

NUTRITIVE VALUE AND FORAGE ACCEPTABILITY OF SOME SELECTED BROWSE PLANTS BY WEST AFRICAN DWARF GOATS

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Abstract

A study was carried out to investigate the suitability of utilizing some selected browse plants: Enterolobium cyclocapum, Gliricidia sepium, Leucaena leucocephala, Gmelina arborea, Azadirachta indica which were chemically analysed for dry matter (DM), crude protein (CP), crude fibre (CF), ash, ether extract (EE), nitrogen free extract (NFE), in the feeding of livestock. The proximate composition was used to assess the nutritive value of the leaves. A free choice study was carried out using ten West African dwarf goats to determine the coefficient of preference (CoP) of the forages using a cafeteria method. Results revealed that the chemical composition of the forages varied significantly ($p < 0.05$). The DM, CP, CF, ash, EE, and NFE ranged between 79.0-90.4%, 11.0-26.4%, 9.7-14.2%, 9.1-14.7, 11.0-15.2% and 26.5-58.3% respectively. The mean daily intake was highest (5.9kg) in Leucaena leucocephala and lowest (0.5kg) in Azadirachta indica. The coefficient of the forage was best in Leucaena leucocephala (1.8). The study suggested the potentials of these selected browse plants as a feed supplement for ruminants.

Key words: Nutritive, forage, acceptability, browse, plants, WAD goats.

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➤ Introduction

The potentials of multipurpose trees and shrubs as alternative fodder resources in ruminant nutrition have been investigated and evaluated for inclusion in livestock production. Unfortunately, the adoption of most of these forages by farmers has been faced with several challenges such as diseases and pests attack, presence of anti-nutritional factors and insufficient knowledge about their potential feeding value. There is therefore the need for continuous screening of browse plants to identify those with good potentials as livestock's

fodder and which could serve as supplement or substitute to the poor quality and available grasses (Oji, et al., 2007).

- Indigenous browse species are useful source of animal feeds, as these plants remain green during the dry season and provide vegetation with better nutritive value than other annual grass and herbaceous species that become withered (Ademosun, 1988). There are different methods of assessing nutritive value of plants, these include chemical analyses, in-vitro digestibility and feeding trial.
- Free choice intake and acceptability study is a quick assessment of physical quality of a feed. Coefficient of Preference (CoP) is a direct measure of acceptability and nutritional capability of feedstuff or forage.
- In recent time, cafeteria technique has been used to assess the acceptability of some forage (Bamikole *et al.*, 2004, Babayemi *et al.*, 2006).
- Voluntary intake is the overall acceptance and relish with which an animal consumes any given feedstuff or diet depending on appearance, odour, taste, texture, temperature and auditory properties of the food.
- Thus this study was designed to evaluate the nutritional composition of some browse plant leaves (*Enterolobium cyclocapum*, *Gliricidia sepium*, *Leucaena leucocephala*, *Gmelina arborea* and *Azadirachta indica*) and to evaluate how readily these selected forages are consumed by ruminant with a view to make appropriate recommendation to farmers who practice cut-and-carry system of grazing.

➤ **Material and method**

• **Collection of samples and acceptability study**

Five different browse plants namely *Enterolobium cyclocapum*, *Gliricidia sepium*, *Leucaena leucocephala*, *Gmelina arborea* and *Azadirachta indica* were used for the study. Ten West African Dwarf goats housed in a group pen were used in the cafeteria feed preference study which lasted for two weeks, including one week of adaptation.

- The forages were harvested fresh, 4kg each of the forages were introduced on cafeteria basis to the animals in five different plastic feeders. The positioning of the forages was changed daily to prevent bias by the animals taking a particular part of the pen as the position for a particular type of forage. The amount consumed was monitored for six hours daily and the quantity consumed for each forage was recorded. The animals were then released for grazing.

