Chemical Composition of Ensiled Maize Husk Treated with Urea and Molasses at Graded Levels

Gofwan Philip Gomwalk
Department of Animal Health Technology,
Plateau State College of Agriculture Garkawa
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Abstract
The experiment was designed to study the chemical composition of Ensiled maize husk treated with urea and molasses at graded levels. Four hundred (400) g of urea was dissolved in 1litre of water, supplemented with molasses at 0, 0, 10, 20 and 3ml (T1, T2, T3, T4 andT5) respectively. Seven treatments were developed which was ensiled for 21days in triplicate in a completely randomized design. Plastic container was used as silo and polythene was used to seal the container. The result of the chemical composition of the Ensiled maize husk showed that there was significant (P< 0.05) difference in all the parameter measured. Treatment 3 (4% urea and 20ml of molasses) recorded the higher value for dry matter, organic matter, crude protein, crude fibre. The lowest value was recorded in T5 (4% urea and 30ml molasses) for dry matter, organic matter, crude fibre and fibre fractions. The results in this study show that, treatment 3 with 4% urea and 20ml of molasses had a sound chemical composition. However, it is recommended to use T3 as basal diet for ruminants.

Introduction

The economic point of view and sustainable environmental concerns encourage investigating the possibility of using the crop residue as animal feed. Numerous of agro-by-products are allowed waste in many parts of Nigeria (Sudik *et al*., 2024b; Sudik, 2019). Efforts to enhance their utilization should be prioritized by animal nutritionists (Kolo *et al*., 2022). During the dry seasons the only feed available for grazing cattle is mature grass, with a low nutritive value of which is often further reduced by frosts. This type of feed is low in protein, net energy and phosphate. In some areas either a phosphate lick or molasses is fed as the sole supplement. Such supplements ·would seem to be of limited value where animals are grazing standing hay which has a protein content insufficient to replace even the metabolic faecal nitrogen loss (Ajiji *et al*., 2022). Maize husk is an important crop widely grown in Nigeria. After harvesting, the cobs are separated from the husk which is discarded as waste or buried to provide organic matter to the soil (Chenost *et al*., 1991). The husks constitute 10-15% of the total maize stover (Heuzé *et al*., 2019; Lizotte *et al*., 2015). Maize husk is abundantly available crop residues in most tropical and sub-tropical countries and commonly used as a diet for ruminants, although it is low crude protein (CP) content and fermented poorly in the rumen. Supplementation of nitrogenous substrates to maize straw is reported to recover its CP deficiency and improve its digestibility through providing necessary ammonia (NH3) for rumen microbial activities which is essential for better rumen fermentation characteristics (Wanapat *et al*., 2009). It was also reported that supplementation of nitrogen (N) sources in combination with energy substrates to straw diets improved feed intake, digestive function along with ruminal characteristics in ruminants through influencing rumen microbial growth (Wu *et al*., 2005). In most of the tropical countries it is a common practice to use urea and molasses as the sources of N and soluble carbohydrate, which provide required NH3 and energy

substrates for rumen microbial activities (Zinn *et al*., 2003). Therefore, the present study was designed to determine the chemical composition of ensiled maize husk treated with urea and molasses at graded levels

Materials and methods

The dried maize husk was use for silage; foreign bodies such as stones, polythene, metals were removed from the maize husk collected. The maize husk was ensiled with urea at 400g with graded level of molasses at 0, 0, 10, 20, 30, 40 and 50ml as T0, T1, T2, T3, T4, T5 and T6 respectively which is shown in Table: 1 below. The samples were ensiled for 21days in triplicate. One litre of water with urea 4% and graded level of molasses in litre were used for formulation or calibration of ensilage. Plastic container was used as silo and polythene was use to seal the container. At the expiration of ensiling period, the silos were opened and the top was scooped off to avoid contamination with partially ensiled materials. The sub samples were taken from the silo and oven dried at 60°C for 48hrs for analysis.

