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EVALUATION OF THE DRIED CASSAVA LEAF MEAL AND MAIZE OFFAL AS CONCENTRATE SUPPLEMENT FOR GOATS FED RICE STRAW: INTAKE AND HAEMATOLOGICAL PARAMETERS

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ABSTRACT

A total of nine West African dwarf x Maradi crossbred goat of 10- 12 months, with an average weight of 8.5 kg and of mixed sexes, were used to evaluate the utilization of dried cassava leaf meal (DCLM) and maize offal (MO) of goats fed rice straw *ad libitum*. The animals were randomly distributed into three treatment groups of three animal each and each animal was a replicate. Diet 1 (70%MO: 30% DCLM), Diet II (50% MO: 50% DCLM) and Diet III (30% MO: 70%DCLM) were used. Each of the animals in the three treatment groups was given 140 g supplement per day while rice straw was fed *ad libitum*. Result obtained show that daily rice straw intake was significantly lower ($p < 0.05$) for diets 1 than diets II and III, but II and III were similar ($p < 0.05$). No significant difference existed in the digestible nutrient intake for all the treatments. The heamatological parameters studied were within normal range, though significantly differences ($P < 0.05$) exist among dietary treatment. Therefore these materials could be safely used in feeding caprine species in areas where the same are in abundant quantities.

Key words: Dry cassava leaf meal, Goats, Nutrient intake, Maize offal and Haematological parameters.

INTRODUCTION

Heamatological parameters refer to those constituents of blood whose levels are normally determined in order to assess the health status of an animal. It has been established that feed components affect blood constituents (Harper *et al.*, 1979; Oladele and Ayo, 1999). Data on these haematological parameters could be of value in developing effective management programmed for prophylaxis and therapy of diseases in the indigenous goat. Total erythrocyte count, Packed Cell Volume (PCV), Haemoglobin concentration count, and total leucocyte count have shown to be important indices of livestock health and production status (Oyewale and Fajimi, 1988) and changes in haematological parameters are of value in assessing the responses of animals to various physiologi-

cal and disease conditions (Yadav *et al.,* 2002; Adenkola and Durotoye, 2004). This thus provides a basis for assessment of the nutritional status of an animal.

Feed shortage poses a major constraint to goat production in Nigeria. Recent development to feed sustainability for goat concentrated on the use of crop residues, browse plants and some industrial by-products because of their relative abundance during the dry season (Agishi, 1985). Cassava and maize leaves have been used as fodder for sheep and goats with satisfactory results (Abate and Abate, 1992; Wanapat *et al.,* 2000; Theng Kouch *et al,* 2003; Fasae *et al,* 2006; Ahamefule *et al*., 2007). Cassava leaf is composed of leaves and small tender stems. It is highly nutritious containing 17.8 -34.8 % CP (Alli-Balogun *et al.,* 2003). A major problem facing stock owners in the tropical and subtropical regions of the world is the provision of adequate nutrition to the ruminants during the long dry season. The scarcity of energy and protein is one of the problems in ruminant production (Adegbola *et al.,* 1988). There are millions of tones of unconventional animal fed resources that are available but not fully utilized for ruminant production. There is therefore, a need to search for alternative quality but low cost feed for feeding these animals especially during the dry season. Emphasis by animal nutritionist is usually on nutrient digestibility, utilization, and performance of farm animals (Uko and Ataja, 1998), however, it is pertinent to consider the health status of the animals used in various feeding trials. One way of assessing this is the use of haematological studies and this has been found useful for disease prognosis and for therapeutic and feed stress monitoring (Togun and Useni, 2005)

The objectives of this study were to investigate the effect of feeding dried cassava leaf meal: maize offal mixture as concentrate supplements on some heamatological parameters of goat fed rice straw.

MATERIALS AND METHODS

Experimental site

The study was performed at the Teaching and Research Farm of the University of Agriculture, Makurdi with latitude $07^0 41'$ N and longitude $08^o 37'$E, located in the Southern Guinea Savannah zone of Nigeria. The area has an annual rain fall spanning between 6-7 months and ranging from 1,317-1,323 mm with an ambient temperature range of 26.5^0 C to 37^0 C. The highest temperatures are usually recorded between February and March (Ako, 2002).

Experimental diets

Fresh cassava leaves were collected from farmers' plots after harvesting of tubers, sun dried for 2-3 days and ground (DCLM). Maize offal (MO) was collected from local millers and sun dried for 2-3 days. Three experimental diets were formulated. (30% MO: 70% DCL; 50% MO: 50% DCLM and 70% MO: 30% DCLM) designated diet I, II and III respectively (Table 2).