- Feed preference was determined from the coefficient of preference (CoP) value calculated from the ratio between the intakes of each individual feed sample divided by the average intake of the five feed samples (Karbo *et al.*, 1993, Bamikole *et al.*, 2004).
- On this basis, a feed was taken to be relatively preferred if the CoP value is greater than unity.

$$\text{Coefficient of Preference} = \frac{\text{intake of individual forage offered}}{\text{mean intake of all the forage offered}}$$

➤ Chemical and Statistical Analysis

- The air-dried samples of browse plants were oven dried at 105⁰ to a constant weight for dry matter determination (DM). The samples were milled in a hammer mill to pass through 1mm mesh sieve and stored in an air tight container at room temperature for laboratory analysis. Proximate analysis; crude protein, crude fibre, ash, ether extract and nitrogen free extract were analysed in triplicates using standard procedure of AOAC, 2012.
- Data obtained were analysed and subjected to Analysis of Variance procedure (ANOVA) of SAS 2012. Significant means were separated by Duncan's Multiple Range Test of the same package.

➤ Results and discussion

Table 1: Proximate composition (%) of selected browse plants

Samples/ parameters	Dry matter	Crude protein	Crude fibre	Ash	Ether extract	Nitrogen free extract
<i>Enterolobium cyclocapum</i>	88.9 ^b	12.6 ^c	9.7 ^d	10.6 ^b	13.7 ^b	53.0 ^a
<i>Gliricidia sepium</i>	80.2 ^c	25.5 ^a	13.1 ^b	11.1 ^b	13.8 ^b	26.5 ^d
<i>Leucaena leucocephala</i>	90.4 ^a	26.4 ^a	14.2 ^a	9.9 ^c	15.2 ^a	37.7 ^c
<i>Gmelina arborea</i>	88.1 ^b	11.0 ^c	12.0 ^c	9.1 ^c	11.2 ^c	58.3 ^a
<i>Azadirachta indica</i>	79.0 ^d	15.3 ^b	10.1 ^c	14.7 ^a	11.0 ^c	48.6 ^b
SEM	0.02	0.34	0.12	0.16	0.05	0.06

a,b,c,d : mean value in the same row are significantly (p<0.05) different., SEM : Standard error of mean.

- The proximate composition of the selected browse plants studied is presented in Table 1. All parameters analysed differed significantly ($p < 0.05$). The dry matter content of these forages ranged from 79.0% in *Azadirachta indica* to 90.4% in *Leucaena leucocephala*. Crude protein ranged from 11.0% in *Gmelina arborea* to 26.4% in *Leucaena leucocephala*.
- The crude protein content of the browse plants exceeds the minimum recommended range of 7.0-8.0% for efficient functioning of rumen micro-organisms (Van Soest, 1994). Also, it is in agreement with the findings of Bamikole *et al.*, 2003 and Falola, 2016 who reported CP range of 10-37% for most tropical forage and browse plants. Browse plants have been reported to have high crude protein of high digestibility, vitamins and minerals (Odeyinka, 2001; Asaolu *et al.*, 2011).

Table 2: Mean of daily intake of selected browse plants and the coefficient of preference by WAD goats.

Browse plants	Mean daily intake (kg/DM)	Coefficient of preference (CoP)	Ranking of forage preference
<i>Enterolobium cyclocapum</i>	0.90	0.33	4 th
<i>Gliricidia sepium</i>	5.50	1.69	2 nd
<i>Leucaena leucocephala</i>	5.90	1.80	1 st
<i>Gmelina arborea</i>	3.30	1.01	3 rd
<i>Azadirachta indica</i>	0.50	0.16	5 th

- Presented in Table 2, is the Coefficient of preference (CoP) for five different browse plants. The mean daily intake ranged from 0.50kg/DM in *Azadirachta indica* to 5.90kg/DM in *Leucaena leucocephala*. Intake of green fodders is affected by plant species, stage of maturity and level of phytochemical present in the forage (Kalio, *et al.*, 2006).
- Coefficient of preference was used to rank the different forages in order of preference; *Leucaena leucocephala* > *Gliricidia sepium* > *Gmelina arborea* > *Enterolobium cyclocapum* > *Azadirachta indica*.

➤ Conclusion

- The multipurpose trees and shrubs evaluated in this study showed potentials of meeting nutrient requirements of ruminants with high level of crude protein as well as cheaper alternative feed supplement to ruminant during dry season.

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