INFLUENCE OF FICUS LEAF MEAL AS A REPLACEMENT FOR COTTON SEED CAKE ON SOME BLOOD AND RUMEN METABOLITES OF GROWING BUNAJI BULLS

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Abstract
A study was conducted to evaluate the influence of inclusion of *Ficus thonningii* leaf meal (FTLM) in a CSC based diet for growing Bunaji bulls on some rumen metabolites. FTLM was included at 0 and 10, 20 and 30 % in the diets. The pH values observed in the rumen fluid was similar (P>0.05) across dietary treatments. Rumen ammonia nitrogen and Total Volatile acid (TVFA) were higher (P<0.05) at 0 and 10 % inclusion levels as compared to 20 and 30 % inclusion levels. Blood urea nitrogen (BUN) was highest (P<0.05) at 30 % inclusion level (3.87 mmol/L) compared to 0% inclusion level (1.83 mmol/L). Creatinine level was also highest (P<0.05) in 30 % FTLM (55.00 µmol/L), while glucose level was highest (P<0.05) at 10 % inclusion level (7.13 mmol/L). Inclusion of FTLM in the diet of growing Bunaji bulls up to 10% has no any detrimental effect on some of rumen and blood metabolites.
Keywords: Bunaji bull, blood profile, *Ficus thoningii*, rumen indices, cotton seed cake.

Introduction

Leaf meal of browse trees and shrubs when used as supplement offers a good source of easily digestible and extractable protein (Iyayi, 1991). Apart from the protein, they contain 2-8 per cent fatty acids, which play an important role in ruminant nutrition. Browse fodder trees or shrub form an integral part of tropical and sub tropical farming system (Smith, 1993). Ficus species belong to the family Moraceae. The characteristic of this family have been described by Keay *et al.* (1964) but the main features include possession of latex, alternate leaves, paired stipules, minute flowers crowded in highly specialized inflorescences. The proximate analysis of the leaves of some Ficus species in Northern Guinea Savannah of Nigeria to range from 8.9 to 25.9% (Abdu *et al.*, 2012). Abdu *et al.* (2012) reported significant effect of *F. sycomorus* leaf meal supplementation on voluntary feed intake, nutrient digestibility and nitrogen balance in Yankasa bucks. Majority of work reported on Ficus has been on Sheep (Bankole *et al.*, 2001), goats (Abdu *et al*,. 2012), rabbit (Jokthan *et al.*, 2003). These works has revealed the potentials of Ficus as dry season feed but there is scanty information on the use of Ficus for feeding cattle in literature. The aim of this work is to evaluate some blood and rumen metabolites in Bunaji bulls fed *F. thoningii* leaf meal.

Materials and Methods

The study was conducted at the National Animal Production Research Institute, Ahmadu Bello University, Zaria. It is located within the Northern Guinea Savannah Zone of Nigeria at latitude 11^0 09' 06'' N and longitude 7^0 38' 55", at an altitude of 706m above sea level (E-trex legent GPS instrument, 2016). Twelve (12) growing Bunaji bulls between the ages of 12 to 15 months and with average weight of 150kg body weight were randomly allocated in to four groups of three animals per group and each group was assigned randomly to one of the four dietary treatments. The dietary treatments consisted of inclusion levels of *Ficus* *thoningii* leaf meals at 0, 10, 20, and 30 percent inclusion levels. This was included in the supplementary concentrate diet (Table 1a and 1b). The rumen fluid samples collected were strained through double layers of cheese cloth and immediately after collection, temperature and pH were recorded using digital hand thermometer and Henna Digital Hand pH meter (model 9409) and put into plastic bottles containing equal quantity of 0.1N H_2SO_4 to trap the ammonia. The rumen ammonia

Table 1a: Gross composition of experimental concentrate diets

	Inclusion levels of *FTLM (%)*			
Ingredients	**0**	**10**	**20**	**30**
Maize offal	76.53	67.37	58.23	48.93
Cotton seed cake	2.47	1.63	0.77	0.07
FTLM	0	10	20	30
Wheat bran	10	10	10	10
Rice bran	5	5	5	5
Poultry litter	5	5	5	5
Salt	1	1	1	1
Total	100	100	100	100

FTLM=*Ficus thoningii leaf meal*

Table 1b: Chemical composition of supplementary concentrate diets, *D. smutsii* and .*F. thoningii*

Parameters	**Inclusion levels of FTLM**				***D. smutsii***	***F. thoningii***
	0	**10**	**20**	**30**		
Dry matter	93.86	93.81	93.40	93.83	94.42	89.29
Crude protein	15.25	16.63	15.13	15.00	7.88	13.69
Ether extract	9.60	4.42	8.43	6.74	3.61	16.11
Ash	6.62	5.61	7.15	6.74	4.56	12.52
Neutral Detergent Fibre	41.72	43.63	45.75	46.66	68.43	38.05
Acid Detergent Fibre	16.69	22.64	25.58	28.28	47.32	37.95
Cellulose	19.04	18.88	18.34	22.91	38.96	39.00
Hemi cellulose	25.03	20.99	20.17	18.38	21.11	0.10
Lignin	3.13	3.90	7.70	6.12	5.50	26.20

concentrations were determined by simple micro-Kjeldahl distillation (AOAC, 2005) procedure. Total Volatile Fatty Acids were determined by Gas Chromatography (Cottyn *et al.*, 1968). Blood samples were collected from three animals in each of the treatment groups using Hyperdemic Syringe for the determination of Serum Biochemical Indices (blood glucose, total protein, urea nitrogen and Creatinine). Total proteins were determined using Refractometer (Cole, 1974), Plasma Urea Nitrogen (PUN) by Diacetylmonoxime Method with the use of a Commercial kit (Stanbio-urea nitrogen kit, procedure number 580, Stanbio Laboratories) as reported by Kiran and Mutsvangwa (2007). All data obtained from the study was subjected to analysis of variance (ANOVA) of SAS (2008). Duncan Multiple Range Test of SAS was used to separate treatment means. The statistical model for the experiments was as follows: $\mathbf{Y_{ijk} = \mu + B_i + e_{ijk}}$

