DETERMINATION OF FIBRE FRACTIONS OF GROUNDNUT SHELL FORTIFIED WITH MOLASSES AND NON-PROTEIN NITROGEN SOURCES

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ABSTRACT

The experiment was conducted at Nutrition/Biochemistry Laboratory, Department of Animal Production Technology, Audu Bako College of Agriculture, Dambatta to evaluate the fibre fractions of groundnut shell fortified with molasses and non-protein sources in in-vitro laboratory silos (946ml). There were four treatment viz: T_1 (100%GNS + 4% Urea), T_2 (100% GNS + 4% Urea + 10% molasses), T_3 (97% GNS + 3% PL) and T_4 (97%GNS + 10% molasses + 3% PL) ensiled for 21 days in the triplicate. At the expiration of the ensiling period, samples were taken for analysis. The results of fibre fractions showed that there is significant ($P<0.05$) differences in NDF and cellulose. It could be concluded that ensiling of groundnut shell with molasses and non-protein nitrogen sources improve the nutritive value of the ground nut shell. It is recommended that groundnut shell could be ensiled with molasses and 4% Urea + 10% molasses + 3% PL to improve the nutritive value of the ground nut shell.

Key words: Molasses, Silage, poultry litter, urea

DESCRIPTION OF PROBLEM

Nigerian ruminant industry is facing the problem of forage scarcity with high cost of feeds precipitated by inadequate supply of feed ingredients. This constraint has affected ruminant animal production negatively and created a wide gap between the demand and supply of animal protein in Nigeria [1]. Meanwhile, dry season has been reported to be a serious threat to sustainable ruminant production [2] and peaceful coexistence of pastoral nomads and host community which also threatens national security and sub-regional security [3]. The major limitation using crop residues as feed is deficiency in nutrients, low digestibility low palatability and high lingin content. However, there are many methods for improving the nutritive value of these by-products and these includes physical, chemical, physic-chemical and biological treatments [4]. 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 and utilization by animals [5].

MATERIALS AND METHODS

The study was conducted at the Nutrition/Biochemisry Laboratory of the Department of Animal Production Technology, Audu Bako college of Agriculture (ABCOA) Dambatta, Kano State, Nigeria.

Experimental materials

Groundnut shell (GNS) was sourced from groundnut processing point within the college campus and around Danmarke village of Makoda local Government of kano State. The collected groundnut shells were cleaned to remove all foreign objects such as polyethene, iron, stones and dust. Urea and molasses were purchased from Danmarke market. The cleaned groundnut shells were spread on a concrete floor and sun dried for the period of 3 days during dry season.

Ensiling procedure

The dried groundnut shell was crushed to make compaction easy according to [7]. It was then ensiled with urea and molasses in proportion of T_1 (100%GNS + 4% Urea), T_2 (100% GNS + 4% Urea + 10% molasses), T_3 (97% GNS + 3% PL) and T_4 (97%GNS + 10% molasses + 3% PL). Eighteen (18) bottles (946ml) were used as laboratory silos. The procedure of [8] was followed in which 1kg urea was dissolved in 15 litres of water and sprinkled on 25kg roughage. The samples were ensiled for 21 days in triplicates. Masking tape was used to further seal the bottles after filling with weighed materials and compress. At the expiration of the ensiling period, the laboratory silos were opened and the top most 5cm materials were scooped off to avoid contamination with partially ensiled material. The samples were taken from the silage and oven dried at 60^0C for 48 hours for chemical analysis [9].

Experimental Design and treatments

A completely randomized design (CRD) was used as outlined by [6]. There were four (4) treatments; T_1 (100%GNS + 4% Urea), T_2 (100% GNS + 4% Urea + 10% molasses), T_3 (97% GNS + 3% PL) and T_4 (97%GNS + 10% molasses + 3% PL).

Laboratory analysis (Chemical compositions)

Thoroughly mixed representative samples of the silage were analyzed for fiber fractions {neutral detergent fiber (NDF), acid detergent fiber (ADF) and acid detergent lignin (ADL)} by the procedure of [10]. Cellulose was calculated as ADF-ADL and hemicellulose as NDF-ADF [11]. The data collected were subjected to analysis of variance (ANOVA) using the general linear model (GLM) of SAS version 9.1[12]. Where significant differences were observed, Duncan Multiple Range Test (DMRT) was used to separate the means at 5% probability level [12].

RESULTS AND DISCUSSION

The results of fibre fractions of the ensiled groundnut shells fortified with non-protein sources and molasses was presented in Table 1. Significant ($P<0.05$) variations were observed between the parameters determined except ADF, ADL and hemicellulose. Treatment 2 had higher ($P<0.05$) NDF value (58.30%) similar to the value recorded for T_3 (56.03%), and lower in T_1 and T_4 which had similar ($P>0.05$) value. The cellulose value was significantly ($P<0.05$) higher in T_2 (19.15%), similar to the values recorded for T_3 and T_4, treatment T_1 had the lower value (15.10%) significantly ($P<0.05$).

The Acid detergent fibre (ADF) values obtained in the present study were in agreement with 22.84 – 31.56% reported by [13] for sugarcane waste ensiled with soybean meal residue and rumen digesta. The neutral detergent fibre values of the present study was higher than 48.5% reported by [14] for dried African grape leaf meal. The acid detergent lignin (ADL) value obtained in this study was higher than 8.96 – 11.16% reported by [15]. The variation might be attributed to difference in the silage procedure and or experimental materials. The cellulose and hemicellulose values obtained in the present study were lower 24.76 – 26.99% and 28.87 – 33.19%, respectively, reported by [16] for sugarcane waste ensiled with soybean meal residue and fore stomach digesta from camel. These discrepancies might be due to the variations in the experimental materials.

Table 1: Fibre fractions of the ensiled groundnut shells fortifed with non-protein nitrogen sources and molasses

Parameters	Treatments				SEM
	1	2	3	4	
Acid Detergent Fibre	30.19	30.55	30.03	31.27	0.743
Neutral Detergent Fibre	54.40^b	58.30^a	56.30^{ab}	54.29^b	0.856
Acid detergent lignin	15.09	11.40	13.75	14.35	1.784
Cellulose	15.10^b	19.15^a	16.28^{ab}	16.92^b	0.769
Hemicellulose	24.22	27.75	26.50	23.02	1.636

CONCLUSION AND APPLICATION

Ensiling of groundnut shell with non-protein nitrogen sources and molasses improved the nutritive value of the ground nut shell. It is recommended that silage of groundnut shell treated with non-protein nitrogen sources could be made for better nutritional value of the groundnut shell.

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