

# PROXIMATE COMPOSITION OF ENSILED CAMEL'S FOOT PODS WITH RICE STRAWS AT GRADED LEVELS FOR RUMINANT FEEDING

Muftau, M. A. and Anakuka, D

<sup>1</sup>Department of Animal Science, Faculty of Agriculture, Kebbi State University of Science and Technology, Aliero, Kebbi State, Nigeria  
E-mail: [mamuftau@gmail.com](mailto:mamuftau@gmail.com)

## ABSTRACT

An experiment was conducted to determine the chemical composition of ensiled rice straw with different levels of camel foot pod meal. Fifteen glass bottles silo of 20 cl size were used for the ensiling process. The rice straws were properly chopped and mixed with camel pod meal at inclusion levels of 80:20, 70:30, 60:40 and 50:50 representing treatments B, C, D and E respectively and 100:00 (control) as treatment A (rice straw hay) in a completely randomized design. Each mixture was replicated three times and properly ensiled under anaerobic condition for twenty-one days except for the hay. At the end of the experiment, the samples were taken from each mixture for pH determination and proximate analysis. The results showed that the chemical composition of the ensiled materials varied significantly ( $p < 0.05$ ) between the treatment groups. Treatment E had the highest CP (7.64%) and the lowest CF (21.50%), ADF (41.93%) and ADL (22.00%) while treatments B and D had the highest ash content each (27.00%) with treatment D having the lowest pH value of 3.0 among the resultant silage. However the DM (96.50%), CF (35%), ADF (46.91%) and ADL (27.00%) were highest in treatment A than the ensiled treatments. The results suggested that ensiling rice straw with graded levels of camel pods meal up 50:50 proportion will improve the feeding value of rice straws which can serves as ruminant feed during forage scarcity.

**Keywords:** Camel foot pod, proximate composition, rice straw, silage.

## INTRODUCTION

Livestock production in many developing countries is largely limited by unavailability and high cost of feed. Low quality feeds are considered to be major constraints affecting the productivity of farm animals in the tropics. The feed shortage is more persistent in the dry season when natural pastures mature and become highly fibrous with low crude protein content (Oni *et al.*, 2010). The low availability of quality feeds especially during the dry season makes it necessary for the use of unconventional feed resources (Fajemisin *et al.*, 2018). The availability of green forage is mostly seasonal only in dry season, when plant growth is high. The seasonal scarcity can considerably be reduced by conserving the surplus forage during high fodder availability period. Silage and hay making has great potentials to solving the seasonal shortage of feeds for ruminants in Nigeria by preserving excess forage produced during the wet season for use at the dry season (Olorunnisomo and Adesina, 2014). The problem of low quality feeds and forage scarcity in the dry season can be reduced drastically by utilizing the mixture of leguminous browse plant part (pods) from *Piliostigma reticulatum* commonly known as camel's foot and crop residues like rice straws (Olorunnisomo and Fayemi, 2012). Mixture of browse pods with crop residue such as rice straw could improve the feeding value of the latter. The crude protein of browse pods usually exceed that of grasses two to four folds especially in the dry season when the content of grasses dropped to 3% or less. Crude fiber content of most browse plants may be high but not more than the dry season grass (Nouhoun and Eva, 2013). The rice straws is usually considered and treated as valueless waste and are often burnt, added to the soil as soil conditioner and sometimes left in the farms to rot. They are also used as livestock beddings, basket making and as fodder despite its low nutritive value. Although silage technology has been available for years, but their usage in the traditional ruminant production has not been popular unlike hay making (Obua, 2018). Ensiling is a practice reported to enhance the feeding quality of crop residues and other potential plant feedstuffs by improving the nutritive value, acceptability, palatability and utilization of feed by animal (Shahabodin, 2014). The study is therefore to evaluate the nutritional quality of rice straws ensiled with camel foot pods meal at graded levels as a potential feed for ruminant animals.

## MATERIALS AND METHOD

### Experimental site

The experiment was conducted in the Animal Science Department Laboratory of Kebbi State University of Science and Technology Aliero. The area lies at Latitude 12°: 16", 42°N and Longitude 7°, 6°E of the Equator. The ambient temperature ranges from 26°C to 42°C with annual rainfall of about 500 – 850mm with a peak in

August (KARDA, 2017).

