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## HAEMATOLOGICAL PROFILE OF RAMS FED GRADED LEVELS OF CASSAVA PULP AND DRY POULTRY DROPPINGS BASED DIET

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### Abstract

The study was carried out to assess the haematological indices in rams fed cassava pulp and sun-dried poultry droppings as an alternative energy and protein source. A total of twelve West African Dwarf rams aged 9-12 months were used for the experiment of 70 days feeding trial. Chopped elephant grass (*Pennisetum purpureum*) was used as basal diet and four diets of Cassava pulp and Dry poultry droppings as concentrate supplements-based diets. The four diets (T<sub>1</sub> - 0% Cassava pulp and 0% Dry poultry droppings, T<sub>2</sub> - 25% Cassava pulp and 25% Dry poultry droppings, T<sub>3</sub> - 50% Cassava pulp and 50% Dry poultry droppings, and T<sub>4</sub> - 75% Cassava pulp and 75% Dry poultry droppings) were fed to the rams at the rate of 3% of the body weight. The rams were divided into four treatments in a completely randomized design. Data collected were haematological parameters such as packed cell volume, red blood cell, white blood cell, haemoglobin and many others. Data were analyzed using analysis of variance and the mean were separated using Duncan multiple range test. The haematological indices of the animals were within the normal range reported for sheep. The PCV, haemoglobin, RBC, WBC, platelet and lymphocyte were however significantly ( $P < 0.05$ ) higher in T<sub>1</sub> rams than other treatment groups. These are indications of no deleterious effect of cassava pulp and dried poultry droppings on the blood profile and health of the animals.

Key words: Haematology, Cassava pulp, Poultry droppings, Ram, Supplemental diet

### INTRODUCTION

Protein inadequacy in the diets of most people in a developing country like Nigeria has been a major concern to animal scientists. In Nigeria, protein consumption is below 67g/person/day recommended by the World Health Organization (WHO) ([Akintola et al., 1999](#)). There is therefore the need to increase the protein intake to a level which compares to that of the developed nations ([Okereke et al., 2005](#)). Efficient and intensive production of meat and milk can bridge the supply-demand of animal protein gap in Nigeria (FAO, 2010). However, effective and efficient sheep production cannot be enhanced optimally with the use of only conventional feedstuffs such as maize, soybean cake and fish meal owing to their exorbitant cost and erratic supply ([Akinmutimi, 2004](#)) and the competition both with humans and monogastric animals ([Ajayi et al., 2008](#)).

As a result of this, animal scientists are now looking inward for possible use of non-conventional energy and protein materials of agro-industrial waste which are cheap with comparable nutritive value, health friendly, readily available and without much usage by man ([Ndubueze et al., 2006](#); [Devendra and Leng, 2011](#)). One of such non-conventional feed resources is poultry droppings. Previous studies showed that it can be used as protein supplement (Ndubueze et al., 2006; Aro and Tewe, 2007; Bello and Tsado, 2014). The chemical composition of poultry dropping, especially the high nitrogen content is highly rich ([Lanyasunya et al., 2006](#)). Cassava pulp on the other hand is also rich in **metabolizable energy** and very well degraded in the rumen (Smith, 1988). It is available throughout the year and has been evaluated as feed stuff for small ruminants (Adegbola et al., 1989). A good balance between protein and energy in the ration is needed so that the requirements of ration quality are



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met. This study was therefore designed to assess the haematological indices in rams fed cassava pulp and sun-dried poultry droppings as an alternative energy and protein source.

**MATERIALS AND METHOD**

**Experimental site:** The experiment was carried out at the sheep and goat unit of the Institute of Agricultural Research and Training, Obafemi Awolowo University, Moor plantation Ibadan.

**Preparation of test ingredients:** Fresh poultry droppings were obtained from caged layers reared commercially. The poultry droppings were sun-dried for 5-6 hours daily for 3-5 days to a constant weight. As the drying progressed, the lumps were manually crushed to reduce the particle size. The dried droppings were later pounded using pestle and mortar and chopped into 5mm particle size for easy digestibility. Thereafter, it was packed into rice-sacks until needed and used as partial replacement for groundnut haulm. Fresh cassava pulp was also collected from Garri-processing firm located around Ibadan township. The pulps were spread on concrete floor and sun dried for 3 days to constant weight, after which the pulps were packed into rice-sacks and used as partial replacement for corn bran.

