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CHEMICAL COMPOSITION AND PREFERENCE STUDIES OF DIFFERENT SPECIES OF *FICUS* LEAVES FED TO GROWING BUNAJI BULLS

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ABSTRACT

Preference study was carried out on five species of *Ficus* leaves namely: *F. thoningii, F. sycomorus, F. polita, F. platyphylla* and *F. glumosa*, evaluated using five growing Bunaji bulls. The average intake of fresh and wilted leaves by the bulls were significantly ($P < 0.05$) varied, ranging from 6.40 to 7.40kg/DM and 6.40 to 7.10 kg/ DM, respectively. The preference ranking (that is, 1st to 5th) for both the fresh and wilted leaves produced the following order: *F. sycomorus* > *F. thoningii* > *F. polita* > *F. platyphylla* > *F. glumosa* in fresh form but *F. polita* > *F. thoningii* > *F. sycomorus* and *F. glumosa* > *F. platyphylla* in wilted form. Apparently, *F. sycomorus* and *F. polita* appeared to be most preferred by the cattle in both fresh and wilted leaves compared to the least preference values are recorded for *F. glumosa* and *F. platyphylla* both in fresh and wilted forms. The crude protein (CP) content of the *Ficus species* ranges from 11.25 to 13.69 %. The content of neutral detergent fibre (NDF) ranged from 28.73 to 46.90 %. The concentrations of tannin, saponin, phytate, oxalate, alkaloid and cyanide were low. It is concluded that growing Bunaji bulls preferred F. sycomorus in fresh form and *F. polita* in wilted form, and the finding may be beneficial in the planning of supplemental feeding for growing Bunaji bulls.

INTRODUCTION

Increasing demand and subsequent high cost of conventional animal feed ingredients in the Tropics have created the need for sustainable alternatives, particularly natural feed resources indigenous to the region (Abubakar and Muhamed 1992; Osagie 1998; Tian *et al*. 2007). Browse plant species have high potentials as important feed resources for ruminants during the dry season and are quite palatable. Since they are trees or perennial shrubs that remain green all year round, they constitute a ready source of feed during off-season feeding (Oji *et al.* 2007). They have appreciable level of crude protein and may serve as valuable feed supplements to low quality diet (Ayo Enwerem *et al.* 2008) The plant species differ in their physical structure and chemical composition (Dove, 1996). The process of selecting diet from plants by cattle is mostly influenced by physical structure and chemical composition of the plants, and especially the concentration of anti-nutrient or toxin (Provenza and Cocintta, 1994). Moreover the trees and shrubs are sources of fuel, wood and timber, increase soil fertility, serve as wind and water erosion control, and are medicinal (*Oji et al.* 2003).

MATERIALS AND METHODS

Experimental Site

The experiments were conducted at the Experimental Unit of the Beef Research Programme of the National Animal Production Research Institute (NAPRI), Shika, Zaria, Nigeria. The study area fall within latitudes 11^{o}N and 12^{o} N and longitudes7^{o}E and 8°E, with an altitude of 640 m above sea level. Shika is located within the Northern Guinea Savannah zone with an average annual rainfall of 1.10 mm, which starts from early May to mid-October. The maximum temperature, range from 26 to 32 ^{o}C, depending on the seasons, while the mean relative humidity during the hamattan and rainy season are 21 and 72 %, respectively (Ovipams, 2012).

Preference evaluation of different *Ficus species* fed to growing Bunaji bulls

A preference trial was conducted on both fresh and wilted leaves of five different *Ficus species*, collected in NAPRI premises, to observe the preference of cattle to the different *Ficus species* for a period of five days following a 7 day adjustment period. Fresh and wilted leaves of *Ficus species*, identified in the study area were used. About 2 kg of each *Ficus species* in fresh and in wilted states were offered to five experimental animals in cafeteria method of feeding. Intake of *Ficus* leaves were recorded and relative palatability index (RPI) was calculated per *Ficus species* in the form of fresh and in wilted leaves. This was done by dividing the daily intake values of individual *Ficus* species by that of the plant with the highest consumption value and multiplied by 100 (Larbi *et al*. 1993). The daily RPI obtained for each of the *Ficus species* was subjected to statistical analysis. The species were then ranked based on the calculations, with highest consumption value being the most preferred and *viceversa.*

RESULTS AND DISCUSSION

Chemical composition of *Ficus species*

Results obtained from the chemical composition of different *Ficus* leaves are presented in Table 2. The crude protein (CP) range was 11.25-13.69 %. *F. thoningii* had the highest CP and the lowest CP (11.25 %) was recorded in *F. polita*. The acid detergent fibre (ADF) and neutral detergent fibre (NDF) contents ranged from 24.58-41.55 % and 28.73-46.90 %, respectively. while the ash content varied between 5.53 to 8.77 % for the CP contents of all the *Ficus species* were generally higher than 8 %, below which Norton (2003) observed that feeds do not provide the required levels of ammonia for optimum rumen microbial activities. The result of the present study showed that *Ficus* leaves could be of high nutritional quality in ruminant diet. The CP content of the *Ficus* leaves in this study was higher than 10.88 % CP content, reported to be the adequate requirement for production for the ruminant (NRC, 1976). The CP range of the *Ficus* leaves in the present study was however, higher than the range reported by Rittner and Reed, (1992).

The NDF level obtained in this study was lower than the safe upper limit of 60 % (Meissner *et al*., 1991) for guaranteed forage intake by the ruminant. The variation in the NDF levels in the tested leaves did not differ widely in contrast with the report by Hove *et al*. (2001) in browses. This finding may be due to non -inclusion of the petioles of the leaves as observed by Mokoboki *et al*. (2005) with leaves from Acacia.

