ASSESSMENT OF ENSILED MILLET STOVER WITH OR WITHOUT LEGUMES STOVER FOR QUALITY AND ACCEPTABILITY BY WEST AFRICAN DWARF GOAT

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ABSTRACT
This study was conducted to evaluate the ensiled millet stover with or without legumes stover for quality and acceptability by West African dwarf goats. The materials were ensiled for 90 days in bag silo. There were five silage treatments: A (100% Millet stover only), B (80% Millet stover + 20% Groundnut stover), C (80% Millet stover + 20% Bambaranut stover), D (80% Millet stover + 20% Soybean stover), E (80% Millet stover + 20% Cajan cajanus stover) with four replicates each. Acceptability studies was done using eight (8) female West African dwarf goats of average weight of 8-12kg. Results of physical characteristics of ensiled millet stover with or without legumes produced good quality silages with greenish yellow colour, firm texture and good aroma (fruity and pleasant). The result of coefficient of preference (CoP) indicates that 100% ensiled millet stover was highly preferred, followed by ensiled millet stover with bambaranut stover by WAD goats with CoP values of 1.08 and 1.02, respectively. However daily mean consumption (g/day) suggested that with time the goats would get use to other silage types. The CP contents of the silage types ranged significantly ($P<0.05$) from A silage (11.50%) to D silage (14.08%). The silage pH and temperature (^0C) values ranged from 3.70 to 3.83 and 25.75 to 26.75^oC. Moisture content and dry matter (DM) values ranged from A silage (63.90%) to E silage (67.28%) and from E silage (32.71%) to A silage (36.60%) respectively. However, the pH, temperature, moisture and DM values were similar across the treatments. The result obtained from this study indicates that all the silage types preserved well and legumes stover improved CP content of ensiled millet stover significantly.Therefore, the silage could be used for feeding ruminants, since CP contents were above 7% threshold recommended for ruminants.

Keywords: Millet stover, legumes stover, acceptability, dwarf goat, crude protein.

INTRODUCTION
Inadequate quantity and quality of forages availability in all year- round couple with high cost of conventional feed especially during the dry season has necessitated the use of crop residues in ruminants feed production. Furthermore, increasing trends of livestock production in Nigeria suggest the need for development of feed conservation strategies which will allow for stock-piling fodders during the period of abundant supply for later use in the dry season. This will redistribute the feed supply over the year to meet the requirements of livestock resources (Muhammad *et al.,* 2009). Silage production is one of the forage conservation methods practiced in intensive livestock production systems. While it is not a common practice among the livestock producers in Nigeria, silage is a viable option for preservation of surplus forage during the growing season when yield and nutritional values are optimal.Year-round supply of sufficient quantity and quality of feed is a goal sought for in a profitable livestock production enterprise. Manipulation

of forage species selection, production technique and fodder conservation practices could be effectively utilized to bridge the gap in feed supply during the dry season. Silage can be used at any time when required especially during the period of shortage and dry season. Pearl millet like other cereal crops is cultivated on large scale-farming in north – central and north – east Nigeria. Ensiling cereal stover with legumes stover will improve nutrional quality and feed value of the materials ensiled especially the crude protein contents. This will reduce the cost of feeding protein concentrate as supplement in dry season period. As a feedstuff it is mainly grown to produce hay, silage, green-chop, pasture and stand over feed grazed directly (FAO, 2009). Silage can be made from the stover after the main crop has been harvested. Silage is defined as any plant material that has undergone fermentation or "pickling" in a silo, while silo is any storage structure in which green, moist forage is preserved. The primary goal of making silage is to maximize the preservation of original nutrients in the forage crop for feeding of livestock at a later date in livestock feeding programs. The study was carried out to determine the effect of ensiling millet stover with or without legumes stover on silage physical characteristics, crude protein content and acceptability of ensiled millet stover by West African dwarf goats.

Materials and Methods

Freshly harvested green millet stovers and legumes stovers were collected from Teaching and Research Farm of Federal University Wukari, Taraba state, Nigeria. Harvesting was done in the month of November. Harvested millet stovers and legumes stovers were chopped into 3 – 5 cm pieces size (for easy compaction) and wilted under shade for 24 hours on the spread nylon sheet. Four different legumes stovers were used which included groundnut stover, bambaranu tstover, soybean stover and pigeon pea stover. Each legume stover was added at 20% level treatment. The ensilage was done in five treatments: A (100% Millet stover only) control, B (80% Millet Stover+20%Groundnut stover), C (80% Millet Stover + 20%Bambaranut stover), D(80% Millet stover + Soybean stover), E (80%Millet stover + 20% Cajanus cajan stover). All were replicated four times in a completely randomised design. The materials were ensiled in bag silo for a period of 90 days.The pH, temperature, colour, smell, texture, dry matter and moisture content were determined using the methods of Bababyemi *et al.* (2009) and Amuda *et al.* (2017).

