Gain	1.84	1.84	1.67	1.51	1.34	0.09	NS
Weekly Body Condition Score Gain	0.15	0.15	0.14	0.13	1.11	0.01	NS

Mean with different superscript (a, b) are significantly (P<0.05) different

Keys

T_1 = 0 % Inclusion of Fermented molasses-treated Sawdust, T_2 = 10 % Inclusion of Fermented molasses-treated sawdust , T_3 = 20 % Inclusion of Fermented molasses-treated sawdust, T_4 = 30 % Inclusion of Ferme nted molasses-treated sawdust, T_5 = 40 % Inclusion of Fermented molasses-treated sawdust, SEM = Standard Error of Mean, LS = Level of Significance, NS = No Significance, * = Significant at P<0.05

Table 6: Apparent digestibility of Brahman x Sokoto gudali cattle fed diets containing varying inclusion levels of fermented molasses-treated sawdust diet.

Treatment Parameters	T_1	T_2	T_3	T_4	T_5	SEM	LSD
Dry Matter	74.4^{a}	75.01^{a}	71.32^{a}	68.41^{ab}	67.24^{b}	1.17	*
Crude Protein	50.32	52.75	47.48	41.07	41.89	1.95	NS
Crude Fibre	55.30	53.91	51.94	44.81	44.34	1.82	NS
Crude Ash	49.73	50.10	55.26	56.507	64.07	3.03	NS
Ether Extract	52.98^{b}	53.04^{b}	54.24^{ab}	60.24^{a}	59.11^{a}	1.18	*
Nitrogen Free Extract	51.04^{b}	52.25^{b}	54.87^{ab}	60.65^{a}	63.05^{a}	1.67	*

Mean with different superscript (a, b, c) are significantly (P<0.05) different

Keys

T_1 = 0 % Inclusion of Fermented molasses-treated sawdust, T_2 = 10 % Inclusion of Fermented molasses-treated sawdust, T_3 = 20 % Inclusion of Fermented molasses-treated sawdust, T_4 = 30 % Inclusion of Fermented molasses-treated sawdust, T_5 = 40 % Inclusion of Fermented molasses-treated sawdust, SEM = Standard error of Mean, LS = Level of Significance, NS = No Significance, * = Significant at P<0.05

Table 7. Cost Benefit Analysis of Brahman x Sokoto Gudali cattle fed diets containing varying inclusion levels of fermented molasses-treated sawdust diet

Treatment Parameters	T_1	T_2	T_3	T_4	T_5	SME	LSD
Ave weekly feed in take	10.40	10.395	10.40	10.37	10.38	0.01	NS
Cost of feed per kg(₦)	73.05^{a}	68.05^{b}	63.05^{c}	58.05^{d}	53.05^{e}	2.36	*
Ave weekly feed cost (₦)	759.92^{a}	707.44^{b}	655.46^{c}	601.87^{d}	550.39^{e}	24.73	*
Ave weekly weight gain	1.57^{a}	1.64^{a}	1.38^{b}	1.155^{c}	1.125^{c}	0.07	*
Feed cost per kg weight gain (₦)	484.99^{b}	432.41^{a}	475.07^{a}	521.18^{b}	489.33^{b}	10.69	*

Mean with different superscript (a b) are significantly (P<0.05) different

Keys

T_1 = 0 % Inclusion of Fermented molasses-treated sawdust, T_2 = 10 % Inclusion of Fermented molasses-treated sawdust, T_3 = 20 % Inclusion of Fermented molasses-treated sawdust, T_4 = 30 % Inclusion of Fermented molasses-treated sawdust, T_5 = 40 % Inclusion of Fermented molasses-treated sawdust, SEM = Standard error of Mean, LS = Level of Significance, NS = No Significance, * = Significant at p< 0.05

Proximate composition of experimental diet: Proximate composition of the experimental diet is presented in Table 2. The results showed that as the inclusion levels of fermented molasses-treated sawdust increases in the feed the crude protein, ether extract and ash content decreases. The dry matter composition were similar T_1 (90.20), T_2 (90.40), T_3 (90.8), T_4 (90.80) and T_5 (91.00) among the treatments groups. Crude fibre content increases with increase in inclusion level while ether extracts decreases with increase in inclusion levels of fermented molasses-treated sawdust in the diet. T_1 (0 % fermented molasses-treated sawdust) recorded the highest (12.15 %) crude protein content while the lowest (9.05%) was observed in T_5 (40 % fermented molasses-treated sawdust). Nitrogen free extract also increases slightly as the inclusion level of fermented molasses-treated sawdust in the diet increases.