### Sample collection and processing

Rice straws were collected from local farmers in the study area and chopped into small particle size prior to treatment. Similarly, mature camel foot pods were picked around the University orchard and were air dried for 3 days and later crushed to powder form with mortar and pestle. Known quantities of chopped rice straws and camel foot pods meal were mixed for ensiling process.

### Ensiling procedure

The rice straw for silage was packed in polythene bags to make compaction easier (Ogunlolu *et al.*, 2010). The chopped rice straws were ensiled with *Piliostigma reticulatum* (camel foot) pods in the following proportion (%): A 100:00; B 80:20; C 70:30; D 60:40 and E 50:50 tagged as treatments A, B, C, D and E respectively. The samples were replicated three times in a Completely Randomized Design (CRD) and 50ml of water were sprinkled into each replicate. Fifteen glass bottles were used as laboratory silos (Ogunlolu *et al.*, 2010) and ensiled for 21 days in triplicates; masking tape was used to further seal the glass bottles after filling with weighed materials and compressed. At the expiration of the ensiling period, the glass bottle were open and a forceps was used to scoop the resultant silage from the bottles. Thereafter, pH was determined by putting 50g of a sample in water using digital pH meter and sub samples from each replicate were collected, oven dried at 650C for 48 hours for proximate analysis. Crude protein, ether extracts (EE), Ash, Crude Fibre (CF), Acid detergent lignin (ADL) and ADF were measured according to the procedure described by AOAC (2015).

### Statistical analysis

All data collected were analysed and subjected to analysis of variance using General Linear Model (GLM) of the SPSS (2015). Duncan Multiple Range Test was used to determine the significant differences among the treatment means at 5% probability level.

## RESULTS AND DISCUSSION

The results of the pH properties of the silage are shown in Table 1. Ensiling rice straws with camel foot pods meal increased the pH of the resultant silage across the treatments. The highest pH value was recorded in the control treatment (5.85) while the least was recorded in treatment D (3.05). The pH values of the resultant silage were higher than the values obtained by Lamidi and Akhighe (2018) when guinea grass was ensiled with varying proportion of sweet potato peels.

Table 1: pH properties of silage

| Treatments (%) | pH   |
|----------------|------|
| A (100:00)     | 5.85 |
| B (80:20)      | 3.35 |
| C (70:30)      | 3.63 |
| D (60:40)      | 3.05 |
| E (50:50)      | 4.04 |

Ensiled rice straw with camel foot pod meal had significant ( $p < 0.05$ ) effect on the proximate composition of the resultant silage with the exception of crude fiber (CF). The crude protein (CP) content of the ensiled rice straw in TD had the highest value (6.81%) while the lowest CP content was obtained in the control treatment (4.20%). The CP increased as the camel foot pods meal increases in the ensiled rice straws. The higher CP value among the ensiled treatments in this study was in agreement with the findings of Jolaosho (2013) when guinea grass, cassava peels, brewery and pineapple wastes were ensiled at different proportions.

The CF of TC (30.00%) and TD (30.50%) were lower than the control treatment (37.50%). The CF content follows a definite pattern. The CF values obtained in this study were similar with those obtained by Ajayi and Joseph (2019) when cassava leaves were ensiled with maize stover.

The NFC were higher (57.30%) in the control treatments ( $P < 0.05$ ) while the least was obtained in treatment D (48.69%). This contradicts the findings of Okukenu *et al.* (2015) who reported an increased in the carbohydrate content of ensiled *Panicum maximum* with *Centrosema mole* with longer period of ensiling.

The ADF and ADL were highest in the control treatment (46.91% and 27.00%) respectively than the ensiled treatments. The lowest fibre fractions were obtained in TE. The reduction in ADF and ADL contents of the silage was in line with the findings of Akinola (2008), which might be attributed to degradation of cell wall by the activity of bacterial enzymes and production of organic acids during fermentation (Yahaya *et al.*, 2022). The higher the ADF, the less digestible the feed and less energy it would contain (McDonald *et al.*, 2003).

