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NITROGEN BALANCE OF GROWING RED SOKOTO BUCKS FED HAY FROM *Panicummaximum* AND *Digitaria smutsii* CONCENTRATES AT DIFFERENT RATIOS

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ABSTRACT

This study was conducted to evaluate the effects of feeding (50:50) Concentrate/Digitariasmutsii hay (C:D), 75:25 concentrate/Panicum maximum hay (C:P), (50:50) C:P and (25:75) C:P on the nitrogen balance of growing red Sokoto bucks for 7 days at the Teaching and Research farm, Department of Animal Science, Faculty of Agriculture, Ahmadu Bello University, Zaria. Twelve bucks weighing 10.5±0.5kg were used with 3 replicate bucks/treatment in a CRD. The nitrogen retained as % intake was significantly higher (P<0.05) in bucks fed C:P mixture (75:25). It was therefore concluded from this study that 75% concentrate mixed with 25% Panicum maximumhay recorded a better result in terms of nitrogen balance.

Key words: *Panicummaximum*, concentrate, nitrogen balance, red Sokoto bucks, retention.

INTRODUCTION

Paucity of feed is a major challenge of livestock production in Nigeria especially during the dry season of the year. This is due to the poor quality of the standing hay during this period of the year, leading to the poor nutrient intake and reduced productivity of these indigenous breedsin terms of meat, milk and other products depending on the purpose of production (*Adamuetal*., 2010; Odoemelam, *etal*., 2013; Tona *etal*., 2014). This often results in low intake of animal protein below the FAO recommendation.Livestock farmers in developing countries are faced with various challenges that led to a considerable fall in the production of certain livestock species like goats, cattle, swine and poultry (Tona et al., 2014; Anifowose *etal*., 2016).*Panicum maximum* is propagated by seed and tillers and considered to be the most valuable fodder plant in the area where it is found naturally, it has high seed and leaf production, high dry matter yield and very palatable to game and livestock Akinola (2018). This experiment was thus designed to determine the nitrogen intake and output in red Sokoto bucks when fed *Panicum maximum* and concentrates in ratios during the dry season in the northern guinea savanna of Nigeria.

MATERIALS AND METHODS

Management of experimental animals

Twelve growing red Sokoto bucks weighing 10.5 ± 0.5kg were used for this study were sourced from Kafur market in Kafur Local Government Area of Katsina State. Metabolic cages, feeding troughs and drinkers were thoroughly washed and disinfected before the arrival of the animals. The animals were treated against endo- and ecto-parasites, using *Ivomec* at recommended dose (0.5ml/10kg body weight) subcutaneously and treated against any sign of infection during the adjustment period of 14 days.

Experimental design, treatments and feeding

This experiment was conducted at the Teaching and Researchof the Department of Animal Science, Ahmadu Bello University, Zaria. A total number of 12 bucks were initially balanced for body weight and randomly allotted to four dietary treatments with three (3) animals per treatment,each buck served as a replicatein a Completely Randomized Design experiment (CRD). The experimental treatment 1 was the control where the bucks were fed with concentrate diets and *Digitaria smutsi* hay in (50:50) at 3% of body weight, treatment 2, 3

and 4 were fed concentrate and *Panicum maximum* at (75:25), (50:50), and (25:75), respectively at 3% of their body weight.

Nitrogen balance study

Twelve bucks were housed in individual metabolic cages ideal for easy collection of urine and faeces as described by Osuji *et al.,* (1993). Three bucks from each treatment were assigned to each of the experimental diet and fed once daily in the morning. The trial lasted for 21 days. The first 14 days was for acclimatization after which faecal and urinary collection followed in the subsequent 7 days (*Osuji et al*., 1993). Animals' feed intake was determined by subtracting the orts from the total feed supplied daily. Total faecal output from individual animals was collected daily in the morning, weighed, mixed thoroughly and 10% sub sample taken for dry matter determination. The total faecal samples collected over seven (7) days period was bulked and sub sampled for laboratory analysis.The total urine output for 24 hours was collected from individual animals for a period of 7 days. This was done by using graduated plastic containers and 10ml of 0.1N H_2SO_4 was introduced to trap ammonia. Ten percent of the daily urine output was taken from each buck and the total was bulked and stored in a freezer at 0^0C till needed for analysis.Urine was analyzed for urinary nitrogen and crude protein using kjedahl procedure AOAC (2005).

$$\text{The Biological Value} = \frac{\text{Nitrogen Intake} - (\text{Urinary Nitrogen} + \text{Feacal Nitrogen})}{\text{Nitrogen Intake} - \text{Feacal Nitrogen}} \times \frac{100}{1}$$

Statistical Analysis and Model

Data collected on daily feed intake,Nitrogen retention was analyzed by ANOVA using General Linear Model Procedure of SAS, (2002). Sigfnificant ($P<0.05$) differences among treatment means were separated using Duncan Multiple Range Test (DMRT) of the same statistical package.

RESULTS

Table 1: Chemical Composition and Metabolizable energy of Experimental Diets Fed to Growingred Sokoto bucks.

