

PROXIMATE COMPOSITION AND FORAGE PREFERENCE OF SOME BROWSE PLANTS BY WEST AFRICAN DWARF GOATS.

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Abstract

A study was carried out to investigate the suitability of utilising some selected browse plants: *Leuceana leucocephala*, *Gliricidia sepium*, *Azadirachta indica*, *Terminalia catapa* and *Gmelina arborea* in the feeding of ruminant livestock. The proximate composition and in vitro gas production techniques were used to assess the nutritive value of the leaves as well as their forage acceptability using a cafeteria method involving eleven adult West African dwarf goats. The crude protein (CP) ranged from 11.59 – 26.78%, the crude fiber (CF) ranged from 10.13 – 14.33%. The mean daily intake was highest (5.99kg) in *Leuceana leucocephala* and lowest (0.60kg) in *Azadirachta indica*. The coefficient of the forage was best in *Leuceana leucocephala* (1.83) and *Gliricidia sepium* (1.70), better in *Gmelina arborea* (1.00) and poor in *Azadirachta indica* (0.60) and *Terminalia catapa* (0.97). The results showed that these selected browse plants have good level of nutrients, all except *Azadirachta indica* are well accepted by ruminants.

Introduction

Multipurpose trees and shrubs (MPTS) commonly called browses are important components of agro forestry systems in West Africa. In ruminant livestock production, feeding of browse forage has become an essential practice especially in the dry season when there is always scarcity of grass and herbaceous legume forages. Browse plant species have high potentials as important feed resources for ruminants during the dry season and are quite palatable. They are trees or perennial shrubs that remain green all year round, thus constituting a ready source of feed during off season (Oji, *et al.*, 2007). Additionally, they have appreciable level of crude protein, vitamins and mineral elements and may serve as valuable feed supplements to low quality diets (Ayo-Enwerem *et al.*, 2008). Moreover these trees and shrubs are sources of fuel; wood and timber, increase soil fertility, serve as wind and water erosion control and some of them are medicinal (Oji, *et al.*, 2003). 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.*, (2004). The feed intake or the palatability of forage is regulated by many factors: harvesting, physical and metabolic feedback, and secondary metabolites. Voluntary intake is the overall acceptance and relish with which an animal consumes any given food stuff or diet. It is the

result of a summation of many different factors sensed by the animal in the process of locating and consuming feed. This depends on number of factors such as appearance, odour, taste, texture, temperature and in some cases auditory properties of the food. These various factors are in turn, affected by the physical and chemical nature of the feed. The effect on individual animal may be modified by physiological and psychological differences. Intake therefore is an important measure of feeding value of forage. Thus this study was design to evaluate the nutrient potential of some browse plant leaves (*Gliricidia sepium*, *Leucaena leucocephala*, *Azadirachta indica*, and *Gmelina arborea* and *Terminalia catapa* and to evaluate how readily these selected forages are consumed by ruminant animals with a view to make appropriate recommendation to farmers who practice cut- and -carry system of grazing.

Material and method

Acceptability study

The study was carried out at goats unit of the Federal College of Animal Health and Production Technology, Ibadan. Five different browse plants namely *Leuceana luecocephala*, *Gliricidia sepium*, *Azadirachta indica* and *Gmelina arborea* were used for the study. Eleven adult West African Dwarf goats housed in a group pen were used in the cafeteria feed preference study that lasted for two weeks, including one week of adaptation. The forages were harvested fresh, 4 kg each forage were introduced on cafeteria basis to the animals in five different plastic feeders, and thus each animal had free access to each of the forage in the 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 per day and quantity consumed was recorded. After then the animals were released to go 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 nine feed samples (Karbo *et al.*, 1993, Bamikole *et al.*, 2004). On the basis, a feed was taken to be relatively preferred if the CoP value is greater than unity.

