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Nutrient Intake by Yankasa Rams fed Sugarcane Waste (SCW) Silage

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Abstract
A feeding trial was conducted for twelve weeks (eighty four days) to assess the nutrients intake of Yankasa rams fed ensiled sugarcane waste (ESCW) enhanced with non – protein nitrogen sources (urea and poultry litter) and soybean meal. Sixteen (16) Yankasa rams (mean body weight 25kg±0.46; aged 8 to 15 months) were randomly allotted to the treatment groups viz; T_1 (100% SCW plus urea, unensiled) as control, T_2 (100% SCW plus urea, ensiled), T_3 (75%SCW plus 25% SBM, ensiled) and T_4 (75% SCW plus 25% PL, ensiled) in a randomised complete block design (RCBD). The experimental rams were offered basal diet along with clean drinking water and mineral salt lick *ad-libitum*, while a concentrate diet was formulated containing 16.26%CP and offered at 1.5% body weight to each of the experimental animals. The results obtained indicated non-significant (P>0.05) differences in the treatment means of all the nutrient intakes evaluated however, all the values obtained for T_3 and T_4 were numerically higher. The results of the study showed that ensilage of SCW with urea, PL, SBM enhanced nutrient intake. Therefore, SCW silage fortified with these materials could be used to feed small ruminants when feed resources are unlimited or low.

Keywords: Sugarcane waste, non-protein nitrogen,Yankasa sheep

Introduction

Sugarcane (*Saccharum officinarum*) is one of the tropical crops which have high biomass production (Brown *et al*., 1987; Alexander, 1988). The problem associated with feeding ruminant livestock adequately in quantity and quality during the dry season calls for an alternative means of feeding bulky materials after ensiling. Sugarcane waste is one of such unconventional feedstuffs which are produced in large quantities in the country and could therefore be used to feed livestock after ensiling with urea, poultry litter and soybean residue. The treatment will increase the nitrogen content of the diet and also improve digestibility and utilization of fibre by ruminant animals. In Nigeria, sugarcane is harvested mainly in the dry season which is a period of the year when there is lack of the roughage for ruminants. Sugarcane waste comprises the tops, peels, and baggase (obtained when the cane is chewed and the liquid swallowed). Small-scale farmers cannot afford the investments required to establish improved pastures and feed concentrate supplements to alleviate dry season growth checks (Smith *et al.,* 1991). Therefore, it has become imperative for ruminant nutritionists to investigate ways of utilizing feedstuffs that are of no nutritional benefits to man for feeding various classes of livestock.

This study therefore aimed at determining the effects of feeding ESCW on performance of sheep as dry season feed. The objective of this study was to find the nutrient intake by Yankasa sheep fed ESCW enhanced with urea, soybean meal and poultry litter.

Materials and Methods

Location and climate: The study was conducted at the Small Ruminant Unit of the Livestock Teaching and Research Farm, Department of Animal Science, Kano University of Science and Technology, Wudil, Kano State, located in the Sudan Savannah Region of Nigeria. The site is situated between longitude $8^0$25'E and latitude $12^0$58'N. The area has an average annual rainfall of 890mm with a peak in August with an average annual temperature range of 38 to 43^0C and relative humidity of 40 to 51% (Olofin *et al*., 2008).

Ensiling procedures and experimental materials: Sugarcane waste (SCW) was collected within and around the University campus, cleaned for extraneous materials like stones, iron and polythene. Soybean grains were obtained from the market, soaked in water overnight and dried by spreading on a concrete floor under sun light. After drying it was milled to produce soybean meal (SBM). Inorganic granulated urea was obtained from market while poultry litter (PL) was obtained from the deep litter poultry production system. The collected SCW, PL and SBM were sun-dried for a period of 3 days during dry season by thinly spreading on a concrete floor. The dried sugarcane wastes used for the silage were chopped into about 2-3cm length using forage chopper for better

compaction. The procedure of Roy and Rangnekar (2006) was followed in which 1kg urea was dissolved in 15 litres of water and sprinkled on 25kg sugarcane waste.

Four basal diets were formulated viz; T_1 (100% SCW plus urea, unensiled) as control, T_2 (100% SCW plus urea, ensiled), T_3 (75%SCW plus 25% SBM, ensiled) and T_4 (75% SCW plus 25% PL, ensiled). Diet T_1 (control diet) was air dried immediately after mixing with urea for 7 – 9 hours every day for about 7 days until it became crispy and bagged while diets T_2, T_3 and T_4 were ensiled for 21 days in a 300 liter capacity water reservoir as silo. Silos filled with weighed materials was covered with polythene and compressed by human trampling.Four hundred kilograms (400kg) of each diet were produced and bagged for the experiment. All basal diets were fed *ad-libitum* to all the experimental animals according to treatments while a concentrate diet with 16.26% CP was formulated and offered as supplement at 1.5% body weight to all the experimental animals.

Experimental animals and management: Sixteen (16) male Yankasa rams (mean body weight 25kg±0.46; aged 8 to 15 months) were purchased and treated for internal and external parasites with Ivomec® – super at 200µg/kg body weight subcutaneously before the start of the experiment. Rams were divided into 4 groups of 4 animals each in a Randomized Complete Block Design (RCBD) based on live weight (Steel and Torrie, 1980). Rams were housed in individual pens measuring 2m x 1m. The pens were cleaned and disinfected using Omo® detergent and Moriguard®. Water and salt lick were provided *ad libitum*.

Data collection: The experimental animals were weighed individually prior to the commencement of the experiment and subsequently at weekly intervals between 8:00am and 10:00am before being offered feed. Daily records of feed intake were taken throughout the period of the experiment by weighing feed offered and left over the following day. Nutrient intakes were calculated as the amount of nutrients in feed after chemical analysis multiplied by feed intake.The feeding trial lasted twelve weeks.