Five (5) dietary treatments were formulated, T1 was ensiled with only water, while the other treatment was ensiled with urea at 4% as T2, T3, T4 and T5 was added 0, 10, 20, 30ml molasses respectively (Table 1).

Table 1: Composition of ensiled materials

Treatments	%Urea	Maize husk (kg)	Molasses (ml)
1	0	1	0
2	4	1	0
3	4	1	10
4	4	1	20
5	4	1	30

The experimental design used is completely randomized design, in which each treatment was replicated three times. Chemical Analysis Proximate analysis and chemical analysis groups together a variety of substances which have common chemical characteristics e.g protein. It does not analyze for individual amino acids but a group of nitrogen compounds called crude protein. The proximate composition of samples of experimental silage was determined using methods described by the Association of Official Analytical Chemists (AOAC, 1995) and fibre fraction was also determined according to (Van Soest *et al*., 1991) as described by Sudik *et al*. (2024a) at Central Laboratory, Federal University, Gashua, Nigeria. The obtained data were subjected to one-way ANOVA, and significant differences between treatment means were determined using the Duncan's Multiple Range Test at a 5% level of significance ($P<0.05$)

Results and discuss

Table 2 shows the chemical composition of ensiled Maize husk with urea (4%) and molasses at graded levels of inclusion. Treating maize husk with urea and molasses significantly ($p<0.05$) affect the proximate components. Moisture content increased with increased molasses, 30% had the highest value and the 0% urea and 0% molasses had the least values. The 20% molasses had highest crude protein and neutral detergent fibre while 0% had least values in both whereas crude fibre, total ash and acid detergent fibre were highest in 0% urea and molasses. The present study has shown that crude protein content has increased with increasing addition of non-protein nitrogen

source (urea) except in 30% molasses. The highest value was obtained in 30% molasses while the lowest was observed in 0% Urea and 0% molasses. This finding supports Kolo *et al*., (2022). The crude fibre is the measure of the cellulose, hemicellulose and lignin content of forages (Kolo *et al*., 2022). The In this study, the crude fibre content was observed to be within the range of 8.17% and 13.07% reported by Kolo *et al*. (2022). Sudik (2024) stated that high fibre content increased removal of carcinogens, potential mutagens, steroids, bile acids and xenobiotics by binding or absorbing to dietary fibre components and be rapidly excreted; hence these diets will have health promoting benefits for the ruminants and non-ruminants.

Table 2: Chemical composition of ensiled Maize husk with urea (4%) and molasses at graded levels of inclusion

Nutrient (%)	T1 (0% urea and molasses)	T2 (4% urea and 0% molasses)	T3 (4% urea and 10% molasses)	T4 (4% urea and 20% molasses)	T5 (4% urea and 30% molasses)	SEM	p-value
Moisture	10.56^{c}	10.05^{c}	11.56^{b}	11.69^{b}	12.11^{a}	0.60	0.345
Crude protein	9.12^{d}	10.15^{c}	11.09^{b}	12.89^{a}	11.56^{b}	0.84	0.467
Crude fibre	13.92^{a}	13.29^{a}	12.35^{b}	12.40^{b}	13.01^{ab}	0.58	0.812
Total ash	9.47^{a}	8.71^{b}	8.58^{b}	7.96^{bc}	7.16^{c}	0.87	0.564
Neutral detergent fibre	34.66^{c}	34.15^{c}	36.55^{b}	37.28^{a}	36.74^{b}	1.19	0.368
Acid detergent fibre	25.46^{a}	24.19^{bc}	24.58^{b}	23.61^{c}	24.57^{b}	0.67	0.614

^{a,b,c}Means in the same row with different letters show significant differences ($p<0.05$) among dietary treatments

Conclusion

The study of chemical composition of ensiled maize husk showed that there was modifications in the chemical composition of the treated maize husk which has a better performance in the 20% molasses and could be used as alternative roughage feed for ruminants when other fibrous source are not available.

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