EFFECTS OF MOISTURE LEVELS ON THE NUTRITIVE VALUE OF ENSILED SUGARCANE (*SACCHARUM OFFISINARUM)* WASTE ENHANCED WITH POULTRY LITTER

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ABSTRACT
The study was conducted to evaluate the effects of moisture levels on the nutritive value of ensiled sugarcane waste (ESCW) enhanced with poultry litter in a completely randomized experimental design. Combinations of 60% Sugarcane waste (SCW) plus 40% poultry litter (PL) were ensiled using different moisture levels to make four (4) treatments viz. treatment A (600mls), B (800mls), C (1000mls), and D (1200mls) of water each, in triplicates. At the expiration of the ensiling period (21 days), all silages were assessed for physical characteristics and sub samples were taken for analyses. The results of the physical characteristics showed that all the silages were adequately fermented with firmed texture, colours ranging from dark or deep brown to light brown or pale yellow while the aroma were pleasant, sweet and putrid. The results for the proximate analysis of the silages showed that moisture levels lead to significant ($P<0.05$) differences among the treatment means in all the parameters evaluated except Dry Matter. The Crude Protein, Crude Fibre and ash mean values were significantly ($P<0.05$) higher in treatment C whereas treatment B had significantly ($P<0.05$) higher Ether Extracts and Nitrogen Free Extract values. In conclusion, based on the results of the physical characteristics and proximate composition, all the silages can be considered to be well fermented due to moisture levels enhanced fermentation, however, treatment C is recommended due to its higher Crude Protein content.

Key – words: Sugarcane waste, Poultry litter, Ensiling

INTRODUCTION
Insufficient quantity and quality of feed for ruminants during the dry season is a major limiting factor for effective production and management. The provision of good quality all year-round forage or feed is a major problem in ruminant production system in Nigeria. Forage availability is usually inadequate and the quality of the available ones is poor in the tropics for feeding all-round the year. Ruminant production could be improved upon by cultivating plants during the cropping season and their waste removed during harvesting, dried and stored as fodder for ruminants feeding during the scarce period when most of these animals lose a percentage of their body weight as a result of shortage and poor forage (Lakpini, 2002). These wastes which form bulk of the feed resource are generally low in protein and high in cellulose content. Sugarcane waste among other crop residues have been reported to be abundant and left unutilized when primary product has been obtained. The waste when properly processed and utilized can make a cheap source of nutrients especially dietary energy and fermentable products for small holder ruminant production (Mickan, 2005). Various physical, chemical and biological treatments have been used to improve the utilization for low quality feed such as corn cob and sugarcane waste (Abasiekong, 1991). The most popular is chemical treatments through the used sodium hydroxide, an alkali which apart from its unavailability could be hazardous owing to its caustic nature (Adebowale, 1995). The used of urea solution for treatment in some parts of the world might be more practical but it also expensive to the rural farmers. Meanwhile, researches into the use of by-products like poultry litter at various levels of dietary inclusion have been shown to improve digestibility of poor-quality feed (Adebowale, 1995; Eniolorunda *et al*., 2010). There is much availability of sugarcane waste in Northern Nigeria. Sugarcane waste pollutes the environment and if burnt causes air pollution which might increase global warming. Utilization of sugarcane waste is

very important in feeding animals like cattle, sheep, and goats. In Nigeria sugarcane waste can provide cheap source of feeding stuff with appreciable amount of nutrient (Ayoade *et al*., 2007), therefore, could be used to feed livestock. The treatment will increase the non-protein nitrogen content of the diet and also improve digestibility and utilization of fibre by the animals. More so, moisture enhances the processes of fermentation. The objective of this study is to evaluate the effects of moisture levels on ensiled sugarcane waste enhanced with poultry litter as ruminants feed.