CoP = $\frac{\text{intake of individual feed offered}}{\text{Mean intake of all the feed offered}}$

Statistical Analysis: Data obtained were analysed by ANOVA while significantly different means were separated using the New Duncan's Multiple range tests with the aid of SAS, (2002).

Results and discussion

The proximate composition of the MPTS studied is presented in Table 1. DM ranged from 27.02 % in *Gliricidia sepium* to 39.26% in *Azadiractha indica* the variations in DM contents of the MPTS could be attributed to stage of growth (Oji, *et al.*, 2003). Crude protein ranged from 11.59% in *Gmelina arborea* to 26.78% in *Leuceana leucocephala*. The crude protein content of the browse plants exceeds the minimum recommended range of 7.0 -8.0% for efficient functioning of rumen microorganisms (Van Soest, 1994) and higher than the range of 11.0 -13.0% known to be capable of supplying adequate protein for maintenance and moderate growth in goats (NRC, 1981). Browse plants have been reported to have high CP of high digestibility, and are also high in vitamins and minerals (Odeyinka, 2001; Asaolu *et al.*, 2011). Crude fiber ranged from 9.66% in *Terminalia catapa* to 14.33% in *Leuceana luecocephala*. High levels of fibre have been acknowledge to be inversely related to feed digestibility and nutrient availability (McDonald *et al.*, 1995). Table 2. Showed the dry matter intake and the CoP of the browse plants. The dry matter intake ranged from 0.600kg/DM in *Azadiractha indica* to 5.99kg/DM in *Leuceana leucocephala*. Intake in *Azadiractha indica* (0.600g/DM) was very low but high in *L. leucocephala* (5.99kg) and *G. sepium* (5.54kg). An animal may find a specific feed or forage acceptable or unacceptable (Marten, 1978). Intake of green fodders is affected by plant species, stage of maturity and level of photochemical among others (Kalio, *et al.*, 2006). Provenza and Balgh, (1987) reported that inexperienced animals may completely reject

or consume low quantity of a newly introduced forage for long periods compared to animals exposed to the forage early in life. Coefficient of preference (COP) 1.83 - 0.18 was used to rank the MPTS in order of preference; *L. leucocephala* > *G. sepium* > *G. arborea* > *T. catapa* > *A. indica*.

Conclusion

The MPTS were found to have appreciable level of crude protein and may serve as valuable feed supplements to low quality diets. They have potentials to contribute substantially to ruminant animal production in Nigeria.

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Table:1 proximate composition (g/100kg) of the browse plants

Samples	Dry matter	Crude protein	Crude fibre	Ash	Ether-extract	NFE
<i>Leuceana leucocephala</i>	36.43 ^b	26.78 ^a	14.33 ^a	9.85 ^c	15.35 ^a	37.72 ^c
<i>Gliricidia sepium</i>	27.07 ^c	25.50 ^a	13.08 ^b	11.10 ^b	13.83 ^b	27.48 ^d
<i>Azadiractha indica</i>	39.26 ^a	15.30 ^b	10.13 ^c	14.72 ^a	11.18 ^c	48.66 ^b
<i>Gmelina aborea</i>	35.58 ^b	11.59 ^c	11.90 ^c	9.09 ^c	11.27 ^c	58.15 ^a
<i>Terminalia catapa</i>	34.76 ^b	12.61 ^c	9.66 ^d	10.58 ^b	13.71 ^b	53.44 ^a

SEM

A,b,c,d : mean value in the same row are significantly ($p < 0.05$) different., SEM : Standard Error of Mean.

Table 4: coefficient of preference of some browse plants by WAD goats

Browse plants	Mean daily intake (kg)	Coefficient of preference(COP)	Ranking of forage preference
<i>Leuceana leucocephala</i>	5.99	1.83	1
<i>Gliricidia sepium</i>	5.54	1.70	2
<i>Gmelina aborea</i>	3.24	1.00	3
<i>Terminalia catapa</i>	0.97	0.30	4
<i>Azadiractha indica</i>	0.60	0.18	5