**Experimental animals and management:** Twelve sheep aged 9-12 months were used for the experiment. The animals were housed in individual pens and were acclimatized for 2 weeks. The animals were then allotted into four treatment groups with three animals per treatment before the commencement of the actual feeding trial. The experimental design was completely randomized design and the study lasted for 70 days.

**Preparation of Experimental diet:** Two experimental diets were prepared for the study: basal and supplementary diets. A total of 600 g of chopped elephant grass (*Pennisetum purpureum*) were fed as basal diet/ram/day. Four types of supplementary diets were prepared and fed (T1 = 0%CP and 0% DPD, T2 =25%CP and 25% DPD, T3 = 50% CP and 50 % DPD, T4 = 75% and 75% DPD); where CP =Cassava Pulp and DPD = Dried Poultry Droppings. The basal and supplementary diets were offered at the rate of 3% of body weight, respectively. The Metabolizable energy was calculated using the formulae of Guevara *et al.* (2008). The **gross composition** of the supplemental diet is presented in [Table 1](#).

**Table 1: Gross composition and calculated nutrients of experimental diets fed to rams**

Ingredients	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>
Cassava pulp	0.00	12.50	25.00	37.50
Corn bran	50.00	37.50	25.00	12.50
PKC	15.00	15.00	15.00	15.00
Groundnut haulm	15.00	11.25	7.50	3.75
Poultry dropping	0.00	3.75	7.50	11.25
Brewer Dried Grain	16.25	16.25	16.25	16.25
Bone meal	2.00	2.00	2.00	2.00

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<b>Limestone</b>	1.00	1.00	1.00	1.00
<b>Salt</b>	0.50	0.50	0.50	0.50
<b>Premix</b>	0.25	0.25	0.25	0.25
<b>Total (Kg)</b>	100	100	100	100

**Calculated Nutrients**

<b>Metabolizable Energy (MJ/kg DM)</b>	2181.22	2287.94	2394.73	2501.50
<b>Crude protein (%)</b>	12.49	11.87	11.25	10.63

CP=Cassava pulp; DPD= Dried poultry droppings, T1 = 0%CP and 0% DPD, T2 =25%CP and 25% DPD, T3 = 50% CP and 50 % DPD, T4 = 75% and 75% DPD

**Blood collection and evaluation:** The sheep were bled individually (2 sheep from each treatment) from the jugular vein puncture according to the standard procedure. This was done in the morning before the sheep were fed. Blood samples were collected into labelled sterile universal bottle containing EDTA (ethylenediamine-tetra-acetic acid) for haematological assessment. Blood samples collected were analyzed for full haematology including packed cell volume, haemoglobin, red blood cell (RBC), white blood cell (WBC), platelets, lymphocyte, neutrophils, monocytes and eosinophils as outlined by Mitruka and Rawnsley (1977). Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH) and Mean Corpuscular Haemoglobin Concentration (MCHC) were calculated using appropriate formula.

**Statistical analysis:** Data collected were subjected to ANOVA according to the procedure of Statistical Analysis System (SAS, 1999), and means were separated using Duncan's multiple Range Test of the same package at P<0.05.

**AND DISCUSSION**

Table 2 shows the haematological parameters of growing rams fed graded levels of cassava pulp and dried poultry droppings-based diet. The Packed cell volume range (29.00-34.00%) obtained in this study were within the range (22.00-37.00%) reported by Fajemisin *et al.* (2010), for normal healthy sheep. These values were also relatively close to (29.9-33.6%) reported by Mitruka and Rawnsley, (1977) for clinically healthy sheep. This is an indication that the dietary treatment did not have any harmful effect on the animals. The result obtained from the haemoglobin showed significant difference (P<0.05) between T<sub>1</sub> (10.8g/dl) and T<sub>2</sub> (9.25g/dl). The values reported in this study were within the range (7-15 and 8.15-10.75 g/dl) reported for West African Dwarf goats and WAD sheep by [Daramola \*et al.\*, \(2005\)](#) and [Akinyemi \*et al.\*, \(2010\)](#) respectively. The implication of the values obtained in this study is that the dietary proteins in all the diets were of high quality. The red blood cell values showed that T<sub>1</sub> rams (14.33 x10<sup>6</sup>µL) had significantly higher RBC than those in T<sub>2</sub> (12.83 x10<sup>6</sup>µL). However, all the values obtained in this study fell within the range (9-15x10<sup>6</sup>µL) for normal healthy sheep reported by Merck Manual (2016). For white blood cells, T<sub>1</sub> rams (6325x10<sup>3</sup>µL) and T<sub>2</sub> rams (6200 x10<sup>3</sup>µL) had significantly (P<0.05) higher values than those in T<sub>3</sub> (5625 x10<sup>3</sup>µL) and T<sub>4</sub> (5375 x10<sup>3</sup>µL) However, the values reported were within the range (4,000-12,000x 10<sup>3</sup>µL) reported by Radostits *et al.*, (2010). The values obtained in this study gave an indication that there was no

