PERFORMANCE OF RED SOKOTO BUCKS FED TWO CULTIVARS OF SWEET POTATO VINES AND COWPEA HAY

Jinjiri, A.,*[1] Sa'ad S. K.,[1] Garba, Y.,[2] and Nasiru, A[3]
[1]Rabiu Musa Kwankwaso College of Advanced and Remedial Studies T/ Wada, Kano
[2]Centre for Dryland Agriculture ,Bayero University, Kano
[3]Department of Animal Science, Bayero University, Kano
Corresponding author email: jinjiri.aminu001@gmail.com +23408064980565

ABSTRACT
*Forages and crop residues are the main feed resources which are noted to be low in crude protein occasioned by seasonal fluctuations in climatic factors required for quality forage production. Thus, this study was conducted to evaluate the effect of feeding two cultivars of sweet potato vines (Danchina and King J) and Cowpea hay (serving as control diet) on the nutrients intake and digestibility of Red Sokoto bucks. Twelve bucks were assigned into three dietary treatments: CH (Cowpea hay), DC (*Danchina*) and KJ (*King J) *in a randomized complete block design with four animals per treatments. The result obtained indicated that bucks from the treatment fed* King J *sweet potato vine cultivars had higher feed intake (988.66g/day) followed by* Danchina *(906.66g/day) and the least were the Cowpea hay (883.33g/day). There was no significant (P>0.05) difference was observed with respect to nutrients intake. Likewise result of nutrients digestibility showed no significant differences (P>0.05) among the treatments. It is concluded that Danchina and King J sweet potato vine cultivars can be fed to animals as a replacement for cowpea hay since they were proven to be nutritionally good for enhanced performance of the experimental animals.*
Keywords: Red Sokoto; Sweet potato; Vines; Cowpea hay; Performance

INTRODUCTION

In developing countries, ruminants are managed under crop-based or range-based production systems. Animals in these systems suffer from seasonal nutritional stress (Bruinsma, 2003). Forages and crop residues are the main feed resources which are noted to be low in crude protein occasioned by seasonal fluctuations in climatic factors required for quality forage production. Therefore, in order to reduce the problems of feed scarcity, the use of feed resources such as sweet potato vines can mitigate feed scarcity (Hristov et al, 2004). Nigeria is the second largest producer of sweet potato in Africa after Uganda with over two million metric tones annually (FAO, 2016). Sweet potato vines can be safely fed to animals without any restrictions (Dahlanudin, 2001). Potato vines could, therefore, serve as an important ruminant livestock feed resource in the developing countries.

MATERIALS AND METHODS

Experimental site

The experiment was conducted in the Livestock Teaching and Research Farm of the Department of Animal Science, Faculty of Agriculture, Bayero University which is located between Latitude 10^0 33' and 12^0 27' North of the equator and Longitude 74^0 34' and 9^0 29' east.

Management of the animals and the experimental design

Twelve Red Sokoto bucks were used for the experiment laid in a randomized complete block design. Two varieties of sweet potato vines (*King J and Dan China* vines) and Cowpea hay were the forage sources of the basal feed given to the animals.

Data Collection

Feed intake and growth performance

The experiment lasted for 60 days after an adaptation period of two weeks, daily feed intake (g/day) was recorded, and it was obtained by subtracting the feed left over from the feed offered while the growth performance was determined by weighing (kg) the animals at the beginning of the experiment and subsequently on weekly basis. The live weight changes were determined by difference (final – initial).

Digestibility Trial

At the end of the feeding trial, the faeces voided by each animal were collected using harness bags. Faecal output was weighed and recorded and 5% of the faecal samples were taken for proximate analysis as outlined by (AOAC, 2005). Nutrient digestibility (%) was calculated as difference between nutrient intake and nutrient voided in the faeces divided by nutrient intake and multiplied by 100.

Chemical Analysis

Samples of the vines were analyzed for Dry matter (DM), Crude protein (CP), Crude fiber (CF), Ether extract (EE) Ash and Nitrogen free extract (NFE) according to AOAC official method (AOAC, 2005). While the acid detergent fibre and neutral detergent fibre of the vine samples was determined in accordance with (Van Soest et al, 1991).

Data Analysis

Data were subjected to a two way analysis of variance (ANOVA) Model Procedures of SAS (Version 9.3) (SAS, 2009). Least difference (LSD) was used to separate means at $P \leq 0.05$.

