CHEMICAL EVALUATION OF SILAGE FROM SUGAR CANE WASTE TREATED WITH SOYBEAN MEAL RESIDUE AND CAMEL FORE-STOMACH DIGESTA

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ABSTRACT
An experiment was conducted to evaluate the chemical composition of ensiled sugarcane waste treated with soybean meal residue and camel fore-stomach digesta in a completely randomized design (CRD). Sugarcane waste (SCW) was chopped and treated with different proportion of Soybean meal residue (SBMR) and Camel fore-stomach digesta (FSD) and ensiled in in vitro laboratory silos (946ml). There were four treatments combinations as; A (40% SCW + 25%SBMR + 35%FSD), B (50%SCW + 20%SBMR + 30%FSD), C (60%SCW + 15%SBMR + 25%FSD) and D (70%SCW + 10%SBMR + 20%FSD). The sample was ensiled for 21days in triplicate. At the expiration period of the ensiling period, samples were taken for Analyses. The results shows that significant ($P<0.05$) differences were observed between the treatments means of dry matter (DM), crude fibre (CF), nitrogen free extract (NFE), organic matter (OM), Energy, Cellulose, Hemicelluloses, NDF, ADF and ADL. The results of the study showed that the ensilage has significant effect in improving the nutritional value of sugarcane waste (SCW). Ensilage of sugarcane waste with Soybean meal residue and fore-stomach digesta (from camel) could be used in order to improve the utilization of sugarcane waste by ruminant animal especially during dry season.

Key words: Silage, sugarcane waste, camel, fore-stomach digesta, soybean meal residue

INTRODUCTION
In Nigeria, ruminant animals are essentially raised for meat. They are reared extensively in Northern Nigeria where they are mostly found (Akinmutimi, 2004). If ruminants (particularly sheep and goats) were adequately harnessed they can be used to reduce the wide gap between recommended (35g animals protein/day) and consumption of (8-10g animals' protein/days) in the diet of Nigerians (Ani and Okorie, 2003). However, there are several constraints to ruminant production in Nigeria. These includes low availability of feed during the dry season, seasonal fluctuation of fodder in quantity and quality, nutritional imbalances causes by lack of access to proteins, carbohydrates and minerals. Inadequate feed supply is a major constraint of livestock production in Sub-Saharan African countries, particularly in the late dry and early wet seasons (Arigbede *et al.,* 2011). At this critical period areas open to grazing animals are almost bare ground with poor vegetative cover and low biomass (Muhammad and Kallah, 2013). This obviously adds to the poor performance of ruminant livestock. There is thus a pressing need to look for alternative feedstuffs of no nutritional value to human. This has therefore necessitated the use of crop residues. For instance, Sugarcane wastes. Sugarcane waste (*Saccharum officinarum*) is one of the agricultural produce that has much importance to human lives both locally and industrially (Garba, 2008). However there are many methods for improving the nutritive value of these by-products and these includes physical, chemical, physico-chemical and biological treatments. Ensiling is a physical feed processing technique reported to have helped in enhancing the feeding quality of agro-industrial by-products and other potential plant feedstuffs by reducing the level of toxicants where present, improving the nutrients value, acceptability of feed and utilization by animals (Fasuyi *et al*., 2010). Therefore the study was aimed at determining the effect of treating SCW with SBMR and camel FSD

MATERIALS AND METHODS
The experiment was conducted at the Animal Science Laboratory of Kano University of Science and Technology, Wudil Kano State, located at longitude 8°25'E and latitude l2°58'N. The area has an average annual rainfall of 890mm with annual temperature of 26°C (Olofin *et al*., 2008).Sugarcane

Waste (SCW) was collected from processing/selling points identified within and around Wudil market including the University. All foreign materials such as stone, iron etc. were removed. Soybean Meal Residue (SBMR) was obtained from various soybean cake (*Awara)* processing centers in and around the University campus. Fore Stomach Digesta (FSD) from Camel was collected from Kano main abattoir. At least 5-10 animals brought to the abattoir for slaughter was selected for the collection. After slaughter and evisceration at least 0.5kg of the fresh FSD was collected from each animal. The sample was mixed thoroughly and representative sample was collected. The collected representative samples were immediately transferred to an air tight container and transported to the experimental site. The dried sugarcane waste used for silage was chopped into about 2-3cm length to make compaction easy (Ogunlolu *et al.,* 2010). SCW was ensiled with SBMR and FSD in proportions as represented in Table 1.Twelve bottles of (946ml) were used as laboratory silos (Ogunlolu *et al.,* 2010). The procedure of Roy and Rangneker (2006) was followed in which 15 liters of water was sprinkle on 25kg sugarcane waste. Masking tape was used to further seal the bottles after filling with compressed materials and labeled each bottle. The samples were ensiled for 21days in triplicate. At the expiration of the ensiling period, the silos were opened; sub samples were taken from all the silages and oven dried at 60^0C for 48hrs for analyses. Thoroughly mixed representative samples of silage treatments (A-D) were analyzed for proximate composition according to A.O.A.C (2005) procedures and fibre fractions by the procedure of Van soest *et al*., (1991). Cellulose was calculated as ADF-ADL and hemicellulose as NDF-ADF (Rinne *et al*., 1997). Metabolisable energy (ME) was calculated using the equation MEkcal/kg = 37(%CP) + 81.1(%EE) + 35.5(%NFE) Pauzenga, (1985). Organic matter (OM) was obtained by the difference between dry matter and ash. The data generated from the experiment were subjected to Analysis of variance (ANOVA) using Completely Randomized Design (CRD) according to Steel and Torrie (1980). Where significant differences between the mean are detected, Least Significant Difference (LSD) was used to separate the means.

