INTAKE AND NUTRIENT DIGESTIBILITY IN SHEEP FED SOME SEMI-ARID BROWSE PLANTS

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ABSTRACT

The study was conducted to determine the intake and nutrient digestibility in sheep fed dried leaves of four browse plants. Four sheep of mixed breed (Uda and Yankasa) weighing an average of 28.4kg each were used for the study. The treatments are *Ziziphus mauritania* (A), *Balanites aegyotica* (B), *Ficus sycomorus* (C), and *Celtis integrifolia* (D). The animals were weighed and randomly allocated to four treatments in a 4x4 Latin square design with four periods. Each period lasted for three weeks. The dry matter and crude protein content of the treatments range from 92.2% to 95.6% and 12.78% to 17.33%, respectively. The crude fibre content ranged from 25.0% to 30.5% while the ether extract content ranged from 2.0% to 3.0%. Nutrient digestibility ranged from 58.13% to 65.17%, 72.37% to 94.18% and 52.71% to 64.90% for dry matter, crude protein and crude fibre, respectively. Dry matter intake for treatment D was significantly higher ($P<0.05$) than that of treatments A and C. There was no significant different in crude fiber digestibility of treatments A and B. The results from this study indicated that browse plants used have high nutritional value and therefore could serve as supplementary feed especially during the dry season in the semi-arid zone where dry grass and crops residues are the only available feed resources.

INTRODUCTION

Inadequate nutrition is one of the main causes of low ruminant production in the semi arid zone of Nigeria. Animals live on unimproved native pastures and crop residues of high fiber, low protein and deficient minerals. Tropical forages are characterized by their rapid growth especially during the wet season with preponderant yield exceeding livestock requirements, which if not harvested and fed, continue to grow and quickly becomes fibrous or lignified (Osakwe, 2006). Therefore drought feeding strategies have implored the use of browse plants because trees and shrubs are less susceptible to climatic fluctuation than herbaceous plant.Protein is the most expensive nutrient in feeding livestock and is a necessity to enhance production. Browse plants are usually found to have higher crude protein content than grass (Dube and Nube 1993), even after attaining full maturity. Leaves and pods from browse plants are naturally found in the diets of sheep and goats and this contributed over 60% of the forage requirements by ruminants. They have been used by traditional farmers as sources of forage in most tropical countries (Devendra and Burns 1993), especially in rural areas where sheep and goat meat is used as a source of protein. The objectives of this study were to determine the dry matter intake and nutrient digestibility in sheep fed dried leaves of four browse species growing in the semi arid zone of Nigeria.

MATERIALS AND METHODS

Study Area: The experiment was conducted at the University of Maiduguri Teaching and Research Farm, Maiduguri located on latitude $11^0 5^1$N and longitude $13^0 5^1$E and at about 354m above sea level. The area has a mean annual rainfall and temperature of about 650mm and 32^0C, respectively. Relative humidity ranges from 40-80%Aborisade and Robert (2002). The area is characterized by sparse vegetation consisting mostly of browse plants and other thorny shrub.

Animals and Experimental Design: Four yearling rams of mixed breed (Uda and Yankasa) weighing on average of 28.38±0.87kg, were used for the study. The animals were selected from the flock of sheep kept at the Teaching and Research Farm. The animals were weighed and randomly assigned to 4 treatments in a 4x4 Latin square design with four periods. The treatments are, *Ziziphus mauritania, Balanites aegyptica, Ficus sycomorus and Celtis integrifolia.*The browse plants were collected from Baga and Jere Local Government Areas of Borno state, they were cut, sun-dried, packed and stored in bags for feeding trials.

Feeding and Management and experimental design: The animals were dewormed with Albendazole *bolus* (*Albidol*^{R}) against internal parasites before the commencement of the study. The animals were allocated to the four treatments in a 4x4 Latin square design. The animals were housed individually in a metabolic cage and kept in pens made of cement block with

concrete floors with wide windows for adequate ventilation. Animals were weighed at the beginning and at the end of each collection period. Feed was offered twice daily at 7.30am and 4.00pm, respectively. Feed intakes were recorded throughout the experimental period and were determined by weighing the amount of feed offered to the animals and refusals were collected before morning feeding. Water and mineral salt lick were given *adlibitum*. Animals were fed for 10 days as adaptation period followed by 7 days collection period.Data collected were subjected to analysis of variance procedure for Latin square design (Steel and Torrie, 1980)