Acceptability study

Six West African dwarfs (WAD) goats weighing between (8-16kg) were used to evaluate the free choice intake of ensiled millet stover with or without legumes stovers in a cafeteria feed preference study. The five silages were introduced on a cafeteria basis to the animals (WAD goat).1Kg of each silage type was served in five wooden feeders measuring 150cm by 30cm, the position of each feeder with the treatments were changed daily to avoid the animals sticking to particular treatment at a particular spot. The goats were allowed to feed for 8 hour daily and for upward of 7 days. The intake was measured by deduction of remnants from the amount of feed offered. The silage preferred was determined using coefficient of preference (CoP) value; provided by Babayemi *et al.* (2009) as shown below.

$$\text{Coefficient of preference (CoP)} = \frac{\text{Intake of individual silage}}{\text{Mean intake of the five silage types}}$$

If CoP is less than (< 1), the material is poorly accepted and when is greater than (> 1), the material is well accepted (Bamikole *et al.*, 2004).

RESULT AND DISSCUSION

Table 1 shows the physical characteristics of ensiled silage materials. All ensiled materials were similar in their properties. Had greenish yellow colour, pleasant and fruity odour with firm texture. The greenish yellow colour obtained in this study were close to original colour of both the millet stover and the legumes stovers and this was an indication of good silage as reported by Amuda *et al.* (2018). Good silage usually preserves the original colour of the pasture or any forage (Amuda *et al.*, 2017). All the silages exhibited pleasant and fruity odour which is an indication of well-preserved silage. Kung and Shaver (2002) and Amuda *et al*, (2018) reported that pleasant smell is accepted for good and well-preserved silage. The firm texture felt in the silages is an indication of good silage (Kung and Shaver, 2002).

Table 1: Physical characteristic of ensiled millet stover with or without legumes stovers

Treatment	Colour	Texture	Odour	Mouldness
A	Greenishyellow	Firm	Fruity	No mouldy
B	Greenish yellow	Firm	Pleasant	Slightly mouldy
C	Greenish yellow	Firm	Fruity	No mouldy
D	Greenish yellow	Firm	Pleasant	slightly mouldy
E	Greenish yellow	Firm	Fruity	No mouldy

A= 100% Millet Stover only, B = 80% Millet Stover + 20% Groundnut Stover
C = 80% Millet Stover + 20% Bambaranut Stover, D = 80% Millet Stover + 20% Soybean Stover, E =80% Millet Stover + 20% Cajanus cajan Stover

Crude protein, pH, temperature, moisture content and dry matter composition of the silages are presented in Table 2. There was no significant different ($P<0.05$) between treatments A, B and C. However, the CP contents of treatments D (14.08%) was higher ($P<0.05$) compare to treatments E (11.5%) and C (11.90%). The slight increase in CP contents of ensiled millet stover with legumes stover is due to protein contribution from legumes stover. The CP contents obtained in this study were more than 8.0% which according to Norton (2003) should provide ruminal ammonia levels above the minimum required by rumen microorganisms to support optimum growth for maintenance, production and optimum activity.There was no significant different ($P<0.05$) between the treatments for temperature, pH, moisture and dry matter contents. The moisture and DM contents of the silages were similar to the values reported by Amuda *et al.* (2018), but lower than those reported by Binuomote and Babayemi (2010). Low pH values obtained for all the silages indicates that lactic acid producing bacteria dominate the fermentation phase. Thus, the silage is well-preserved and stable

Table 2: Crude protein, Temperature, pH moisture and Dry Matter of Ensiled Millet stover with or without Legumes stover

Parameters	Treatments					
	A	B	C	D	E	SEM

Crude protein	11.50[b]	13.00[ab]	11.95[b]	14.08[a]	11.84[b]	1.52
Temperature (°C)	26.00	26.75	26.00	26.50	25.75	0.41
pH	3.70	3.82	3.81	3.78	3.83	0.05
Moisture (%)	63.90	65.34	64.55	67.28	67.36	1.58
Dry Matter (%)	36.60	34.64	35.45	32.71	32.64	1.73

[ab] means on the same row with different superscripts are significantly (P<0.05) different.
A= 100% Millet Stover only, B = 80% Millet Stover + 20% Groundnut Stover
C = 80% Millet Stover + 20% Bambaranut Stover, D = 80% Millet Stover + 20% Soybean Stover, E =80% Millet Stover + 20%Cajanus cajan Stover

Presented in Table 3 is the acceptability study of the ensiled millet stover with or without millet stover that WAD goat had free choice on. Based on their CoP values of more than unity, Treatments A and C were preferred compared to Treatments B, D and E. However.with time the animal will get use to other silages.

Table 3: Dry matter intake and coefficient preference of WAD goat fed ensiled millet stover

Silage type	Mean daily consumption of animals (g)/DM	Coefficient of preference
A	353.37	1.080
B	328.32	0.999
C	335.48	1.022
D	317.92	0.968
E	307.59	0.936

A = 100% Millet Stover only, B = 80% Millet Stover + 20% Groundnut Stover
C = 80% Millet Stover + 20% Bambaranut Stover, D = 80% Millet Stover + 20% Soybean Stover, E =80% Millet Stover + 20%Cajanus cajan Stover

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