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Effect of Varied Inclusion Levels of *Alysicarpus vaginalis* in Red Sokoto Bucks Diets on Intake, Digestibility and Nitrogen Balance

H.Y. Adamu¹, Y. Abdurrahman¹, S.B. Abdu¹, M.R. Hassan¹, A. Musa¹, L. Adam² and T.A. Ibrahim¹

¹Department of Animal Science, Ahmadu Bello University, Zaria; ²Yobe state college of Agriculture, Gujba.

Corresponding author: H.Y. Adamu; E-mail: yusufhanwa@yahoo.com; 08035865074

Abstract

The work was carried out to study the intake and nutrient digestibility by Red Sokoto bucks fed grade levels of *Alysicarpus vaginalis* in a complete diet. Four red Sokoto bucks of average weight 17.40kg \pm 2 were used in this study, in a 4 x 4 Latin Square arrangement. Involving four dieting treatments T1, T2, T3 and T4 containing 0%, 10%, 20% and 30% levels of inclusions of *Alysicarpus vaginalis*. The proximate analysis showed that the *Alysicarpus vaginalis* had 30.70% crude fibre, 12.56% crude protein and 47.29% Nitrogen free extract. The animals fed 30% *Alysicarpus vaginalis* had highest intake of all the nutrients. The result indicated that the apparent digestibility of organic matter (63.79%) and crude Protein (71.55%) was high ($p < 0.05$) for animals fed 20% *Alysicarpus vaginalis* and had the best digestibility of almost all the nutrients. The highest Nitrogen retained as per cent of nitrogen intake 64.68% was obtained in animals fed 20% *Alysicarpus vaginalis*. It was concluded that DM intake, nutrient digestibility and nitrogen utilization of bucks can be enhanced by including 20% of *Alysicarpus vaginalis* in their diets.

Keywords: *Alysicarpus vaginalis*, wheat offal, Red Sokoto bucks and sorghum panicles

Introduction

The interest in search for alternative feed ingredients is of paramount importance, because of the global demand for grains which has exceeded the production and stiff competition between man and the livestock industry in depletion of soil quality, lack of water and climate change. With 20% of all cultivated areas, 30% of forests and 10% of grasslands presently undergoing degradation, a quarter of the world's population is sustained by production on degraded soils (FAO, 2008b). A challenge therefore for animal nutrition scientists is to introduce and promote alternative feed resources that have high nutritive value and are adapted to harsh environmental conditions. Wild under-utilized plant resources must therefore receive more attention. In view of this, the judicious use of such plants such as *Alysicarpus vaginalis* as feed resources. It is grown in pastures as forage for livestock. Cattle and horses find it palatable, and sheep found it about as palatable as alfalfa. It is very tolerant of grazing and mowing.

The objectives of this study were to evaluate the intake, digestibility and nitrogen balance in Red Sokoto bucks fed in a complete diet.

Materials and Methods

The experiment was conducted at the Department of Animal Science Farm, Ahmadu Bello University Zaria. *Alysicarpus vaginalis* and Sorghum panicle were sourced within Zaria. They were sun dried, milled and packed in sacks and stored. Other feed ingredients which include cotton seed cake, wheat offal, bone meal and common salt were purchased from Labar Agriculture Enterprise, Zaria.

Four Red Sokoto bucks of average weight 17.40kg \pm 2 were used to study feed intake, digestibility and N balance and were obtained from the Department of Animal science Farm. The animals were dewormed and dipped in acarida solution. The diets consisted of sugar cane scrapping, Cotton seed cake, Sorghum panicle, Salt and Bone meal. Sugar cane scrapping was included at the levels of 0, 10, 20 and 30% levels of inclusion. Digestibility and Nitrogen balance studies were carried out using a 4x4 Latin Square design with 4 periods each of 15 days in which ten days were for adaptation, 5 days for Data collection. The animals were weighed and housed in metabolism cages with free access to feed and clean water supplied *ad libitum*. The diets were offered to the animals daily at 0800hr. 3% of their body weight. Chemical composition of the dried feed and faeces samples were analyzed according to AOAC (2001).

Data collected during the digestibility trials were subjected to one-way ANOVA SAS (1998) to evaluate for significant difference among treatment means. Duncan multiple range tests (DMRT) was used to compare treatment means (Duncan, 1955).

Results and Discussion

Chemical composition and nutrients intake: The chemical composition of *Alysicarpus vaginalis* is presented in Table 1. It was shown that the *Alysicarpus vaginalis* had 12.56, 30.70, and 47.29% of DM, CP, CF, Ash, EE and NFE respectively. Crude Fibre of *A. vaginalis* (30.70%) determined was lower than that value of 52.08% CF reported by Yashim, *et al.*, (2006). The likely differences noticed in the chemical composition of the *Alysicarpus vaginalis* in this trial concurred with the reports of Adamu *et al.* (2013) on different forage legume reported that environmental differences, variation in relation to a stage of growth of the plants and type of foliage sampled, site of sampling and/or proportion of foliage materials and soil influence the chemical composition of forages. However, the *Alysicarpus vaginalis* leaves in the present study had CP contents above 8%, a minimum requirement for ruminants.