Chemical and data analysis: Representative samples of the ESCW and the concentrate supplement were chemically analyzed for dry matter (DM), crude protein (CP), crude fibre (CF), ether extract (EE), ash and nitrogen free extract (NFE) according to AOAC (2005) procedures. Data generated wereanalyzed using SAS Statistical package (SAS, 1989) and significant differences between the means were tested by least significant difference (Steel and Torrie, 1980). Differences between the means were considered significant at 5% probability level ($p<0.05$).

Results and Discussion

Table 1 shows the chemical composition of the experimental diets and the concentrate supplement. The DM content varied from 92.12% in T4 to 94.66% in T_1 while the concentrate diet has DM value of 92.83%. The CP and CF values were higher for T_3 (15.30%, 21.18%, respectively), the concentrate diet had 16.74% CP. Values for EE varied from 2.99% in T_2 to 3.57% in T_4 while ash content slightly increased from 8.17% in T4 to 9.04% in T_2. Highest NFE of 56.87% was obtained in T_3. The reported high DM values in the present study might be attributed to the type of ingredients used in the diets which were all dried materials and the DM content of the hay incorporated in the concentrate diet. The CP levels obtained in the present study for the roughage diets were higher than the 8% recommended by Norton (2003) for growing sheep and goats. Even if there were shortages in the roughage diets, the shortages would probably be compensated for by the CP (16.74%) in the concentrate diet.

Table 1: Chemical composition of the experimental diets

	Treatments				
Constituents (%)	T_1	T_2	T_3	T_4	Concentrate diet
DM	94.66	92.78	93.53	92.12	92.83
CP	14.96	14.06	15.30	15.28	16.74
CF	19.39	20.07	21.18	20.43	11.42
EE	3.03	2.99	3.08	3.57	4.05
Ash	8.78	9.04	8.66	8.17	9.81
NFE	52.98	53.75	56.87	53.41	58.56

T_1 (100%SCW+urea unensiled), T_2 (100%SCW+urea ensiled), T_3 (75%SCW+SBM ensiled), T_4 (75%SCW+PL ensiled)

Table 2 presents the results of nutrients intake by the experimental animals. Nutrients intake values were not significantly ($p>0.05$) different among all the treatment means however, values recorded for T_3 and T_4 were numerically higher. The intake of nutrients by the experimental animals was observed to follow the same pattern with the chemical composition of the diets and quality of intake. The highest values of nutrients intake recorded for animals on diet T_4 agreed with the findings of Fajemisin *et al.* (2008) that poultry droppings would enhance microbial fermentation and improve gut fill in sheep and goats. High DMI might be attributed to high soluble carbohydrate (NFE) and protein quality of the diets and the concentrate supplements. Khan *et al*. (2004) suggested that high CP intake might be due to the inclusion of poultry litter as a source of non-protein nitrogen that enhanced microbial activities in the rumen of animal. However, Ibeawuchi *et al.* (2002) indicated that nutrient intake in ruminants was influenced by palatability.

Table 2: Nutrient intakes by Yankasa rams fed ensiled sugarcane waste (ESCW) treated with urea, soybean meal (SBM) and poultry litter (PL)

Parameters (g/day)	Treatments				
	T_1	T_2	T_3	T_4	LSD
Roughage DMI	408.64	401.80	435.67	459.34	173.570
Concentrate DMI	349.91	352.06	375.13	379.74	98.718
Total DMI	758.60	753.90	810.80	839.10	246.29
Roughage CPI	64.58	60.89	71.27	76.19	27.919
Concentrate CPI	63.10	63.49	67.69	68.48	17.800
Total CPI	127.68	124.38	138.9	144.67	41.182
Roughage CFI	40.55	43.39	52.08	52.01	18.864
Concentrate CFI	43.05	43.31	46.18	46.72	12.142
Total CFI	83.60	86.70	98.26	98.72	27.880
Roughage EEI	13.08	12.95	14.35	17.80	6.113
Concentrate EEI	15.27	15.36	16.38	16.57	4.307
Total EEI	28.35	28.31	30.72	34.37	9.283
Roughage ashI	37.91	39.15	40.34	40.74	15.944
Concentrate ashI	36.96	37.20	39.66	40.13	10.437
Total ashI	74.86	76.35	80.00	80.86	23.798
Roughage NFEI	272.42	276.08	311.49	316.19	118.360
Concentrate NFEI	220.74	221.87	236.79	239.55	62.294
Total NFEI	493.16	497.95	548.27	555.73	163.630

T_1 (100%SCW+urea unensiled), T_2 (100%SCW+urea ensiled), T3 (75%SCW+SBM ensiled), T_4 (75%SCW+PL ensiled)

Beyond nutritional composition, animals tend to consume more palatable diets. The EE and ash intakes were low but within the range recommended by NRC (1985). The presence of these nutrients in the supplemented treatments could have modified the degree of utilization of these diets. It was reported that nutrients such as CP, CF and fat relate to plant palatability (Ibeawuchi *et al.,* 2002).The differences observed in the nutrient intakes in the present study between the treatments could be as a result of palatability of the materials used to treat and ensile the sugarcane waste. Furthermore, an improvement in intake could be attributed to positive influence of the materials used in the concentrate diet.

Conclusion and Recommendations

The results of the study clearly showed that ensilage of SCW with urea, PL, SBM enhanced nutrients intake. Therefore, SCW silage fortified with these materials could be used to feed small ruminants when feed resources are unlimited or low.

Acknowledgment

The authors wish to acknowledge Kano University of Science and Technology, Wudil for providing funds used to conduct the research.

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