The dry matter (DM) of the control treatment was higher ( $P<0.05$ ) than other treatments; although DM value among the resultant silage was higher (96.00%) in TC than other treatments. The DM increased as the camel foot pods meal increases in the ensiled rice straws. The results were similar to the findings of Okukenu *et al.* (2015) who reported higher DM in *Panicum maximum* ensiled with *Centrosema mole* for a period of 30 days. The lipid content of the ensiled rice straw with camel foot pod meal were higher ( $P<0.05$ ) than the control treatment with the highest value (27%) each obtained in TB and TD. Ensiling rice straw with camel foot pod meal increased the ash content of the resultant silage. The values obtained in the study were lower than that of Lamidi and Akhigbe (2018). The lipid content increased as the level of camel foot pods meal increases in the ensiled rice straws. The results for the lipid content obtained in this study was higher than those reported by Muhammad and Yahaya (2009) when rice straw was treated with poultry droppings at varying proportion.

Table 2: Proximate composition of rice straw ensiled with camel foot pod meal

| Treatments     | TA(100:00)         | TB(80:20)           | TC(70:30)          | TD(60:40)           | TE(50:50)           | SEM   |
|----------------|--------------------|---------------------|--------------------|---------------------|---------------------|-------|
| Parameters (%) |                    |                     |                    |                     |                     |       |
| CP             | 4.20 <sup>e</sup>  | 4.73 <sup>b</sup>   | 5.55 <sup>d</sup>  | 6.81 <sup>a</sup>   | 7.64 <sup>c</sup>   | 0.006 |
| CF             | 35.50              | 30.50               | 30.00              | 25.00               | 21.50               | 1.362 |
| NFC            | 57.30 <sup>a</sup> | 49.27 <sup>d</sup>  | 50.95 <sup>b</sup> | 48.69 <sup>e</sup>  | 50.86 <sup>c</sup>  | 0.006 |
| Ash            | 24.00 <sup>c</sup> | 27.00 <sup>a</sup>  | 26.00 <sup>b</sup> | 27.00 <sup>a</sup>  | 26.50 <sup>ab</sup> | 0.165 |
| ADF            | 46.91 <sup>a</sup> | 45.00 <sup>b</sup>  | 43.00 <sup>c</sup> | 44.00 <sup>ab</sup> | 41.93 <sup>d</sup>  | 0.099 |
| ADL            | 27.00 <sup>a</sup> | 24.00 <sup>ab</sup> | 25.00 <sup>b</sup> | 22.00 <sup>c</sup>  | 22.00 <sup>c</sup>  | 0.115 |
| DM             | 96.50 <sup>a</sup> | 95.50 <sup>ab</sup> | 96.00 <sup>a</sup> | 95.50 <sup>ab</sup> | 95.00 <sup>b</sup>  | 0.263 |
| Lipid          | 1.50 <sup>b</sup>  | 4.00 <sup>a</sup>   | 3.50 <sup>a</sup>  | 4.00 <sup>a</sup>   | 4.00 <sup>a</sup>   | 0.203 |

a,b,c,d,e means on the same row with different superscripts are significantly ( $P<0.05$ ) different

ADF: Acid detergent fibre; ADL: Acid detergent lignin; CP: Crude Protein; CF: Crude Fiber; NFC: Non Fiber Carbohydrate; DM: Dry Matter

## CONCLUSION

Ensiling rice straws with camel foot pods meal indicated an improvement in the nutritive value of rice straws. The results show that the chemical composition of the ensiled materials varied significantly ( $P<0.05$ ) between the treatment groups; with TE and TB having the highest value of CP (7.64%), and ash (27.00%) respectively with TE having the lowest crude fiber (21.50%). Higher crude protein with lower levels in pH and fiber fractions among the resultant silage are indicative of high nutritional quality in ensiled rice straws with camel foot pods meal for feeding ruminants during feed shortage.