Table 1: Chemical composition of *Alysicarpus vaginalis*

Nutrients	Percentage
DM	78.23
OM	70.13
CP	12.56
CF	30.70
ASH	8.16
NFE	47.29
OIL	1.35

Table 2 shows the result of nutrients intake. The result showed that the bucks in the treatment diet with 30% inclusion level of *Alysicarpus vaginalis* had the highest values of all the nutrients intake and were significantly different ($p < 0.05$) across the treatment diets. This could likely be related to its palatability and this observation was in conformity with earlier work reported by Yashim *et al.* (2006) who reported that the increased in dry matter intake has to do with the adaptability and as a result of its physical nature.

Table 2: Effects of *Alysicarpus vaginalis* varied inclusion levels on nutrient intake in Red Sokoto bucks

Parameters (%)	<i>Alysicarpus vaginalis</i> inclusion level (%)				SEM
	0.00%	10.00%	20.00%	30.00%	
DM	437.22 ^d	466.34 ^c	493.50 ^b	578.85 ^a	10.04
OM	381.25 ^c	436.40 ^b	433.25 ^b	535.13 ^a	7.87
CP	61.45 ^c	68.52 ^b	67.18 ^b	79.50 ^a	1.22
CF	84.27 ^c	124.99 ^b	122.98 ^b	143.83 ^a	2.06
EE	18.31 ^c	20.05 ^b	19.66 ^b	23.17 ^a	0.33
NFE	238.15 ^d	248.02 ^c	263.46 ^b	321.28 ^a	4.64

^{abc} mean values with different superscripts within a row differ significantly ($p < 0.05$); SEM = standard error of mean. DM: Dry matter OM: Organic matter CP: Crude protein CF: Crude fibre EE: Ether Extract NFE: Nitrogen free extract

Digestibility and nitrogen study: Calculated nutrient digestibility coefficient is presented in Table 3. The dry matter, organic matter and crude protein digestibility showed a significant difference ($p < 0.05$) across the treatments. The least values observed in bucks fed 30% were likely due to the short retention time in the rumen this in conformity with the earlier statement stated that *Alysicarpus vaginalis* had a lower retention time in the rumen, and a relatively higher amount enters the small intestine (Ulyatt *et al.*, 1988). The apparent digestion can therefore be reduced with *Alysicarpus vaginalis* in the diet.

The results of Nitrogen balance study are presented in Table 4. The result showed that nitrogen intake was significantly different ($p < 0.05$) across the treatments. There was a significant difference ($p < 0.05$) in nitrogen loss in faeces across the treatment, Bucks in 30% inclusion level of *Alysicarpus vaginalis* had the highest (24.86%) This may likely be due to the less retention time in the rumen as was stated earlier (Ulyatt *et al.*, 1988).

Conclusion

Based on the results of this study, it can be concluded that *Alysicarpus vaginalis* have feeding value as a fodder for small ruminant and can be included up to 30% in the diets of goat without adverse effect on intake and digestibility of nutrients.

Table 3: Effects of *Alysicarpus vaginalis* varied inclusion level on nutrient digestibility in Red Sokoto bucks

Parameters (%)	<i>Alysicarpus vaginalis</i> inclusion levels (%)				SEM
	0.00%	10.00%	20.00%	30.00%	
DM	58.68 ^c	59.98 ^b	60.99 ^a	55.74 ^d	0.47
OM	61.34 ^b	55.50 ^d	63.79 ^a	60.11 ^c	0.43
CP	71.75 ^a	67.64 ^c	71.55 ^a	69.13 ^b	0.42
CF	85.56 ^c	87.19 ^a	86.06 ^b	87.58 ^a	0.26
EE	87.60 ^a	84.97 ^c	85.63 ^b	84.49 ^c	0.27
NFE	44.14 ^a	28.84 ^d	36.00 ^c	38.64 ^b	0.67

^{a,bcd}Mean values with different superscripts within a row differed significantly (P<0.05); SEM standard error of means and SS Sugarcane scrapping

Table 4: Effects of *Alysicarpus vaginalis* varied inclusion level on nitrogen balance in Red Sokoto bucks.

Parameters (%)	<i>Alysicarpus vaginalis</i> inclusion levels (%)				SEM
	0.00%	10.00%	20.00%	30.00%	
N Intake	61.45 ^c	68.52 ^b	67.08 ^b	79.50 ^a	1.22
N Loss in faeces	17.14 ^d	21.99 ^b	18.60 ^c	24.86 ^a	0.45
N Loss in urine	4.41 ^c	5.04 ^b	4.93 ^c	7.59 ^a	0.24
Total N Loss	21.67 ^d	27.03 ^b	23.53 ^c	32.45 ^a	0.49
N Absorbed	44.30 ^d	46.53 ^c	48.49 ^b	54.70 ^a	0.92
N Balance	39.77 ^c	41.49 ^c	43.55 ^b	45.55 ^a	0.89
N % in feed	64.04 ^a	60.49 ^b	64.68 ^a	58.98 ^c	0.49

^{abc} mean values with different superscripts within a row differ significantly (p<0.05)

SEM = standard error of mean

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