# PROXIMATE COMPOSITIONS OF GROUNDNUT SHELL FORTIFIED WITH MOLASSES AND NON-PROTEIN NITROGEN SOURCES

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## ABSTRACT

The experiment was conducted to evaluate the chemical composition of groundnut shell fortified with molasses and non-protein sources in in-vitro laboratory silos (946ml). There were four(4) 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 triplicate. At the expiration of the ensiling period, samples were taken for analysis. The results of proximate compositions showed that there were no significant ($P>0.03$) differences in the parameters among the treatments except EE. However, the results of fibre fractions showed that there is significant ($P<0.05$) differences only in NDF and cellulose. It could be concluded that ensiling of groundnut shell with molasses and non-protein nitrogen sources to 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 and 3% PL to improve the nutritive value of the ground nut shell.

**Key words:** Ensilage, Ground nut, Nitrogen, urea

## DESCRIPTION OF PROBLEM

The main feed resources for ruminant animals are pastures, crop residues and other agro-industrial by-products. In the dry season and post-harvest periods, these feed resources become the main sources of energy for ruminants when poor quality forages prevail [1]. The quantity and quality of available feedstuffs are major factors influencing productivity of ruminants in many parts of the world, especially regions with high population of livestock [2]. In Africa where small farmers predominate, treatment with a urea solution followed by a period of storage under ensiled conditions may be more convenient. Treatment of crop residues with urea has three primary interrelated benefits, namely increased nitrogen concentration, feed intake and nutrient digestibility [2]. Groundnut shells which are agricultural by-products are one of the most available biomass resources in the northern part of Nigeria [3]. Molasses has several important roles in livestock feeding, due to the nutritive, appetizing and physical properties of its sugar content. Molasses is difficult to handle because of its viscosity: it is rarely fed directly in its liquid form but instead mixed with other ingredients [4]. Poultry manure can be used like any other protein concentrate. When dried poultry manure ration is maintained at a normal energy level, the weight gains or milk productions are satisfactory [5]. Improving fibre utilization following treatment with urea suggests that scope exists to derive more nutrients from fibre by microbial fermentation in the rumen. However, potentially degradable fibre may be transported from the rumen before fermentation could be complete [5]. Therefore, the study aim to determine proximate compositions of groundnut shell fortified with molasses and non-protein nitrogen sources.

## MATERIALS AND METHODS

The study was conducted at the Nutrition/Biochemisry Laboratory of the Department of Animal Production Technology

of 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 open market. The cleaned groundnut shells were spread on a concrete floor and sun dried for the period of 3 days during dry season.

**Experimental Design and treatments**

A complete 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).

**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 compressed. 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 $60^0$C for 48 hours for chemical analysis [9].

**Laboratory analysis (Chemical compositions)**

Thoroughly mixed representative samples of the silage were analyzed for proximate composition (DM, CP, CF, EE, NFE and ash) according to [9]. Metabolizable energy (ME) was calculated using equation ME kcal/kg = 37(CP) + 81.1(EE) + 35.5(NFE) [10]. Organic matter (OM) was obtained by the differences between dry matter and ash. The data collected were subjected to analysis of variance (ANOVA) using the general linear model (GLM) of SAS version 9.1 [11]. Where significant differences were observed, Duncan Multiple Range Test (DMRT) was used to separate the means [12]. The differences between the means were considered at 5% probability level ($P<0.05$).

## RESULTS AND DISCUSSION

The result of the proximate compositions of the ensiled groundnut shells enhanced with non-protein sources and molasses is presented in Table 1. The result indicated that there is no significant ($P> 0.05$) difference in the parameters evaluated except EE. Though there is no significant ($P>0.05$) difference between the treatments terms of CP, but $T_2$ had the highest value (15.13%) while $T_4$ (14.05%) had the lowest value numerically. The EE value was significantly ($P<0.05$) higher in $T_4$ (1.22%) similar to the value obtained in $T_1$ and $T_3$, treatment 2 had the lower value (1.00%) significantly ($P<0.05$).

The dry matter values of the present study were within the range of 90.02 – 94.34% reported by [13] for sugarcane waste ensiled with soybean meal residue and rumen digesta. The CP values obtained in this study was higher than 13.47 – 13.83% reported by [14] this is probably due to the differences in the experimental materials used. However, treatment with urea and molasses in the present study had higher CP values this is probably because of the contribution of the nitrogen present in the urea. The EE and ash value of the present study were lower than 1.88% for EE and 10.25% for ash reported by [15] for groundnut hull treated with urea and molasses. This is probably due to the variation in the ensiling procedure and materials. The NFE values obtained in this study was lower than 69.27 – 81.92% reported by [16] The ME and OM values where higher in the treatment with poultry litter only compared to other treatment this is probably due to the presence of microorganism in the litter. The metabolizable energy of the present study was within the range of 2,105.87 – 2,479.00 kcal/kg

obtained by [13] but lower than 2,745.87 – 2,821.69 kcal/kg reported by [16] for sugarcane waste ensiled with soya beans meal residue and rumen digesta. This is probably due to differences in the experimental materials. Organic matter values obtained in the study is in line with 86.97-89.69% reported by [17].

**Table 1: Proximate compositions of the ensiled of the ensiled groundnut shells enhanced with non-protein nitrogen sources and molasses.**

| Parameters (%) | Treatments | | | | SEM |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | |
| Dry Matter | 94.75 | 92.83 | 94.75 | 93.70 | 1.40 |
| Crude Protein | 14.59 | 15.13 | 15.00 | 14.05 | 2.29 |
| Crude Fibre | 34.50 | 33.83 | 33.64 | 32.81 | 2.10 |
| Ether Extract | $1.17^{ab}$ | $1.00^{b}$ | $1.05^{ab}$ | $1.22^{a}$ | 0.05 |
| Ash | 7.17 | 7.48 | 7.08 | 6.92 | 0.27 |
| Nitrogen Free Extract | 42.58 | 42.54 | 42.70 | 44.98 | 2.07 |
| Organic Matter | 87.57 | 85.35 | 87.68 | 86.78 | 1.66 |
| Metabolizable energy (kcal/kg) | 2146.13 | 2149.07 | 2164.68 | 2213.93 | 57.53 |

## CONCLUSION AND APPLICATION

Ensiling of groundnut shell with non-protein nitrogen sources and molasses improved the nutritive value of the ground nut shell. Treatment with combination of 100% GNS + 4% Urea + 10% molasses produced a silage with highest CP and therefore recommended.

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