MATERIALS AND METHODS

The study was conducted at the Animal Science Laboratory of Kano University of Science and Technology Wudil, Kano State, located at longitude 8^{o} 25'E and latitude 12^{o}58'N. The area has an average annual rain fall of 890mm with an average annual temperature of 26^{o}c (Olofin, 1985). Sugarcane waste (SCW) was collected from selling points identified within and around Wudil market including the University. All foreign materials (stones, irons and polythene) were removed. Poultry litter was obtained from a deep litter production system. The collected sugarcane waste and poultry litter were sun dried for 7-9 hours depending on the weather for 7 days until they became dry. The dried sugarcane waste and poultry litter were then milled separately through 8mm mash in a hammer mill. The milled sugarcane waste used for the silages was then mixed with the poultry litter in the ratio of 60:40. Water (moisture) was used in four (4) different proportions of 600mls, 800mls, 1000mls and 1200mls as treatments A, B, C and D. All silages were thoroughly mixed, filled and compressed into the laboratory silos (946mls bottles) and compacted as fast as possible to disallow air from being trapped in the silage. Masking tape was used to further seal the bottles. The samples were ensiled for 21 days in triplicate. At the expiration of the ensiling period, the laboratory silos were opened and the top most 5cm material was scooped off to avoid contamination with partially ensiled material. The samples were taken using forceps from each ensiled bottle for physical observation. Each content was scored for aroma and colour by three independent scorers on a subjective score of 1-4 (Table 1), sub samples were taken from all silages after mixing the whole content, oven dried at 60^{0}C for 48 hours for chemical analysis. The proximate composition of the samples was analysed according to the methods described by AOAC (2005). The experiment was laid using completely randomized design (CRD) as outlined by Steel and Torrie (1980) and data generated were subjected to analysis of variance (ANOVA) using SAS statistical package (SAS, 1989). Differences between the means were considered significant at 5% probability level.

Table 1: Description of Colour and Aroma Rating used as indices of Silage Quality

RATING	COLOUR	AROMA
1	Dark or deep brown	Putrid or rancid
2	Light brown	Pleasant
3	Pale yellow	Sweet
4	Yellowish green	Very sweet

Source: Muhammad *et al.*, (2009).

RESULTS AND DISCUSSION

Physical characteristics of the prepared silage

The results of the physical properties of the prepared silages (Table 2) showed that all the silages were adequately fermented and had colours ranging from dark or deep brown to light brown or pale yellow, which is in line with the report of Oduguwa *et al*. (2011) using similar procedure of ensiling. Ensiling process is known to be used in the processing and enhancing the palatability of certain ingredients (Dan Abba *et al.*, 2020). The results obtained for colour (Table 2) was close to the original colour of the materials used in the silage which coincide with the finding of Oduguwa *et al*. (2011). The aroma of the silages was sweet, pleasant and putrid or rancid which are all indicative of a good quality silage. All the compounded silages were firm in texture due probably to the low moisture contents. Treatment C which has high moisture contents is slimy indicating spoilage due to mould growth. This finding agrees with that of Wattiaux (2000) who reported high moisture level to favour growth of moulds on silages.

Table 2: Physical characteristics of the prepared silages

	Physical properties			
TRT	**Colour**	**Aroma**	**Texture**	**Other observation**
A	1	1	Firm	-
B	2	2	Firm	Mould on top
C	1	1	Slimy	-
D	3	3	Firm	-

A 600mls, B 800mls, C 1000mls, and D 1200mls of water

Proximate compositions of the prepared silage

The results for the proximate analysis of the silages (Table 3) showed significant (P<0.05) differences among the treatment means in all the parameters evaluated except DM. The DM values ranged from 85.70% in treatment C to 86.55% in treatment B, the values were found to be lower than 90% reported by Boda (1990). The Crude Protein, Crude Fibre and ash values were significantly (P<0.05) higher in treatment C while lowest in whereas treatment B had significantly (P<0.05) higher Ether Extracts and Nitrogen Free Extract values.

Table 3: Proximate compositions of the prepared silages

	Treatments				
Parameters	**A**	**B**	**C**	**D**	**LSD**
DM	86.18	86.55	85.70	86.20	2.158
CF	4.68^{c}	4.83^{c}	6.87^{a}	5.40^{b}	0.873
CP	12.58^{b}	8.02^{d}	13.67^{a}	9.41^{c}	1.009
	4.73^{b}	3.77^{c}	5.70^{a}	3.52^{c}	0.461
Ash					
EE	3.73^{b}	4.43^{a}	3.43^{b}	2.72^{c}	0.521
NFE	72.09^{b}	78.94^{a}	72.51^{b}	78.96^{a}	1.350

^{a,b,c} Mean with different superscript within the same row are significantly (P<0.05) different.

A 600mls, B 800mls, C 1000mls, and D 1200mls of water

CONCLUSION

In conclusion, moisture levels significantly affect the nutritive value of ensiled sugarcane wastes enhanced with poultry litter and based on the results of the physical characteristics and proximate composition, all the silages can be considered to be well fermented due to mould growth, however, treatment C is recommended due to its higher Crude Protein content.

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