Results and Discussion

The result of some blood metabolites of growing Bunaji bulls are presented in Table 2. Blood urea nitrogen (BUN) increased (P< 0.05) significantly across the treatments as the levels of FTLM increased from 0-30 % inclusion levels with the highest value of 3.87 mmol/L observed in 30 % inclusion level and lowest value of 1.83mmol/L in 0% inclusion level. This can be attributed to slow solubilisation of cotton seed cake. This indicates that there was generally optimum BUN concentration for all the diets, which implies that there were efficient nitrogen metabolic transaction in the rumen. The value reported is within the normal range for healthy animals. Animal fed diet with 30 % inclusion level of FTLM had significantly (P< 0.05) lower total blood protein (5.27 g/ dL) compared to those fed 0, 10 and 20 % inclusion levels (5.60, 5.73 and 5.73 g/ dL, respectively). The low value observed in animals fed higher inclusion level of FTLM can be attributed to inefficiency of nutrient (protein) utilization by the animals. (Fasae *et al*., 2011) reported similar result in West African Dwarf goats, which is attributed to the tannin content. Animals fed diet with 10 % inclusion level of FTLM had significantly (P < 0.05) higher blood

Table 2: Effects of inclusion levels of *F. thoningii leaf meal* on some blood metabolites of growing Bunaji bulls.

Parameters	Inclusion levels of FTLM				SEM /LOS
	0	10	20	30	
Total protein (g/ dL)	5.60^{a}	5.73^{a}	5.73^{a}	5.27^{b}	0.16*
Blood urea N (mmol/ L)	1.83^{c}	2.97^{b}	2.77^{b}	3.87^{a}	0.35*
Creatinine (umol/ L)	31.67^{b}	36.33^{b}	38.33^{b}	55.00^{a}	3.70*
Glucose (mmol/ L)	3.17^{b}	7.13^{a}	2.90^{b}	4.27^{b}	0.79*

^{a,b,c}Means with different superscripts in each row differed significantly (*P*< 0.05)

glucose level (7.13 mmol/ L) compared to those fed higher inclusion levels of FTLM. The glucose in the blood of animal is an important source of energy and metabolic intermediates Galliot (1995). The apparent similarity in values of blood glucose in spite of the increasing FTLM levels across the treatments supports the observation by Russel and Wright (1983) that blood glucose level is a poor indicator of nutritional status due to its sensitivity to stress and insensitivity to nutritional change. The creatinine level of the bulls was significantly (P < 0.05) higher (55.00 umol/ l) at the highest inclusion level (30 %) compared to 0, 10 and 20 % inclusion levels, (31.67, 36.33 and 38.33 µmol/L, respectively). The higher creatinine concentration observed at 30 % inclusion level can be attributed to increased muscle mass and level of physical activity in the animals. Previous study documented that creatinine levels may indicate proper physiological status of kidneys in goat (Ismartoyo *et al*., 1993). Table 3 presents the effects of varied inclusion levels of FTLM on some mean rumen induces of growing Bunaji bulls. There was no significant (P>0.05) difference in rumen pH across the treatment groups. The concentration of ammonia nitrogen were significantly (P<0.05) reduced in animals fed 20 and 30 % levels of FTLM as compared to those fed 0 and 10 % levels of inclusion which might be due to reduced proteolytic activity in the rumen of bulls fed 20 and 30 % levels of *Ficus* inclusion. Min *et al*. (2002) reported a similar result in *L. corniculatus*, a plant rich in condensed tannin, that it markedly reduced rumen proteolytic activity and rumen ammonia concentration in sheep. Bermingham *et al*. (2001) found a decreased ammonia nitrogen concentration in sheep rumen fed Sainfoin leaves which contain 38 g CT/ kg DM. The total volatile fatty acids concentration follows the same trend. The variation observed in TVFA in this study might be due to variations in the type and concentration of tannins present in the test materials. Similar observation has been reported by (Makkar *et al*., 1995) in animal fed quabracho tannins, but Getachew *et al*. (2008) however reported lower VFA production by adding condensed tannin in batch culture of mixed rumen microorganisms.

Table 3: Effect of inclusion levels of *F. thoningii* leaf meal on some rumen indices of growing Bunaji bulls

Parameters	Inclusion levels of FTLM				SEM/LOS
	0	10	20	30	
pH	6.77	6.82	6.86	6.84	0.04^{NS}
Temperature °C	25.16^{b}	25.84^{a}	25.08^{c}	25.16^{b}	0.20*
NH_3 – N (mg /L)	6.67^{a}	6.56^{a}	6.04^{b}	5.92^{b}	0.18*
TVFA (mmol /L)	26.67^{a}	26.25^{a}	24.17^{b}	23.67^{b}	0.74*

^{a,b,c}Means with different superscripts in each row differed significantly (P< 0.05) TVFA=Total volatile fatty acid NH_3-N=Ammonia nitrogen NS=Not significant

Conclusion

From the result of this study, it can be concluded that inclusion of FTLM in the diet of growing Bunaji bulls up to 10% has no any detrimental effect on some of rumen and blood metabolites studied, it can be included in the diet .

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