INTAKE AND GROWTH PERFORMANCE OF SHEEP FED ALBIZIA LEBBECK-CASSAVA PEEL SILAGE

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ABSTRACT
This study was conducted to evaluate the intake and performance of West African Dwarf (WAD) sheep fed *Albizia lebbeck*-cassava peel silage. Eight West African Dwarf (WAD) sheep aged 5-6 months, and average weights of 10.5 kg were randomly allotted into four dietary treatments in a 4 x 4 Latin Square Design in a trial that lasted 56 days. Diets 1 to 3 are silage treatments, while diet 4 is the control (*Panicum maximum*). The values of dry matter ranged from 43.62 – 86.83%. Crude protein content for the silage diet varies from 11.28-13.32%, and the control was 6.81%, while the Neutral detergent fibre, Acid detergent fibre and Acid detergent lignin values ranged from 25.55-35.26 %, 24.61-29.40 % and 18.73-26.13 %, respectively. Total feed intake and weight gain was highest in sheep fed diet 1 (840 and 566 g/day), and lowest in sheep fed diet 4 (69.29 and 48.93 g/day). Feed Conversion Ratio (FCR) was best in sheep fed diet 3 (9.05). It can be concluded that sheep fed diet 1 performed best in terms of total feed intake and weight gain, while diet 3 were better utilized by the sheep. Therefore, *Albizia lebbeck*-cassava peel silage would enhance sheep performance during dry season when grasses would have been deficient of essential nutrients.

Keywords: *Albizia lebbeck* foliage, cassava peel, intake, weight gain, Sheep, silage

INTRODUCTION
Optimal productivity of small ruminants declines during the dry season due to inadequate nutrition occasioned by rapid decline in quantity and quality of pastures. Under these conditions, animals have to survive on highly lignified forages (crop residues or agro-industrial by-products) which are relatively deficient of the essential nutrients. Crop residues are usually fibrous and deficient of protein and soluble carbohydrates required for increased ruminal microbial fermentation and improved performance of animals (Dixon and Egan, 1987). Cassava peel, though, low in nitrogen, remains the most outstanding source of energy for ruminants (Adegbola *et al.*, 2010). Utilization of crop residue based diets by supplementing with leaves of multipurpose tree fodder as a cheap protein-rich has been reported (Mousa, 2011). However, despite the nutritional potentials of leguminous fodder trees, it is rarely utilize as feed resource for ruminants by livestock rearers. One of such under-utilized multipurpose tree fodder is *Albizia lebbeck*. *A. lebbeck*, (family; *Fabacaee*,) is an introduced leguminous fodder tree species in Nigeria (Keay *et al.*, 1964). *A. lebbeck* leaves has a relatively low content of tannin and about 17-26 % crude protein contents (Lowry *et al.*, 1994). Hence, this study was conducted to determine the intake and performance by West African Dwarf sheep fed *Albizia lebbeck*-cassava peel silage.

MATERIALS AND METHODS
Study site, animal management and experimental design
The experiment was conducted at the Sheep and Goat Unit of the Institute of Agricultural Research and Training, Moor Plantation, Ibadan. Prior to commencement of the experiment, animals were given prophylactic treatments against ecto and endo-parasites. Sheep were fed guinea grass and concentrate feed during 14-day adaptation period. Eight West African Dwarf (WAD) sheep (5-6 months old, average live weight of 10.5 kg) were weighed and randomly allocated to individual pens in a 4 x 4 Latin Square Design. Experimental diets were fed for 56 days.

Silage preparation and ensiling procedures

Fresh foliages of Albizia lebbeck was harvested from the National Cereals Research Institute (NRCI) Moor Plantation, Ibadan. Fresh cassava peel was collected from a gari processing mill and spread on a concrete floor to wilt to about 50% DM. Guinea grass (*Panicum maximum*) was harvested at 6 weeks re-growth from an established pasture at the Institute of Agricultural Research and Training, Moor Plantation, Ibadan. Leaves of A. lebbeck and guinea grass (*P. maximum*) were chopped into 3-5 cm length and allowed to wilt. All the materials to be ensiled were mixed in varying proportions to form a homogenous mixture. Each mixture was ensiled separately for 28 days as previously described (Ajayi *et al.*, 2016).

Feed, feeding and growth trials

The *Albizia lebbeck*-cassava peel silage mixture in varying proportions and guinea grass as highlighted below

Diet 1 = 60 % Cassava peel + 25 % *Albizia lebbeck* + 15 % *Panicum maximum*
Diet 2 = 45 % Cassava peel + 40 % *Albizia lebbeck* +15 % *Panicum maximum*
Diet 3 = 30 % Cassava peel + 55 % *Albizia lebbeck* + 15 % *Panicum maximum*
Diet 4 = *Panicum maximum*

Diets 1 to Diet 3 (basal diet) and Diet 4 (control diet) were offered separately to individual animals at 3 % body weight at 08:00 h. Concentrate was offered to all the sheep at 2 % body weight at 16:00 h. Provision was made for a daily feed allowance of 10% above the previous week's consumption. Clean water was served *ad libitum*. Initial weights of the animals were taken and recorded before the commencement of the experiment. Daily feed intake was determined by subtracting feed refused from feed offered over a 24-h period, while live weight changes was measured once each week before feeding in the morning throughout the 56 days feeding trial excluding 2 weeks of adaptation period.