## REFERENCES

- Ajayi, M. O. and Joseph, E. (2019). Characteristics of ensiled cassava leaves and maize stover as dry season feed for ruminants. *Nigerian Journal of Animal production*, 46 (4): 273-281.
- Akinola, J. O. (2008). Effect of urea treated maize stover based complete diet on intake and growth rate of Friesian x Bunaji bulls. Proceedings of 13<sup>th</sup> Annual Conference of ASAN, at ABU Zaria, Nigeria. 19<sup>th</sup> – 24<sup>th</sup> September 2008.
- AOAC (2015). The official methods of analysis. Association of Official Analytical Chemists. 16<sup>th</sup> Edition. Washington DC.
- Fajemisin, A. N., Ibhaze, G. A., Oluwaloyo, O. E. and Omotoso, O. B. (2018). Dietary effect of *Pleurotus pulmonaris* treated cocoa bean shell on fibre fractions utilisation by the West African Dwarf goats. *Nigerian Journal of Animal production*, 45 (5): 169-175.
- Jolaosho, A. O. (2013). Nutritional quality enhancement of sugarcane waste with soya bean residues. Proceedings of the 18<sup>th</sup> Annual Conference of Animal Science Association of Nigeria, 8-12<sup>th</sup> September. Abuja, Nigeria.
- KARDA (2017). Kebbi Agricultural and Rural Development Authority: Annual agricultural production survey report.
- Lamidi, A. A. and Akhigbe, J. (2018). Quality of ensiled Guinea grass (*Panicum maximum*) at varying proportions with sweet potato peels for ruminant production in Niger Delta, Nigeria. *Nigerian Journal of Animal production*, 45 (5): 184-191.

- McDonald, P.; Edward, R.A.; Greenhalgh, J.F.D. and Morgan, C.A. (2003). Animal Nutrition, 6<sup>th</sup> Edition. Pretence Hall.
- Muhammad and Yahaya. (2009). Nutritive value of rice straw treated with poultry litter. Proceedings of the 31<sup>st</sup> Annual Conference of Nigeria Society for Animal production (NSAP). Bayero University Kano.
- Nouhoun, Z., Luc, H. D and Eva, S. (2013). Contribution of browse to ruminant nutrition across three agro-ecological zones of Burkina Faso. *Journal of Arid Environments* 95 (2013) 55- 64.
- Obua, B.E. (2018). Forage conservation in Nigeria. Concave Publications, Owerri, Nigeria.
- Ogunlolu, B. T., Jolaosho, A. O., Akinola, T. O. and Aniwe, P. O. (2010). Effects of length of storage and moisture of Cassava peels, pineapple residues and Guinea grass on mineral content of silage. Proceedings of the 35<sup>th</sup> Annual Conference of Nigeria Society for Animal production (NSAP), 14<sup>th</sup>-17<sup>th</sup> March, 2010, University of Ibadan. Pp. 489-490.
- Okukenu, O. A., Ogunrombi, O. A. and Onifade, O. S. (2015). Effect of forage proportion on the proximate and fibre composition of *Panicum maximum* and *Centrosema mole* silage. Proceedings of the 1<sup>st</sup> Biannual Conference of SOGREDEEN. Held at Federal University of Agriculture, Abeokuta, Ogun State, Nigeria. Pp. 23-25.
- Olorunnisomo, O.A. and Adesina, M.A. (2014). Silage characteristics, nutritive value and preference of zebu cows for moringa leaves ensiled with different levels of cassava peels. *Journal of Applied Agricultural Research*, 6(1): 191-196.
- Olorunnisomo, O.A. and Fayemi, O.H. (2012). Quality and preference of zebu heifers for legume and elephant grass silages with cassava peels. *Livestock research for rural development*. Vol. 24 Article 168. <http://www.ird/jrrd24/9/2016>.
- Oni, A.O., Arigbede, M.O.; Oni, O.O.; Onwuk, C.F.I.; Anele, U.Y.; Oduguwa, B.O. and Yusuf, K.O. (2010). Effect of feeding different levels of *Manihot esculenta* based concentrates with *Panicum maximum* basal diet on the performance of growing west African dwarf goats. *Livestock Science*, 129 (1-3).
- Shahabodin (2014). Non-conventional feedstuffs in the nutrition of farm animals. Elsevier Science Publishing Company Inc.
- SPSS (2015). Statistically Package for Social Sciences. Inc. Chicago, IL.
- Yahaya, Y. A., Sadiq, M. S. and Muhammad, I. R. (2022). Effect of Ensiled or Un-ensiled maize cob treated with Non-protein Nitrogen and soya bean meal on growth of Yankasa sheep. Proceedings of the 47<sup>th</sup> Annual Conference of Nigeria Society for Animal production (NSAP), University of Jos.