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Nutritional Analysis of Sugarcane Waste Ensiled with Different Levels of Soya Bean Milk Residue

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Abstract

An experiment was conducted to determine the chemical composition of sugarcane waste with different levels of soybean meal residue. Four silo pits measuring 1 m × 1 m × 2 m as T₁, T₂, T₃ and T₄ were used. The sugarcane waste was properly mixed with the soya bean milk residue at inclusion levels of 0kg as the control, 4kg, 8kg and 12kg respectively in a complete randomized design. Each mixture was properly ensiled under anaerobic condition for thirty (30) days. At the end of the experiment, the temperatures of the ensiled materials were measured and samples were taken from each mixture for proximate analysis. The result showed that the chemical composition of the ensiled materials varied significantly ($p < 0.01$) between the treatment groups. Treatment 1 had the highest value of dry matter (DM) and crude fibre (CF), treatment 4 had the highest value of crude protein, extract (EE) and ash, while treatment 2 recorded the highest N.F.E. The result revealed that ensiling sugarcane waste with soybean milk residue at different levels improved the nutritional level of sugarcane waste for feeding livestock during feed shortage.

Key words: Ensile, soya-bean, waste, ruminant and sugarcane

Introduction

Ruminant production in many developing countries is largely limited by unavailability and high cost of feeds. Low quality feeds are considered to be major constraints hampering productivity of farm animals. The unavailability of feed is more persistent in dry season when natural pastures mature and become highly fibrous and low in crude protein content (Oni *et al.*, 2010). Non – conventional feeds offer the best alternative in our environment for feed cost and therefore a reduction in the cost of meat and other animal products (Finangwai *et al.*, 2008). Sugarcane scraping is by scraping the outer part of the stem with knife to remove the bark on the stem that affords protection to the underlying cells. The scrapings consist of wax, pigments and fibrous materials of the rind and a small quantity of the underlying parenchyma cells. After scraping, the waste is left to litter both rural and urban settlements constituting environmental pollution. Livestock such as cattle, sheep, goats, scavenge this residue. Possible uses of the scrapings include feeds for livestock and fuel for cooking, as a mulching material for lands and when decayed could constitute a source of manure for soil. The proximate and energy composition of sugarcane waste indicates that dry matter is about 87.6%, crude protein 3.2%, crude fibre 12.7%, ether extract 2.8%, ash 12.8%, NFE 77.1% and gross energy 2.84 Mcal/kg (Alu, 2015).

Soybean meal is the most important protein source used to feed animals, it represents two-thirds of the total world output of protein feedstuff, including all other major oil meals and fish meal (Oil world 2010). Soybean meal residue is a by-product of soya bean after it has been processed to soya cheese or milk. It is used in feeding animals and is readily available and cheap throughout the year. Ensiling is a feed processing technique reported to enhance the feeding quality of agro-industrial by-products and other potential plants feedstuff by reducing level of toxicants, improving the nutrient value, acceptability of feed and utilization of animals (Ashiri *et al.*, 2013). It has been reported that unconventional feed could be conserved and their nutritional value improved by way of ensiling the feed materials which aimed at controlling microbial fermentation that could improve the feeding value of a feeding ingredient (Ashiru *et al.*, 2013).

This study was conducted to evaluate the nutrient quality of sugarcane waste ensiled with soybean meal residue at different levels as a potential feed for ruminant animals.

Material and Methods

The experiment was conducted at the Teaching and Research Farm of the Department of Animal Science and Range Management, Modibbo Adama University of Technology, Yola. It lies between latitude 9° – 14°N and longitude 12° – 38°E at an altitude of 158.8 m above sea level. Sugarcane waste was collected from processing/selling points within Yola, Adamawa State capital. Foreign materials such as polythene materials and stones were removed. Soybean milk residue was also obtained from various soybean milk processing points

within and around Yola. One conventional bag of sugarcane waste was chopped with a cutlass into 2-3cm length to ease mixing and compaction. Four different silo pits were dugged using digger and shovel measuring 3ft deep, 1m wide 2m length. Four different diets were prepared. T₁ (control) contained only sugarcane waste with no soya waste, T₂ received 4kg of soybean waste, T₃ received 8kg and 12kg to T₄. The two feeds were thoroughly mixed together into the silo pits lined with polythene sheet. It was trampled to remove air and covered with polythene sheets before returning the soil. After 30 days of ensiling, temperatures of the ensiled materials were determined as described by AOAC (2005) and samples were taken from each experimental diet for analysis using complete randomized design. The representative samples were analyzed for proximate composition (DM, CP, CF, EE, ASH and N.F.E.) according to AOAC(2005) procedures. The data generated were subjected to analysis of variance (ANOVA) using completely randomized design (CRD) according to Steel and Torrie(1980). Where significant differences between means are detected, least significant differences (LSD) was used to separate the means (Steel and Torrie, 1980).

Results and Discussion

The result of proximate analysis of ensiled sugarcane waste with different levels of soybean milk residue (SBMR) after 30 days of ensiling showed significant differences ($p < 0.05$) in the entire proximate component evaluated except dry matter content. The results indicate that CP, EE and ASH in T₄ is higher than in other groups and least values were obtained in the control group. The CF value is higher in the control and least in T₄. The values for ash are highest in T₂ and lowest in T₁. The high DM value may be attributed to the type of material used. The change in CP is similar to the result obtained by Ngele and Adebola (2006). The increase in CP obtained in this study is as a result of activities of micro-organisms which are known for bioconversion of carbohydrate into protein (Ashiru *et al.*, 2013). The result of ash content is much higher than the value of 1% as reported by Boda (1990), but lower than that of Maigandi *et al.* (2004). The temperature of the ensiled materials at the end of 30 days ensiling did not vary significantly ($p < 0.05$) between treatment groups as shown in Table 2. Report by McDonald(1996) showed that high temperature (42°C) during ensiling moist grass result in a shift from lactic to clostridia type of fermentation. Temperature range of 29.40°C to 45°C was reported as satisfactory silo temperature (Amodu and Abubakar, 2004).

Table 1: Temperature and proximate composition of ensiled sugarcane waste with different level of soya bean milk residue.

Parameters	T1 control	T2 SCW + 4kg SBMR	T3 SCW +8kg SBMR	T4 SCW +12kg SBMR	SEM
Dry matter (Dm)	83.25	82.10	81.90	81.90	0.0387
Crude protein (CP)	2.44 ^d	3.17 ^c	4.22 ^b	5.04 ^a	0.0689
Crude fibre (CF)	42.16 ^a	37.25 ^b	36.23 ^c	33.61 ^d	0.005
Ether Extract (EE)	3.76 ^d	4.53 ^c	4.92 ^b	5.61 ^a	0.005
Ash	2.01 ^d	2.75	2.16 ^b	3.64 ^a	0.0311
NFE	32.90 ^c	34.31 ^a	33.67 ^b	34.00	0.0289
Temperature	40.2	39.5	40.3	41.5	-----

a,b,c,d Mean with different superscripts within the same row are significantly different ($p < 0.05$)

Conclusion

Ensiling of sugarcane waste with different levels of soybean meal residue has significantly improved the nutritional quality of sugarcane waste. Therefore, it is recommended that soybean meal residue can be used ensiled with sugarcane waste to provide as a cheap source of protein for ruminants and in turn reduce cost of feeds and environmental pollution.

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