RESULTS AND DISCUSSION

Performance characteristics

Growth performance characteristics of Red Sokoto bucks fed two cultivars of the sweet potato vines and cowpea hay are presented in Table 2. From the results, sweet potato vine cultivars have no effect on the growth performance of Red Sokoto bucks. The experimental animals consumed *Danchina* and *King J* cultivars more than the cowpea hay (control). There were no significant ($P>0.05$) differences in the initial live weight of the animals, which revealed some level of homogeneity. However, the final weight of the bucks placed on cowpea hay averagely gained 0.82kg, which was comparable to those assigned on *Danchina* (0.86kg) and *King J* (0.84kg) dietary treatments. The body weight changes of the present study were lower than the gain (2.70-5.80kg) reported by Negesse et al, (2016) for grazing local goats supplemented with sweet potato vines. The average daily gain of 49.01 to 50.59g/day observed in this study was in conformity with the value (49.61g/day) recorded by (Johnson et al, 2010) for goats fed forages. There was no significant ($P>0.05$) difference in the average daily feed intake values observed in this study. Animals offered *King J* vine had the highest (988.66g/day) followed by the bucks fed *Danchina* (906.66g/day) while animals fed cowpea hay had the least (883.33g/day). Differences in the average feed intake of the three forages could be explained by the differences in forage palatability (Van Soest, 1987). The low intake of *cowpea* and *danchina* resulted in low nutrients consumption. Differences in intake between the forages might be related to the rate of cellulose digestion in the rumen. The intake of sweet potato vine cultivars was high when compared with *Cowpea.* The average dry matter intake, crude protein intake, crude fibre intake, ash intake, ether extract intake and nitrogen free extract intake did not differ significantly ($P>0.05$). The DM and CP intake values obtained in this study were higher than those reported by Mediksa (2017). The differences among the studies might be as a result of variations in the quality of the feed used, animal's age and physiological status, rumen fill and rate of degradation.

Nutrients Digestibility

Table 4 summarizes the results of the digestibility study, which revealed non significant difference ($P>0.05$) in all the evaluated digestibility indices; dry matter digestibility (DMD), crude protein digestibility (CPD), crude fibre digestibility (CFD), ether extract digestibility (EED), ash digestibility and nitrogen free extract digestibility (NFED). The nutrient digestibility wasnot significant ($P>0.05$) among the treatments. The DM digestibility values recorded in the present study were higher than those reported by Yacout *et al*. (2016) for fresh and sun-dried sweet potato vines but lower than the DM digestibility values obtained (Gian *et al.*, 2004). The DM digestibility follows the assertion of Preston,(1986) that feedstuff should be considered as feed for ruminants when its dry matter coefficient is above 50%. The higher DM digestibility observed in this study could be attributed to the ingredient of the DM which was characteristically lower in DM contents. The crude protein digestibility was not significant ($P>0.05$) between treatments. The CP digestibility observed in this study is attributed to the CP contents of the sweet potato vines. Aye and Adegun (2010) reported that digestibility of nutrients varies with the nutrient composition of the diets and their degree of utilization. The CPD values of this study contradict those obtained (Yacout *et al.*, 2016).

Table 1: Proximate composition of the experimental diets (%)

Nutrients (%)	Cowpea hay	Danchina	King J
DM	86.98	92.12	91.26
CP	13.01	13.74	14.71
CF	20.40	19.08	18.08
EE	4.38	4.26	3.95
Ash	8.33	7.46	9.23
NFE	40.86	47.58	45.37
ADF	25.95	27.53	27.16
NDF	33.06	35.09	35.27

DM: Dry matter, CP: Crude protein, CF: Crude fiber, EE: Ether extract, NFE: Nitrogen Free Extract, ADF: Acid detergent fibre, NDF: Neutral detergent fiber

Table 2: Performance characteristics of Red Sokoto bucks fed cowpea hay and two cultivars of sweet potato vines

Parameters	Cowpea hay	Danchina	King J	Standard Error
Initial weight (kg)	21.14	21.09	22.55	2.34
Final weight (kg)	21.96	21.95	23.39	2.29
ADG (g/day)	50.59	49.01	49.73	4.44
Average Feed intake (g/day)	883.33	906.66	988.66	147.43
DM Intake	831.33	893.33	916.00	70.08
CP Inake	107.33	111.67	120.00	11.78
CF Intake	210.00	210.00	200.00	16.83
EE Inake	33.00	34.33	34.00	4.26
Ash Intake	74.00	97.33	94.00	7.25
NFE Intake	407.00	440.00	456.00	63.33

ADG: Average Daily Gain, DM: Dry matter, CP: Crude protein, CF: Crude fibre, EE: Ether extract, NFE: Nitrogen free extract

Table 3: Nutrients digestibility of Red Sokoto bucks fed cowpea hay and two cultivars of sweet potato vines

Parameters (%)	Cowpea hay	Danchina	King J	Standard Error
DM	75.67	75.67	78.67	1.7
CP	87.00	76.00	80.33	4.28
CF	68.33	67.67	69.00	3.64
EE	51.00	56.67	58.00	10.54
Ash	68.00	71.67	71.00	3.66
NFE	80.00	83.67	87.00	3.78

DM: Dry matter, CP: Crude protein, CF: Crude fiber, EE: Ether extract, NFE: Nitrogen Free Extract

CONCLUSION AND RECOMMENDATION

The study showed that King J and Danchina sweet potato vine cultivars can be fed to animals as a replacement for cowpea hay

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