Parameters (%)	Concentrate	*Panicum maximum*	*Digitaria smutsii*
Dry matter	92.66	92.65	92.91
Crude protein	14.72	11.65	6.31
Crude fibre	11.92	38.70	29.61
Ether extract	2.03	0.35	5.99
Ash	11.96	6.33	5.51
NFE	59.37	43.01	47.09
ADF	2.64	42.46	30.16
NDF	14.66	73.65	59.55
ME(MJ/KgDM)	11.63	11.72	11.03

ME (MJ/kg DM) = 11.78 + 0.0064 CP + $(0.00065 EE)^2$ – CF (0.00414 EE) – 0.0118 A (Alderman, 1985)

Proximate composition and metabolizable energy of experimental diets fed to growing red Sokoto bucks

The Proximate composition and metabolizable energy of experimental diets fed to growing red Sokoto bucks is presented in Table 1. The dry matter of the concentrate supplement was 92.66%, crude protein was 14.72%, crude fibre, ether extract, and Ash were 11.92%, 2.03% and 11.96% respectively. While the NFE, ADF, NDF and ME were 59.37%, 2.64%, 14.66%, and 11.63MJ/kg DM respectively. The dry matter of the *Panicum maximum* hay fed was 92.65%, CP, CF, EE, Ash and NFE were 11.65%, 38.70%, 0.35%, 6.33 and 43.01% respectively while the ADF, NDF and ME were 42.46%, 73.65% and 11.72MJ/kg DM respectively. The *Digitaria smutsii* fed as a basal diet in control composed of 92.91% DM, while the CP, CF, EE, Ash and NFE

were 6.31%, 29.61%, 5.99%, 5.51% and 47.09% respectively while the ADF, NDF and the ME were 30.16%, 59.55%, and 11.03 MJ/kg DM respectively.

Table2. Nitrogen balance of red Sokoto bucks fed mixtures of *Panicum maximum* hayand concentrate in ratios.

Parameters	Control	75:25	50:50	25:75	SEM	P-Value
Nitrogen Intake	5.76^{b}	8.93^{a}	7.41^{ab}	5.79^{b}	0.08	0.023
Faecal Nitrogen Loss	3.04^{ab}	4.36^{a}	2.90^{ab}	2.58^{b}	0.07	0.044
Urinary Nitrogen Loss	0.33^{bc}	0.19^{c}	0.80^{a}	0.53^{ab}	0.01	0.002
Total Nitrogen Outgo	3.36	4.55	3.70	3.12	0.07	0.259
Nitrogen Retained	2.39	3.84	3.71	2.67	0.06	0.110
Nitrogen Absorbed as % intake	41.33	57.33	49.67	46.33	1.09	0.529

^{abc}Mean with different superscripts along the same row are significantly different (P<0.05), SEM =standard error of the mean

The nitrogen balance of red Sokoto bucks fed mixtures of *Panicum maximum* hay and concentrate in ratios is presented in Table 2. Bucks fed (75:25) concentrate/hay ratio had a higher (P<0.05) nitrogen intake (5.93) than control but similar to 50:50 concentrate/hay ratio which was also higher than the control diet while the control diet and 25:75 were at par and lower than treatment 75:25 and 50:50.

Faecal nitrogen loss followed the same pattern as that of the nitrogen intake (P<0.05) while the control and 50:50 C:P were similar and lower than that of 75:25 C:P with 25:75 C:P having the least faecal nitrogen loss. However, urinary nitrogen loss was observed to be higher (P<0.05) in (50:50) C:P with 76% increase over the (75:25) C:P. However, the total nitrogen loss, nitrogen retained and the percentage nitrogen absorbed were not significantly (P>0.05) affected by the diets fed.

DISCUSSION

Nitrogen balance

The higher nitrogen intake in the group fed (75:25) C:P could be attributed to the higher level of concentrate: hay ratio. Higher concentrate intake depicts higher nitrogen intake, due to the higher palatability of the diet. Nitrogen loss through the faeces followed the same trend as the nitrogen intake due to the same reason stated for the higher intake. However, the highest urinary nitrogen loss was observed in the group fed (50:50) C:P. Losses of nitrogen through the urinary tract are related to the rumen degradable protein content in the diet; in addition, the higher the consumption of this nutrient, the greater the amount of ammonia produced, which could exceed the requirement of ruminal microorganisms, hence resulting in increased synthesis of urea in the liver and higher excretion via urine. Therefore, it was observed that diets containing 50:50 C:P presented higher nitrogen loss in urine in relation to other diets while those fed 75;25 concentrate/hay had the highest nitrogen intake and faecal nitrogen loss.

This is in agreement with the report of Anifowose *et al.* (2016) who fed *Panicum maximum* with Bambara nut based concentrate to red Sokoto bucks in ratios and also in concordance with the report of Santos *et al.* (2014) who worked on nitrogen metabolism in lactating goats fed with diets containing different protein sources. Contrarily, Ramos *et al.* (2009) reported no significant effect of C:F ratio on the faecal nitrogen and urinary nitrogen of growing sheep. The disparity here could be as a result of the forage fed and the concentrate ratio. Meanwhile, total nitrogen loss, nitrogen retained and the percentage nitrogen retained were not affected by the dietary treatments. This is similar to the report of Moorby *et al.* (2006). However, the percentage nitrogen

retention ranged from 41.33% in control to 57.33% in bucks fed (75:25) C:P. All animals were in a state of positive nitrogen balance, this implied that all the bucks received adequate nitrogen from the diets fed.

CONCLUSION

It is therefore concluded that the nitrogen balance and the percentage nitrogen retained is not affected by the diets fed to the growing Red Sokoto bucks.

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