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Abstract - The study was undertaken to evaluate the effect of feeding cassava leaf silage (CLS) and cassava peels (CP) on performance characteristics and some haematological parameters of West African Dwarf (WAD) sheep. Nine sheep were randomly allotted into three treatments, with three sheep per treatment. The control diet (T1) consisted of grass, while sheep in (T2) and (T3) were fed with CLS and CP at 1.5% of their body weight, respectively for a period of seven weeks. The average daily weight gain, body length, withers height and heart girth were measured at weekly intervals. In addition, blood samples were collected at the beginning and end of the experiment and analyzed for PCV, WBC, Lymphocyte and Neutrophil count. Statistical analysis showed that animals fed with CP had a significant weight gain ($P<0.05$), while there was no significant difference in wither height, body length and heart girth, respectively. However, there was a significant differences ($P<0.05$) in the haematological parameters measured. No mortality was recorded during the experiment.

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I. Introduction

Sheep are valuable domestic animals in the tropical livestock production system. Sheep in the tropics account for approximately 34% of the total population of the world grazing ruminants and represent a valuable resource in most developing world. (Njidda and Kibon, 2004). The lack of good nutritive feed during dry season is partly responsible for low productivity and reproduction. Thus, sheep can be sustained with cassava leaf silage and cassava peels during difficult months of the dry season.

Nigeria is currently the world's largest producer of cassava crop (IITA, 2005). Peasant farmers mostly grow cassava as a primary staple food but cassava is also being used as a cash crop to produce industrial ethanol, starches, tapioca, and livestock feeds. Ruminants can be fed not only on cassava tuber, but also the stem, leaves, peel and various by-products of tuber processing such as residues from starch, "garri" and "fufu".

Hydrogen cyanide (HCN) toxicity is considered to be a limiting factor in using high level of cassava leaves in the diets of monogastric animal. However, ruminants can neutralize the harmful effects of HCN through the activities of rumen microbes and can therefore utilize cassava leaves more efficiently.

According to Limon, 1992; Kayouli & Lee (2000) silage making is an appropriate method to conserve cassava leaf as feed for use during dry season feeding.

The introduction of cassava leave silage to smallholder farmers in Indonesia was reported by Marjuki et al (2008), in Malawi IITA (2004) but the use of cassava leave as forage plant has not been popular in Nigeria.

Cassava peels form the bulk of residue from cassava root after post harvest and processing. It is a good source of energy in ruminant feeding systems, serving either as the main basal diet or as a supplement.

Many researchers have reported that dietary components have measurable effects on the blood hence blood constituents are widely used in nutritional evaluation and survey of human and animals. The general objective of this study was to evaluate the effect of cassava leaf silage and dried cassava peels on performance of WAD sheep and on some blood components.

II. Materials and Methods

a) Experimental Location

The study was carried out at Babcock University Poultry and Livestock Farm located in Ilara-Remo of Ikenne local government area of Ogun state. This region is in the rainforest zone of Nigeria with an annual rainfall of about 1500 mm and mean temperature of 27°C. Ilara is in the south-west geopolitical zone of Nigeria and falls on latitude of 6°54'N of the equator and longitude 3°42'E of Greenwich.

b) Management of the Experimental Animals

Nine WAD sheep having an average body weight of between 8.67 and 9.33 kg were used for the seven weeks feeding trial. The sheep were tagged and allowed 14 days adjustment period before the onset of the study. All the animals were treated for external and internal parasite with ivermectin according to their body weight (1ml per 25kg). Oxtetracycline L.A. injection (200mg/ml) was administered as prophylaxis.

c) Experimental Diets and Method of Feeding

The cassava leaf silage was prepared by cutting about 30 cm of the cassava top. It was sun dried for 24

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hours and then chopped about 2-4cm, sprinkled with 5% molasses and sealed in polyethylene bags. Silage samples were taken after 30 days of ensiling and proximate analysis of cassava silage and cassava peel were carried out following the procedure of AOAC (1990). The cassava peels was bought from the market.

The sheep were assigned to three dietary treatments in a completely randomized design (CRD). Each treatment had three sheep that were allowed to graze freely during the day between 8:00am-12:00pm and 14:00pm-16:00pm and upon return, were fed with CLS (T2) or CP (T3) at 1.5% of their body weight while the control (T1) was not given supplement. All the sheep had access to clean drinking water. Weekly body measurements; weight gain, withers height, body length and heart girth were measured and recorded. Also, the physical characteristics such as colour, mould growth, smell and pH levels of cassava silage were evaluated.

d) Hematological Analysis

The animals were bled from the jugular vein at the beginning and end of the experiment and the blood samples were kept in bottles containing Ethylene Diamine Tetra Acetic acid (EDTA) and were sent to the laboratory for packed cell volume (PCV), white blood count (WBC), lymphocyte and neutrophil count.

e) Statistical Analysis

The data obtained were subjected to Analysis of Variance ANOVA using (SAS, 1997) and the significant difference between treatments means were separated using LSD test at 5% level of significance.