Growth performance of Brahman x Sokoto Gudali cattle fed diet containing varying

inclusion levels of fermented molasses-treated sawdust: Table 4 showed growth performance of Brahman x Sokoto Gudali cattle fed diet containing varying inclusion levels of fermented molasses-treated sawdust. The results indicate that there was no significant difference (P>0.05) in the initial and final weight of the experimental animals among the treatment groups. Total and weekly weight gain values shows significant (P<0.05) difference among the treatment groups. Animals fed 0%, 10%, and 20% (T_1 T_2 & T_3) of fermented molasses treated sawdust (FMTS) recorded significantly higher values compare with animals fed 30 and 40% (T_4 and T_5) fermented molasses treated sawdust (FMTS) in total and weekly weight gain. The results also shows that there was no significant difference (P>0.05) in total and weekly feed intake among the treatment groups. There were significant difference (P<0.05) in the feed conversion ratio between the treatment groups. Animals fed 0% and 10%, (T_1 & T_2) of fermented molasses treated sawdust diet shows significantly better feed conversion ratio 4.99 and 4.77 than animals fed 30 and 40% fermented molasses treated sawdust diet T_4 (6.74) and T_5 (6.92).

Body Condition Score of Brahman x Sokoto gudali cattle fed diets containing graded levels of fermented molasses-treated sawdust: Body Condition Score of Brahman x Sokoto gudali cattle fed diets containing graded levels of fermented molasses-treated sawdust is presented in Table 5.The result revealed that no Significant difference (P>0.05) was observed between the Animals fed 20% and 30% of fermented molasses treated sawdust diet with Animals fed diet 0%, 10%, and 40% in the final body condition score of the experimental animals among the treatment group. There was no (P> 0.05) significance difference in the total and weekly body condition score gain.

Apparent digestibility of Brahman x Sokoto gudali cattle fed diets containing varying inclusion levels of fermented molasses-treated sawdust diet: The results of Apparent digestibility of Brahman x Sokoto gudali cattle fed diets containing varying inclusion levels of fermented molasses-treated sawdust diet is presented in Table 6.The result showed that there was significant (p<0.05) difference in the dry matter apparent digestibility of the experimental animals among the treatment groups. Animals fed 40% fermented molasses treated sawdust shows significant (p<0.05) difference among the treatment groups, while animals fed up to 30% fermented molasses treated sawdust was not significantly (p>0.05) different between the groups in dry matter digestibility. No significant (p>0.05) differences in the apparent digestibility of crude protein, crude fibre and ash. However, it was observed that the value of crude fibre apparent digestibility decrease slightly as the inclusion level of fermented molasses treated sawdust increased among the treatment groups. Similarly, the ash values increases as the inclusion levels increases although no significant difference was observed. Ether Extract and Nitrogen Free Extract apparent digestibility values were significantly (p<0.05) higher than the control.

Cost Benefit Analysis of Brahman x Sokoto gudali cattle fed diets containing varying inclusion levels of fermented molasses-treated sawdust diet: The results of the Cost Benefit Analysis of Brahman x Sokoto Gudali cattle fed diets containing varying inclusion levels of fermented molasses-treated sawdust diet are presented in table 7. The result shows that there was no significant (P>0.05) difference in average weekly feed intake. The cost of feed per kg decreased significantly (P<0.05) as the inclusion level of the sawdust increases among the treatment groups. Significant (P<0.05) difference existed across treatment groups in the average weekly feed cost respectively. Animals fed 0% fermented molasses treated sawdust recoded highest value (₦759.92), while animals fed 40% fermented molasses treated sawdust recorded the lowest value (₦550.39) in the average weekly feed cost. There were significant (P<0.05) difference across the treatment group in average weekly body weight gain, however, animals fed 0% and 10% fermented molasses treated sawdust were observed to significantly (P<0.05) have higher values in average weekly body weight gain than animals in the other treatment groups. Feed cost per kg weight gain were observed to be significantly (P<0.05) better with animals fed 10% and 20% fermented molasses treated sawdust compare with animal fed 0%, 30% and 40%.