Chemical Analysis

Dried samples of the experimental diets (concentrate, silages and *P. maximum*) were analyzed for Crude protein (N×6.25), Dry matter, Ether extract, Ash, calcium and phosphorus contents as described (AOAC, 1990), while the Neutral Detergent Fiber (NDF), Acid Detergent Fiber (ADF), and Acid Detergent Lignin (ADL) were determined according to the method of Van Soest *et al.* (1991).

Statistical Analysis

Data obtained were analyzed with the general linear model of SAS (1998) and the Duncan option of SAS (1998) and multiple range tests were used to detect significant differences among means at a level of 5%.

RESULTS AND DISCUSSION

The Dry matter content of the silage was relatively similar (Table 2). Dry matter values were highest in Diet 3 (86.83%) and lowest in Diet 4 (43.62%). The crude protein contents of diet 1 to diet 3 (11.28 -13.32 %), were above the 10-12 % recommendation for growth or maintenance of small ruminants (NRC, 1985), compared to the 6.81% CP (control diet), which falls below the minimum threshold level (7% CP) required for optimal rumen microbial activities (Norton, 1994). The NDF value (55.30 %) obtained in diet 4 (control) falls within the range of 50-60 g/100g DM that could increase feed intake (Meissner and Paulsmeier, 1995). The variations in values of chemical composition in diets 1 to 3 might be due to the varying proportions of *A. lebbeck* foliage and cassava peels, and coupled with the extent of removal of the tuberous root from the skin during processing, species and the age of harvest of cassava tuber. Total feed intake, weight gain and feed conversion ratio was significantly different ($P<0.05$) across the treatments (Table 3). Total feed intake (g/day) was highest in sheep fed diet 1(840 g/day) and, followed by sheep fed diet 2 (810 g/day), but lowest in sheep fed diet 4 (566 g/day). The increase observed in feed intake and weight gain by sheep fed *A. lebbeck*-cassava peel silage is suggestive of effective degradability of the diet by rumen microbes, while the lowest feed intake observed in sheep fed control diet could be as a result of the low CP content in the

diet. This agrees with the fact that, even though, sheep relish guinea grass, low CP content diets could depress animal intake (Minson, 1990). The weight gain (g/day) was significantly ($P<0.05$) affected by the experimental diets. Highest weight gain (69.29 g/day) was observed in Sheep fed diet 1, and the least weight (48.93 g/day) was obtained in sheep fed control diet. However, weight gain by sheep fed diets 2 and 3 were significantly similar ($P>0.05$). Feed conversion ratio (FCR) by the sheep was significantly ($P<0.05$) different across the treatments. However, the FCR by Sheep fed diets 2 and 4, respectively was not significantly different ($P>0.05$), ditto, sheep fed diets 1 and 3. Nonetheless, sheep fed diet 3 gave the best FCR and, followed by sheep fed diet 1. The best feed conversion ratio obtained in sheep fed diet 3 compared to sheep fed diets 1and 2, could be an aftermath of the proportion of *A. lebbeck* leaves supplementation in the silage mixtures combined with the higher intake of concentrate diet (48.33%) which improved rumen microbial activities (Norton, 1994).

CONCLUSION

It can be concluded that sheep fed 60% cassava peel, 25% *Albizia lebbeck* and 15% *Panicum maximum* mixtures (diet 1) performed best in terms of feed intake and weight gain, while feed conversion ratio was best in sheep fed 30 % cassava peel, 55 % *Albizia lebbeck* and 15 % *Panicum maximum* mixtures (diet 3) compared to the control diet. Therefore, ensiling *A. lebbeck* foliages with cassava peel based diet would enhance sheep performance during dry season when grasses would have been deficient of essential nutrients.

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Table 1: Chemical composition of *Albizia lebbeck*-Cassava peel Silage and *Panicum maximum* Fed to WAD sheep (g/100g DM).

Parameter (%)	Silage Treatments			*Panicum maximum*	
	Diet 1	Diet 2	Diet 3	Diet 4	
				Panicum maximum	Concentrate
Dry matter	86.07	82.49	86.83	43.62	90.61
Crude protein	12.80	11.29	13.32	6.81	16.43
Ether extract	2.53	3.54	5.17	1.84	7.32
Ash	3.62	3.31	4.25	4.27	9.40
Neutral detergent fibre	31.17	25.55	35.26	55.30	63.85
Acid detergent fibre	29.40	24.61	28.77	34.18	48.31
Acid detergent lignin	26.13	22.32	18.73	8.12	5.67
Hemicellulose	1.77	0.93	6.49	21.12	15.54
Cellulose	3.27	2.29	10.04	26.06	42.64
Calcium	0.66	0.54	0.75	0.01	0.94
Phosphorus	0.85	0.88	0.67	0.03	1.02

Table 2: Performance characteristics of WAD Sheep fed *Albizia lebbeck*-cassava peel silage

Parameters	Diet 1	Diet 2	Diet 3	Diet 4	SEM
Initial live weight (kg)	10.21	10.64	11.63	10.82	
Final live weight (kg)	14.08	13.71	14.26	13.54	
Weight gained (g/d)	69.29^{a}	55.50^{b}	52.86^{b}	48.93^{c}	3.04
Total feed intake (g/d DM)	840^{a}	810^{b}	630^{c}	566^{d}	21.46
Silage intake (%)	61.20	63.16	51.67		
Concentrate (%)	38.80	36.84	48.33	39.34	
Guinea grass (%)				60.66	
FCR (%)	9.86^{b}	12.02^{a}	9.05^{b}	11.12^{a}	1.08

^{abcd} = Means with the same superscripts along the same row are significantly different ($p<0.05$) FCR = Feed conversion ratio