Rice straw was obtained from a farm within the premises of the University of Agriculture, Markurdi after the farmers had harvested and threshed out the grains. It was stored in a dry pen on the Teaching and Research Farm which had been previously cleaned and washed. The rice straw was then chopped into smaller pieces of 10

- 15 cm length sing a cutlass and a chopping plank. The chopped rice straw was then packed into synthetic sacs and fed to the goats.

Experimental animals and their Management

The experimental animals were housed in an open sided cement block, dwarf wall with concrete floor. This was divided into 5 pens on each side with a passage in the middle. Small drainages were constructed, one on each side of the passage to allow water to drain out from the goat house. Each pen measured 285 cm^2 x 285 cm^2. Wires net were used to complete the wall to the roof to prevent access to rodents and also allow for adequate ventilation and illumination. Wooden metabolism cages were placed in three pens at the rate of one cage/pen. Each metabolism cage had three compartments, giving a total of nine compartments.

Nine crossbred (West African dwarf x Maradi) 10 – 12 month old averaging 7 – 12 kg body weight with a mean average of 8.5 kg were randomly divided into three groups of three goat and assigned to the experimental diets. Each animal served as a replicate. They were mixed sexes; the females are non-pregnant and non-lactating. The goat were individually housed in wooden metabolism cages and were fed once daily (rice straw offered *ad libitum* plus 140 gm each of the experimental diets at about 9:00 am) throughout the experiment period. Water and salt lick were provided *ad libitum*. Two weeks were allowed for adjustment to the feed as well as to the environment before the nutritional trial and data collection commenced. During this period, the animals were dewormed using Albendazole (MSD, AGVET USA) at a dose rate of 25 mg/kg. Their bloods was also screened for haemoparasite and were given terraamycin long acting at dose of 20 mg/kg (Skm Pharm. PVT. Ltd.India).

Blood sample for heamatological studies was done once in a week for four weeks started at the 8^{th} week after the commencement of the feeding trial and continue until 12^{th} week of the study. At each sampling, three millimeters of blood were collected aseptically form each animal via jugular venopuncture, using 5 ml syringe and 21 gauge x $1^1/2$ inch sterile needles. The blood was immediately poured inside a bijou bottles containing ethylene diamine tetra acetic acid (EDTA) as anticoagulant at 5 mg/ml of blood sample. After collection, the samples were immediately transferred to Physiology Laboratory, Department of Physiology and Pharmacology, College of Veterinary Medicine, University of Agriculture, Makurdi, where they were analysed for packed cell volume (PCV) using microhaematocrit method, total erythrocyte and total leucocyte count using haemocytometer method as described by Schalm *et* al. (1975). Haemoglobin (Hb) concentration and differential leucocyte count were also determined as described by Schalm *et al*. (1975).

Chemical analysis

Homogenous samples of ground test diets: Diets 1, II, III, DCLM, maize offal, rice straw as well as the feacal samples were analysed for their proximate nutrients at the Livestock Feed Analytical Laboratory Institute of Agricultral Resarch and Training, Moor Plantation, Ibadan- Nigeria

Statistical analysis

All data obtained were subjected to analysis of variance, (Steel and Torrie, 1980) and means and where significant differences exit, were separated by Duncan Multiple Range test (Duncan, 1955). Values of $p < 0.05$ were considered significant.

RESULTS

Dietary treatment had no significant effect ($p > 0.05$) on digestible dry matter intake (DDMI), digestible crude fibre intake (DCFI), and digestible ether extract intake (DEEI). However, there was a slight numerical variation between treatments. Digestible nitrogen free extract intake (NFEI) was between 26.80 - 33.57 g Kg $W^{0.75}$ and was significantly different ($p < 0.05$). Treatment 1 has the highest value and was only significantly higher than treatment III. Generally, digestible nutrient intake decreased from treatment 1 to III as DCLM inclusion increased.

Total mean of various blood constituents namely packed cell volume (PCV), haemoglobin concentration (Hb), total red blood cell (RBC) and total white blood cell count (WBC) were given in Table 3. The mean PCV value of 36.25 ± 0.95% for treatment 1 was higher than the value of 31.25 ± 1.53% of treatment 3 which was statistically significantly ($p < 0.05$). The value of 10.14 ± 1.27 gm% obtained in treatment III for Hb was higher than 8.76 ± 0.41gm% obtained in treatment 1. The total RBC obtained in treatment 1 was the lowest 14.76 ± 0.75 gm% and significantly ($p < 0.05$) different from the values obtained in treatment II and III (Table 3). The total WBC obtained in treatment III was significantly ($p < 0.05$) different from the values obtained in treatment 1 and II (Table 3).