The result obtained on the levels of some anti- nutritive factors in various *Ficus species* leaves is presented in Table 3. The cyanide content observed in the five *Ficus species* in this trial was within the range reported by other workers: from 5.3 to 80 mg/100 g DM (Wobeto *et al*., 2007). The wide variation may be due to the genetic differences among the species, age of the plant, soil fertility and pluviometric precipitation index.

Saponin level of 44.50 mg/100 g reported in *Ficus exasperata by* Muibat *et al. (*2014) was lower than the content of *saponin obtained* in this study. The values of 2.57, 1.06, 21.19 and 0.45 g/100 g reported for phytate, saponin, tannin and oxalate, respectively by Wheeler and Ferrel (1971) are also generally lower than those reported in this study. The variability in the anti-nutritional content may be due to season, harvesting regimen, location, soil type and age (Norton, 1994). The level of oxalate observed in this study is less than that reported for *Trichsanthes anguina* (Ojiako and Igwe, 2008). Tannins contained in the various *Ficus* studied fall within the reported range for most common browses (46 to 4.4 % DM), tannin acid equivalent (Dude *et al*., 2001; Makgobatlou, 2004).

Table 1: Chemical composition of various leaves of *Ficus* species used in the study

Ficus species	DM	CP	CF	EE	ASH	NDF	ADF
F.sycomorus	89.01	12.38	26.35	13.91	7.56	40.87	30.41
F. thoningii	89.29	13.69	20.79	16.11	8.52	38.05	37.95
F. polita	90.03	11.25	15.28	14.61	8.77	28.73	24.58
F.platyphylla	91.12	12.50	25.13	13.81	7.89	38.30	37.10
F. glumosa	90.54	12.94	29.76	12.46	5.53	46.90	41.55

DM=Dry Matter, CP=Crude protein, CF=Crude fibre , EE=Ether extract, NDF=Neutral detergent fibre, ADF=Acid detergent fibre.

Table 2: Levels of some anti nutritive factors in leaves of *Ficus* species

	Levels of some anti-nutritive factors					
Ficus species	**Phytate, %**	**HCN, mg/g**	**Oxalate, mg/g**	**Alkaloid %,**	**Saponin %,**	**Tannin %.**
F. sycomorus	0.17	1.40	13.86	13.86	7.80	1.07
F. thoningii	0.21	2.16	14.08	14.08	5.80	0.71
F. polita	0.15	1.73	25.96	25.96	4.94	0.98
F.platyphylla	0.28	1.30	13.86	13.86	5.09	1.06
F. glumosa	0.24	0.97	14.96	14.96	7.06	0.97

HCN=Cyanide

Preference Study

The result of RPI ranking and average intake of leaves of some selected *Ficus* species fed to growing Bunaji bulls are presented in Table 4. Average intake of the fresh leaves by the bulls

ranged from 6.40 kg DM for *F. platyphylla* to 7.40 kg DM for *F. sycomorus*, while for the wilted leaves, it ranged from 6.40 kg DM for *F. polita* to 7.10 kg for *F. glumosa*. In this study, *Ficus sycomorus* and *F. glumosa* were the most preferred in both fresh and wilted forms, followed by *F. thoningii* in both fresh and wilted forms. This finding is similar to those of (Bamikole *et al.*, 2004) where *F. benjamina* came first, *F. thoningii* ranked second, and *F . polita* came last in ranking order in selection studies of leaves of five different *Ficus* species leaves by goats. The differences in preference of *Ficus* leaves observed in this study dictated to a large extent the RPI of the animals. Related to this observation, Gherardi and Black (1991) had earlier reported that acceptability of forages by sheep was associated with differences in intake of roughages. Several factors influence preference by ruminant (Morand – Fehr, 2003). The variation in the RPI between the fresh and the wilted forms of the *Ficus* leaves may be due to either the coarse texture of the leaves, since according to Ouedrago *et al*. (1990) goats prefer coarse feeds, due to pungent smell or odour that could repel the animals. The low RPI of *F. platyphylla* and *F. polita* leaves in this study could be explained by its strong odour. Similar observation was made by Apori *et al*. (2000), thus resulting in aversion of food by goats. The low acceptability of fresh leaves when compared with the wilted ones may be associated with one or several deterrent compounds such as sugar, organic acid, tannin and alkaloid present in the browse plants which may affect palatability (Arnold, 1981). However, most of the compounds may partially lost due to wilting or drying (Raaflaub and Lascan, 1995).

Table 3: Relative palatability index (RPI) ranking and average intake of some selected leaves of *Ficus species* fed to growing Bunaji bulls

Ficus species	Intake of Fresh Leaves	Intake of Wilted leaves	RPI fresh	RPI wilted
F. sycomorus	7.40^{a}	6.70^{c}	156.001^{st}	134.003^{rd}
F. thoningii	6.80^{b}	7.00^{b}	136.002^{nd}	140.002^{nd}
F. polita	6.70^{c}	7.10^{a}	134.003^{rd}	142.001^{st}
F. platyphylla	6.60^{d}	6.40^{d}	132.004^{th}	128.004^{th}
F. glumosa	6.40^{e}	6.70^{c}	128.005^{th}	134.003^{rd}
M	0.04	0.05		

^{abc} Means with different superscript along column differ significantly at $P<0.05$

RPI=Relative palatability index

CONCLUSION AND RECOMMENDATION

It is concluded that,

Cattle (Bunaji bulls prefer *F. sycomorus > F. Thoningii > F. Polita >F. Platyphylla> F. glumosa)* in fresh form and highest in *F. polita* and least in *F. platyphylla* in the dry form.

It is recommended that, Ficus *thoningii* should be part of farmers agronomic practices because of its higher crude protein content, high biomass production and its acceptability by cattle among the five common species of *Ficus* studied.

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