DISCUSSION

The results of the proximate analysis of unfermented and fermented molasses treated sawdust in this study are within the range reported by Hossain *et al*., (2011) who in his experiment reported. 1.8 – 3.5 % crude protein, 0.6 – 2.0 % ether extract, 39.5 - 74% crude fibre, 12.5 – 47.1% nitrogen-free extracts and 0.30 – 7.6 % ash on different types of sawdust. The non-significant differences recorded on the total body weight gain and feed conversion ratio between animals fed control diet and those fed 20% showed a positive effect of the tested diet. This is in agreement with earlier findings of Ibrahim *et al*., (2013) who reported that there were no significant effects of diets on the final body weight of goat fed variously treated sawdust at 50% replacement for molasses-treated wheat offal. Similarly the non significant

difference in feed intake and final body weight between the control diet and other treatment could imply that fermented molasses-treated sawdust inclusion in cattle diet has no toxic effects and equally palatable. This agrees with Ibrahim *et al*., (2013), Cody *et al*., (1963) who reported that 25% sawdust was found to be the most desirable level for roughage substitution.

The significant ($P<0.05$) decrease observed in final body condition score as the inclusion level of the test ingredient increases could imply that the inclusion of the test ingredient (fermented molasses- treated sawdust) in the diet above 30% had significant effect on the fat deposits in relation to skeletal features of animals. Encinias *et al.,* (2000) reported that Body condition score provides producers a relative score based on an evaluation of fat deposits in relation to skeletal features.

The statistical ($p>0.05$) similarity observed in the dry matter apparent digestibility between the animals fed control diet and those fed up to 40% inclusion level shows the tolerance level of the tested diet. Paterson, (2003) argued that the principal anti-nutritive factor in utilizing most wastes as ruminant livestock feeds is their high fibrous lingo-cellulose contents. The non significant ($p>0.05$) difference in crude protein and crude fibre apparent digestibility between the control diet and other treatment group could imply that fermented molasses- treated sawdust inclusion in cattle diet has no anti-nutritional effects. This agrees with Radwan, (1994) who reported that addition of sawdust as fibre source in rabbit ration had improvement effect on digestibility of protein, ether extract and crude fibre. The increase in apparent digestibility of ether extract and nitrogen free extract observed as the inclusion level of fermented molasses treated sawdust increases is in line with the findings of Afolabi, (2002).

Significant ($p<0.05$) difference observed in the cost benefit analyses of feed per kilogram and average weekly feed cost among the treatment group indicate that addition of fermented molasses sawdust may reduced the cost of feeding cattle significantly. Significantly lower ($P<0.05$) value recorded by animals fed 10% and 20% fermented molasses treated sawdust diet compare to animals fed 30% and 40% fermented molasses treated sawdust diet in the average weekly feed cost per kilogram weight gain, suggest that addition of fermented molasses treated sawdust up to 20% may improve economic benefit of cattle production significantly. This is in agreement with earlier findings of Anigbogu *et al*., (2010) who reported that incorporation of *Zymomonzas mobilis* treated sawdust at 15% and 20% in the ration improve economic benefit analysis in red sokoto goats.

CONCLUSIONS

It can be concluded from this study that up to 20 % of fermented molasses-treated sawdust can be included in the diet of Brahman x Sokoto Gudali cattle for optimum body weight gain, body condition score, and apparent digestibility and effective feed cost per kilogram weight gain of the animals. Therefore fermented molasses-treated sawdust can be suitably included in the diets of Brahman x Sokoto Gudali cattle up to 20 % level and improved weight gain.

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