RESULTS AND DISCUSSION

Effect of Treatments on Intake and Digestibility in Sheep: The daily dry matter intake were 1.08, 0.75, 1.12 and 1.36kg/day for sheep fed on *Ziziphus mauritania*, *Balanites aegyptica*, *Ficus sycomorus* and *Celtis integrifolia* respectively. There were significant differences (P<0.05) between dry matter intake of the treatments. Treatment A dry matter intake is significantly lower than that of treatment D (P<0.05). In this study, dry matter intake of treatment B (*Balanites aegyptica*) is significantly different (P<0.05) from other treatments, whereas there were no significant difference (P>0.05) in dry matter intake between Treatments A and C. However, dry matter intake of Treatment D is highly significant (P<0.05) from that of Treatments A, B and C.Nastis and Liacos, (1982) in their study with browse plants in northern part of Israel, reported dry matter intake of 4.5kg in cattle which is higher than the values obtained in this study. Mecha and Adegbola, (1980) recorded a daily dry matter intake of 63g/kgw (0.75) for sheep fed some browse trees. A dry matter digestibility of 45.4% in goat fed oak leaves in southern France was reported by Helze *et. al.* (1989) which is lower than the values obtained in this study, knowing that the digestibility of browse is higher in goats than in sheep (Blatex and Wainman, 1964).The crude protein digestibility for the four browse plants used in this study ranged from 71.25 to 94.18% with the mean value of 87.55%. Among the four treatments used, Treatment C (*Ficus sycomorus*) had the highest crude protein digestibility with a daily weight gain of 180.68g/day. Treatments A (*Ziziphus mauritania*) and B (*Balanites aegyptica*) had almost the same crude protein digestibility of 92.41% and 92.37%, respectively with daily weight gain of 64.26g/day and 43.23g/day, respectively. Treatment D (*Celtis integrifolia*) had the lowest crude protein digestibility of 71.25% with 192.83g/day weight gain.Nastis and Liacos, (1981) reported a crude protein digestibility of 36.95% in sheep fed some browse plants in northern Israel which were lower than the values obtained in this study. Sidahmed and Moris, (1981) reported crude protein digestibility of 81.24% in goats fed some browse plants in the Mediterranean region of Spain which is also lower than the values obtained in this study. The differences in crude protein digestibility may be attributed to the different browse species used in the respective studies.Crude fibre digestibility for the four browse plants used in this study were 53.00%, 52.71%, 64.90% and 58.02% for Treatments A, B, C and D, respectively. From the values obtained, Treatment C has the highest crude fibre digestibility of 64.90% with Treatments A and B having similar crude fibre digestibility of 53.0% and 52.71%, respectively. For crude fibre digestibility, Treatment A was not significantly different (P>O.O5) when compared with Treatments B and D, although there was a significantly different (P<O.O5) in Treatment C. Sidahmed *et. al.*, (1981) reported 26.67% crude fibre digestibility in goats fed some browse leaves in the Mediterranean region which is lower than the values obtained in this study. Nastis and Liacos (1992) in their study in northern part of Israel reported that the crude fibre digestibility in sheep was 48.62% which is lower than the values obtained in this study. These differences in crude fibre digestibility may be attributed to the variation in crude fibre content of the browse species used in the respective studies.The ether extract digestibility obtained from this study ranged from 58.29% to 70.82%. Treatment D recorded the highest ether extract digestibility of 70.82% followed by Treatment B with 68.26%. Perevolotsky *et. al.* (1992) found that the ether extract digestibility of sheep fed browse plants in Israel was 30.05% which is very low compared to the values obtained in this study.

Conclusion and Recommendation: The results of the chemical composition and nutrient digestibility of the browse plants obtained in this study showed that most of the browse plants are of high potential nutritive value, high in crude protein content and digestibility. Browse species such as *Ziziphus mauritania*, *Balanites aegyptica*, *Ficus sycomorus* and *Celtis integrifolia* are highly recommended to famers

for livestock feeding. They will serve as supplement especially during the long dry period in the semi arid zone when the dry grasses and crop residues are the available feed resources.Browse plant are relished by ruminant animals, thus they can be used to meet maintenance and production requirements of livestock in semi arid zone.

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Table 1: Proximate Analysis of Leaves of Browse plants (%DM)

Parameters	Treatments			
	A	B	C	D
Dry matter	95.6	92.2	93.2	93.2
Crude protein	15.35	17.33	12.78	14.09
Crude fibre	26.0	25.5	30.0	25.0
Ether extract	2.0	3.0	2.0	3.0
Ash content	7.0	5.0	5.0	11.5
NFE	29.65	49.17	49.17	53.5

NFE= Nitrogen free extract.

Table 2: Effect of treatments on intake in sheep

Parameters	A	B	C	D	SEM
Intake (kg/day)	1.08^{c}	0.75^{b}	1.12^{c}	1.36^{a}	0.031
Faecal output (kg/day)	0.44	0.27	0.47	0.49	0.386
Live weight (g/day)	64.26	49.17	49.17	53.59	

Table 3: Effect of treatments on digestibility in sheep

Parameters	Apparent digestibility (%)				
	A	B	C	D	SEM
Drymatter	98.41^{b}	65.17^{a}	58.13^{b}	64.23^{a}	1.553
Crude protein	92.41^{a}	92.37^{c}	94.18^{c}	71.25^{b}	1.165
Crude fiber	53.00^{c}	52.71^{c}	64.90^{a}	58.02^{b}	1.862
Ether extract	58.29^{a}	69.26^{a}	59.54^{a}	70.82^{b}	1.786

Means with different super script are significantly ($P<0.05$) SEM= Standard Error of Means

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