

COMPARATIVE GROWTH EFFECT OF HURA CREPITANS, PANICUM MAXIMUM AND STYLOSANTHES SCABRA AS FORAGES FOR WEST AFRICAN DWARF GOATS.

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ABSTRACT

A feeding trial of 63 days was conducted using thirty male West African Dwarf (WAD) goats with an average initial weight of 6.16 ± 0.25 kg and between 6 and 8 months of age. The goats were allotted to three (3) treatments of 10 goats each and 2 replicates of 5 goats each in a completely randomized design. Performance studies were carried out, after the initial 2 weeks acclimatization period. The three forages used were *Hura crepitans* leaves (HCL), *Panicum maximum* (PM) and *Stylosanthes Scabra* (SS) representing treatments 1, 2 and 3 respectively. The forages were cut and fed to the animals every morning from 06:00 am and withdrawn by 06:00 pm for concentrate feed. The proximate composition showed that HCL was higher ($p < 0.05$) in crude protein (18.22%) than PM (13.98%) and SS (15.91%). Likewise, in ether extract (7.20%) but lower in crude fibre (20.04%) than PM (22.81%) and SS (26.13%). The daily weight gain, final live weight and feed conversion ratio were significantly ($p < 0.05$) different across the forages. The highest daily weight gain (262.53g) and final live weight (22.71Kg) were observed for goats fed HCL, while the least value for ADWG (220.00g) and FLW(20.06Kg) were recorded for goats fed SS. Feed conversion ratio was also most favorable for goats on HCL than goats fed PM and SS. Feed intake showed non-significant ($p < 0.05$) difference across treatments. It was concluded that *Hura crepitans* leaves could comfortably replace *Panicum maximum* and *Stylosanthes scabra* in West African Dwarf goats' diets, with improved growth performance.

Keywords: Growth, forages, anti-nutrients, goat

INTRODUCTION

The major obstacle to ruminant livestock production is the seasonal fluctuation in forage quantity and quality due to rainfall patterns (Garba and Ibrahim, 2018). During the dry season, forage yields and quality reportedly decline drastically for both natural and artificial pastures (Adjorholo *et al.*, 2014). However, a good number of trees and herbaceous legume leaves are able to meet nutrient requirements for small ruminant production even during the dry season (Solderinde *et al.*, 2007; Akinlade *et al.*, 2014). A typical example of such leguminous trees is the *Hura crepitans* (Sand box) leaves. It is grown mostly as a shade tree in cocoa plantations or as a support for Vanilla plants (Burkill, 1985). *Hura crepitans* succeeds in humid, lowland, tropical and sub-tropical climates (Fowomola and Akindahunsi, 2007). It prefers fertile, well-drained soil (Lorenzi, 2022). Established plants are very drought tolerant (De Filippis *et al.*, 2004). Plants however, are susceptible to wind damage, fast growing trees, easily reaching a height of 4 meters within two years (Esonu *et al.* 2014). The seeds develop within a somewhat spherical moody capsule made up of a number of sections like segments of orange. The leaves of sand box tree are papery thin, heart-shaped, up to 60 cm long and are rich in protein and minerals but with some anti-nutritional components mostly alkaloids, tannins, saponins and flavonoids (Fowomola and Akindahunsi, 2007). Ruminant animals however, can tolerate to some extent these anti-nutritional components. *Stylosanthes scabra* (shrubby stylo) is an important drought tolerant forage legume suitable for seasonally dry environments. It is a shrubby, erect legume with a long tap root system that makes the species drought tolerant and able to produce moderately high-quality forage under rain fed condition (Mpanza *et al.*, 2020). *Panicum maximum* is a perennial, tufted grass with a short, creeping rhizome. It prefers fertile soil and is well adapted to a wide variety of conditions. It is often found in open woodland and is one of most valuable fodder plants in Nigeria (Gibbs Russell *et al.*, 1991). This study therefore was carried out to determine the effect of *Hura crepitans*, *Panicum maximum* and *Stylosanthes scabra* forages on the growth performance of West African Dwarf goats.

MATERIALS AND METHODS

Location of the study

The experiment was conducted at the Goatry Unit located at the Teaching and Research Farm, University of Calabar, Calabar, Nigeria.

Sources of forages

The sandbox leaves were obtained from sandbox trees within the Federal Housing Estate of Calabar metropolis while *Panicum maximum* and *Stylosanthes scabra* were harvested from University of Calabar forage farm.

Experimental diets

A standard concentrate diet was given to all the goats from 06:00 pm to 07:00 pm, while the following forages; *Hura crepitans* leaves (HCL) *Panicum maximum* (PM) and *Stylosanthes Scabra* (SS) were given to goats from 06:00 am to 06:00 pm which represented Treatments 1, 2, and 3 respectively.