III. Results and Discussion

The proximate analysis of the cassava leaf silage and cassava peel is presented in Table 1. The dry matter and crude protein values of the cassava leaf silage in this study are similar in values to (Marjuki et al. 2008), but the CP value is less than 24.7% reported by (Adegbola and Okonkwo, 2002). Devendra (1997), attributed the apparent lack of interest in the use of cassava leaves for feeding ruminants to inadequate appreciation of the relative high crude protein content of the leaves. The ether extract and crude fibre of the CLS were within the acceptable range (4.0-15.2 and 4.8-15.4) respectively but, the ash content was lower compared to (Smith, 1992). The dry matter and crude fibre of the CP were similar to those reported by (Adeloye et al. 2006).

The protein content was also within the range 2.8-6.5, however, the ether extract was higher and the ash content lower.

The silage pH value was acidic 4.36. Based on the greenish brown colour, absence of mould and a pleasant smell, the silage was considered to be of good quality.

Table 1 : Proximate analysis of cassava leaf silage and cassava peels

Constituent %	CLS	CP
Dry matter	30.39	29.2
Crude protein	15.46	5.72
Crude fibre	13.86	9.8
Ether extract	4.80	9.37
Ash	2.20	2.23

The effect of the feeding experiment on the performance of WAD sheep is shown in Table 2. The total weight gain of the sheep in T1, T2 and T3 were significantly different ($P<0.05$) from each other. The sheep fed cassava peels (T3) gained more weight than T2 and T1. This finding agrees with Fomunyan and Meffeja (1987) who fed sheep on three levels of dried cassava peels and growth rate increased linearly with increasing dietary levels of cassava peels. Sheep on cassava leaf silage did better than the control. The result also agrees with Fernandez and Preston (1978), who reported an increase in daily weight gain for ruminants fed with cassava foliage. Feeding cassava leaf silage has been reported to increase body weight gain (Bunyeth & Preston, 2006; Yousuf et al 2007). The sheep grazed on grass alone suffered a weight loss due to scarcity of grass. Therefore, for optimum production, grazing animals should be given supplement such as CLS and CP during the dry season as rumen degradability of cassava leaves and cassava peels is high 84% and 83%. The body length, heart girth and wither height were not significantly different. Similar observations were reported by Ahmed (1977) who observed no effect on the body length and withers height of sheep fed dry cassava peel diets. There was no mortality recorded during the feeding experiment.

Supplementing cassava leaf silage and cassava peel did not affect the sheep as the animals were apparently healthy and grazing freely.

Table 2 : Performance of WAD sheep fed cassava leaf silage and cassava peels

Parameters	T1 (Control)	T2(CLS)	T3(CP)
Initial body weight (kg)	9.33	9.00	8.67
Final body weight (kg)	8.87	11.00	11.00
Total body weight (kg)	-0.66 ± 0.88^{c}	2.00 ± 0.58^{ab}	2.33 ± 0.88^{a}
Average daily gain (g)	-13.5^{c}	40.8^{ab}	47.6^{a}
Body length(cm)	1.33 ± 0.88	2.67 ± 0.88	2.33 ± 0.88
Wither height(cm)	2.67 ± 0.33	1.33 ± 0.67	1.00 ± 0.58
Heart girth(cm)	1.33 ± 0.67	1.00 ± 0.58	1.00 ± 0.58
Mortality	-	-	-

abc: means within the same row with different superscripts are significantly different

The haematological analysis as shown in Table 3 indicates that the initial and final analysis on the pack cell volume and the white blood count were significantly different ($P<0.05$).

Table 3 : Haematological analysis of the WAD sheep fed cassava leaf silage and cassava peel

Parameters	Initials			Final		
	T1	T2	T3	T1	T2	T3
PCV (%)	31^{b}	27^{b}	31^{b}	23^{a}	23^{a}	25^{a}
WBC ($x10^6/cm^3$)	5.5^{a}	6.06^{a}	7.76^{a}	9.83^{b}	11.43^{b}	10.23^{b}
Lymphocyte	68	57^{a}	63	72	75^{b}	65
Neutrophil	32	43	37	28	25	35

abc: means within the same row with different superscripts are significantly different($P<0.05$)

There was a significantly different ($P<0.05$) between the initial and final PCV also, the white blood count was significantly different ($P<0.05$). The final WBC count although higher was within the normal range for sheep similar to (Reece & Swenson, 2004). According to Olorunnisomo et al (2012) the white blood cells count is an indicator of immune response to infectious or toxic substances in the organism and a high count is an indication of pathogenic infection or presence of antigens in the organism. The final lymphocyte count in T2 was higher and the neutrophil was relatively low. However, the animals were apparently healthy.

This study showed that the two feeds sustained the body weight of the animals and there was no adverse effect on the production parameters measured and the animals were apparently healthy. Sheep in the control recorded a loss in body weight during the period of experiment. It is therefore, recommended to supplement animals with cassava leaf silage and cassava peels during the dry season when feed scarcity can be a challenge.

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