Table 1: Proportion (%) of Sugarcane Waste (SCW) ensiled with Soybean Meal Residue (SBMR) and Camel Fore-Stomach Digesta (FSD).

Treatments	SCW	SBMR	FSD
A	40	25	35
B	50	20	30
C	60	15	25
D	70	10	20

RESULT AND DISCUSSION

Table 2 showed the results of the chemical composition obtained from the ensilage. Significance ($P<0.05$) differences between the treatment means of the ensiled materials were seen in all the proximate parameters evaluated except for CP, EE and Ash which were all similar ($P>0.05$), but higher values are observed in treatment A for CP and EE. The DM (%) contents of treatment B (95.3l %) was significantly ($P<0.05$) higher than all other treatments, treatment A, C and D were similar ($P>0.05$). The DM contents 91.42 - 95.31% of the silages were higher than the value 90% reported by Boda (1990). This may be as a result of different treatment combination of the digesta prior to the ensiling. The mean CP content of all the silages in the present study (13.60 -13.83%) were higher than the value of 8% defined as the required by ruminants (Norton, 2003) and as the dietary threshold level providing adequate ammonia concentration for microbial activities within the rumen. The CF values obtained in the present study (29.94 -33.86%) were higher than the value (23.08%) reported by Nguyen and Nguyen (2001) for urea-treated baggase. The ash contents of the ensiled sample obtained is higher than 1% as reported by Boda (1990), this could be due to the differences in the experimental materials used.

Table 2: Chemical Composition (%) of Ensiled Sugarcane Waste (SCW), treated with Soybean Meal Residue (SBMR) and Camel Fore-Stomach Digesta (FSD).

Parameters	Treatments				LSD
	A	B	C	D	
DM	93.33[b]	95.31[a]	94.10[b]	91.42[b]	1.068
CP	13.83	13.60	13.47	13.48	0.876
CF	29.94[c]	31.23[b]	31.97[b]	33.86[a]	0.772
EE	1.43	0.62	1.01	1.29	0.912
ASH	3.58	3.20	3.36	3.68	0.708
NFE	60.88[bc]	60.30[c]	61.32[b]	63.58[a]	0.643
OM	89.75[b]	92.11[a]	90.74[ab]	87.74[c]	1.641
ME (Kcal/kg)	2788.66[ab]	2694.16[b]	2757.55[b]	2860.23[a]	98.536

[a,b,c] Means in the same row with different superscript are significantly different (P<0.05**)**

Table 3 showed the results of fibre fractions of the ensiled material. Significant differences (P<0.05) were observed in all the parameters evaluated. The results for NDF and ADF obtained in the present study (70.06 - 78.57% NDF and 41.60 - 45.38% ADF) respectively were comparable to the values reported by Oduguwa *et al*. (2011). The high fibre fraction reported for all the silages in the present study could be attributed to the degree of lignifications of SCW used and the high fibre content of the fore-stomach digesta. However, the range of NDF values recorded in the present study (70.06, 71.45, 71.57 and 78.57%) was slightly within the critical level of NDF (75%) reported by Buxton (1996) above which the NDF inhibits feed intake.

Table 3: Fibre Fractions (%) of Ensiled Sugarcane Waste (SCW), treated with Soybean Meal Residue (SBMR) and Camel Fore-Stomach Digesta (FSD).

Parameters	Treatments				LSD
	A	B	C	D	
NDF	70.06[c]	71.57[b]	71.45[b]	78.57[a]	1.301
ADF	41.60[c]	43.23[b]	43.59[b]	45.38[a]	1.087
ADL	14.60[d]	16.32[c]	18.95[b]	20.62[a]	0.860
Cellulose	26.99[a]	26.91[a]	24.64[b]	24.76[b]	1.853
Hemicellulose	28.46[b]	28.35[b]	27.87[b]	33.19[a]	1.890

[abcd]Means in the same row with different superscript are significantly different (P<0.05)

CONCLUSION

In conclusion the results of the study showed that ensiling of sugarcane waste with Soybean meal residue and Fore-stomach digesta (from camel) has a significance effects in improving the nutritional value of SCW. However, the result showed that all the parameters were within the normal range of good silage. Furthermore proportion of (40%SCW +%SBMR+35%FSD) gives the best result of ensilage.

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