Experimental animals and their management

Thirty West African Dwarf goats of average weight 6.16 ± 0.25 kg between 6 and 8 months of age were purchased from local farmers in Akpabuyo LGA, Cross River State, Nigeria. They were randomly allotted into three groups using a completely randomized design (CRD) and individually housed in pens equipped with feeding and watering troughs. The feeding trial lasted for 63 days after the first 14 days of acclimatization. The goats were weighed weekly with a hanging weighing scale (sensitivity of 0.1 kg) and feed intake was taken daily. Weight gain and feed conversion ratio were calculated.

Proximate analysis

The dry matter was determined after oven drying to a constant weight. Nitrogen content was determined by the micro Kjeldahl method of AOAC (2006) method and crude protein calculated as $N \times 6.25$, the ash content was determined as the residue remaining after incinerating the sample at 600°C in a muffle furnace. The AOAC (2006) methods were employed for ether extract and crude fibre determinations.

Statistical analysis

All data obtained were subjected to one- way analysis of variance in a completely randomized design (CRD) using Minitab (1998) computer package.

RESULTS AND DISCUSSION

The proximate composition of the experimental forages is presented in Table 1. The dry matter content of HCL, PM and SS were 22.55, 21.05 and 20.89 % respectively. There were all within the range of 12.50 – 22.90 % DM reported by Akinyemi and Onayinka (1982) for tropical grasses. HCL had a significantly ($p < 0.05$) higher crude protein (18.22%) than PM (14.98%) and SS (15.91%). This observation is in consonance with earlier reports of Arigbede *et al.* (2004) where leguminous forages recorded higher crude protein values than grasses. The lowest value of crude fibre (20.04 %) was recorded for HCL, while the two grasses PM (25.04%) and SS (26.19%) had numerically similar crude fibre values.

Table 1: Proximate composition of *Hura crepitans* (HCL) leaves, *Panicum maximum* (PM), and *Stylosanthes scabra* (SS)

Parameter (%)	HCL (T1)	PM (T2)	SS (T3)	SEM
Dry matter	22.55	21.05	20.89	1.82
Crude protein	18.22 ^a	14.98 ^b	15.91 ^b	0.64
Ether Extract	7.20	5.62	4.91	0.31
Ash	9.44	10.18	10.09	1.66
Crude fibre	20.04 ^b	25.81 ^a	26.18 ^a	3.02
NFE	45.10	43.41	42.88	6.03

SEM= standard error of means, NFE=Nitrogen free extracts.

^{ab} Means within the same row with different superscripts differ significantly ($p < 0.05$)

The results of the growth performance of WAD goats fed the experimental forages are presented in Table 2. The final live weight (FLW), average daily weight gain (ADWG) and feed conversion ratio (FCR) showed significant ($p < 0.05$) differences. The above parameters favoured goats on HCL than goats on the other forages which had numerically ($p > 0.05$) similar values. This could be attributed to the higher crude protein content of HCL which translated to better performance indicators in that treatment. The FLW (22.71Kg), ADWG (16.54g) and FCR (7.64) values were recorded for goats on HCL, while goats on PM and SS recorded 20.45 and 20.06 Kg of FLW and 14.34 and 13.86g of ADWG respectively. The feed intake was not affected significantly ($p > 0.05$), but numerically, the least daily feed intake (2005.25 g) was observed for goats fed HCL. This could be because of the bitter components of some anti-nutritional content of the leaves especially, saponin, which precipitated undesirable taste thus, lowering palatability and acceptability of the leaves by the animals.

Table 2: Growth performance of West African Dwarf goats fed *Hura crepitans*, *Panicum maximum*

and *Stylosanthes scabra* forages

Parameter	HCL	PM	SS	SEM
Initial weight (Kg)	6.17	6.11	6.20	0.77
Final weight (Kg)	22.71 ^a	20.45 ^b	20.06 ^b	1.34
Average weight gain (Kg)	16.54 ^a	14.34 ^b	13.86 ^b	1.70
Average daily weight gain (g)	262.53 ^a	227.62 ^b	220.00 ^b	11.00
Feed intake (g)	2,005.25	2,034.92	2,002.09	13.40
FCR	7.64 ^b	8.94 ^a	9.10 ^a	0.92

HCL=*Hura crepitans* leaves, PM= *Panicum maximum*, SS=*Stylosanthes Scabra*, Kg= kilograms, g=grams, FCR= feed conversion ratio, SEM= Standard error of means.

^{ab} means on the same row with different superscripts differ significantly(p<0.05)

CONCLUSION AND RECOMMENDATION

Hura crepitans is an all-season plant, it flourishes during the dry and rainy seasons, and its nutritional components are very rich and can comfortably promote West African Dwarf Goat performance than *Panicum maximum* and *Stylosanthes scabra*. However, more research should be carried out on their effects on the blood indices of WAD goats to ascertain the health status of goats fed these forages.

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