DISCUSSION

The digestible dry matter intake values ranged between 48.00 – 56.30 g/Kg/$W^{0.75}$/ day and it's upper limit 56.30 g/Kg/$W^{0.75}$/ day fall within the range of 55 -63.4 g/Kg/ $W^{0.75}$/day for goats fed *Panicum maximum* and *Stylosanthes hamata* at different levels (Arigbede *et al.*, 2002). The crude protein intake (CPI) values ranged between 2.86 g – 3.90 g/Kg/$W^{0.75}$/day. The value is, however, higher than 1.59 g reported for goats fed only grass but lower than 6.71 g/Kg/ $W^{0.75}$ when 25 % *Ficus thonningi* was supplemented (Bamikole *et al.*, 2002). There was no significant difference in DCFI for all the treatment groups ranged between 11.92 g/Kg/$W^{0.75}$ – 15.82 g which falls within 8.88 g – 25.99 g as reported by Arigbede *et al.* (2002) for goats fed grass and legumes at different levels. Generally, the nutrient intake decreased from treatment 1 – III as DCLM inclusion increased. Digestible dry matter intake values obtained indicate that goats had moderate amount of nutrients for sustenance and production.

The statistical difference in the value of haematological parameters could be attributed to the level of crude protein present in the different diets, and that the components of these diets may mildly suppressed haemopoietic tissues. The fact that haematological values obtained for all experimental diets (Diets 1, II & III) were within normal range as recorded for caprine speceies by different workers. (David and Kreb, 1972; Schalm et al., 1975; Oduye, 1976; Adenkola and Durotoye, 2004), and the absence of mortality during the study pe-

riod implies that the experimental diets were in o way inferior to other conventional feeds of goat.

CONCLUSION AND RECOMMENDATIONS

In conclusion therefore, the feeding regiments used in the present study do not affect the health status of caprine species and it could be recommended for caprine especially in an area where these materials are in abundant instead of normal burning or left to rot in the fields.

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Table 1: Proximate Composition of Feed Ingredients (on dry matter basis)

Nutrient	DCLM	Maize offal	Rice straw
Dry Matter (%)	88.09	88.95	88.89
Crude Protein (%)	20.29	13.21	5.66
Crude Fibre (%)	22.65	11.81	42.07
Ash (%)	13.84	3.37	13.46
Ether Extract (%)	5.94	7.89	1.78
Nitrogen Free Extract (%)	37.23	63.75	37.05
Gross Energy (Kcal/gm)	3.014	4.129	1.832

Table 2: Proximate Composition of Dietary Supplements (dry matter basis)

Nutrient	Diet I	Diet II	Diet III
Dry Matter (%)	89.30	88.82	88.72
Crude Protein (%)	15.33	16.75	17.38
Crude Fibre (%)	15.06	17.23	19.40
Ash (%)	9.37	11.04	11.70
Ether Extract (%)	4.43	4.43	5.52
Nitrogen Free Extract (%)	55.80	50.51	46.00
Gross energy (Kcal/gm)	2.919	2.862	2.530

Diet 1 = 70% Maize offal: 30% Dry cassava leaf meal
Diet 11 = 50% Maize offal: 50% Dry cassava leaf meal
Diet 111 = 30% Maize offal: 70% Dry cassava leaf meal

Table 3: Digestible Nutrients Intake of Goats on Experimental Diets (g/day)

Nutrients	Diets			
	1 70:30	II 50:50	III 30:70	SEM
Digestible dry matter intake (DCMI)	56.30	50.84	48.00	6.07
Digestible crude protein intake (DCPI	3.90	2.86	2.86	0.51NS
Digestible crude fibre intake (DCFI)	15.82	14.32	11.92	0.99NS
Digestible ether extract intake (DEEI)	2.27	1.70	2.16	0.01NS
Digestible nitrogen free extract intake (DNFEI)	33.57a	29.27ab	26.80b	1.47*

***** = ($P < 0.05$)
NS = Not Significant
[a, b, c]Means followed by the same superscripts in horizontal rows are not significantly from one another ($P > 0.05$)

Table 4: Haematological Parameters of West African Dwarf X Maradi Goat as affected by Experimental diets

Haematological parameters	Treatments		
	Week 1	Week 2	Week 3
Packed cell volume (%)	36.25 ± 0.95*	36.50 ± 2.10	31.25 ± 1.55*
Haemoglobin concentration (gm/dl)	8.76 ± 0.41	8.94 ± 0.84	10.14 ± 1.27*
Total erythrocyte count (x 106/µl)	14.76 ± 0.75	17.47 ± 1.71	17.37 ± 1.69
Total leucocyte count (x 103/µl)	12.00 ± 0.36	12.08 ± 0.64*	10.08 ± 0.42*

***** = ($P < 0.05$)