**RESULTS**

Table 2 shows



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microbial infection or presence of foreign bodies or antigens or parasites in the circulatory system of the experimental animals. It was observed that there was no significant ( $P>0.05$ ) difference in the blood constants MCV and MCHC, except for MCHC which was significantly lower in T<sub>1</sub> (31.78g/dl) and T<sub>2</sub> (31.87g/dl) but were within the normal range of MCV (28-40 fL), MCH (8-12Pg), MCHC (31-34g/dl) reported in sheep (Forhead, *et al.*, 2002). The differential counts of animals in all the treatment groups were within the normal ranges. The neutrophil, monocyte, lymphocyte and eosinophil were all within the normal range of 10-50% neutrophil, 40-75% lymphocyte, 1-5% monocyte and 1-8% eosinophil reported by Coles (1986). Low level of eosinophil within physiological range indicated lack of parasitic infection. The basophil level obtained did not portend any danger of a disease condition since they were within the reported range of 0-3% (Coles, 1986).

**Table 2: Haematological indices of rams fed graded levels of cassava pulp and layer poultry droppings**

Parameters	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	P value
PCV (%)	34.00 <sup>a</sup>	29.00 <sup>b</sup>	30.00 <sup>ab</sup>	30.50 <sup>ab</sup>	0.03
Hb (g/dl)	10.80 <sup>a</sup>	9.25 <sup>b</sup>	9.80 <sup>ab</sup>	9.90 <sup>ab</sup>	0.01
RBC (x10 <sup>6</sup> µL)	14.33 <sup>a</sup>	12.83 <sup>b</sup>	13.32 <sup>ab</sup>	13.28 <sup>ab</sup>	0.02
WBC (x10 <sup>3</sup> µL)	6325.00 <sup>a</sup>	6200.00 <sup>a</sup>	5625.00 <sup>b</sup>	5375.00 <sup>b</sup>	0.00
MCV (fL)	23.72	22.61	23.38	22.91	0.52
MCHC (%)	31.78 <sup>b</sup>	31.87 <sup>b</sup>	32.80 <sup>a</sup>	32.47 <sup>ab</sup>	0.03
MCH (Pg)	7.53	7.21	7.32	7.44	0.64
Platelet (x10 <sup>3</sup> µL)	114500 <sup>a</sup>	92500 <sup>b</sup>	103000 <sup>ab</sup>	112500 <sup>ab</sup>	0.01
Lymphocyte (%)	67.00 <sup>a</sup>	56.00 <sup>b</sup>	63.50 <sup>a</sup>	63.50 <sup>a</sup>	0.00
Neutrophil (%)	29.00 <sup>b</sup>	40.00 <sup>a</sup>	31.50 <sup>a</sup>	32.50 <sup>a</sup>	0.01
Monocyte (%)	1.50	2.00	2.50	2.50	0.14
Eosinophil (%)	2.50	2.00	2.50	1.50	0.25

<sup>ab</sup>= Means on the same row with different superscripts are significantly ( $P<0.05$ ) different. PCV= Packed cell volume, Hb= Haemoglobin, RBC= Red blood cell, WBC= White blood cell, MCV= Mean corpuscular haemoglobin, MCH= Mean corpuscular haemoglobin, MCHC= Mean corpuscular haemoglobin concentration, T<sub>1</sub> = 0% CP and 0% DPD, T<sub>2</sub> =25% CP and 25% DPD, T<sub>3</sub> = 50% CP and 50 % DPD, T<sub>4</sub> = 75% and 75% DPD

**CONCLUSION**

The result of haematological constituents of the West African Dwarf rams showed no adverse effect on the blood profile and health of the animals. Consequently, up to 75% inclusion level of cassava pulp and dry poultry droppings could be fed to sheep without adverse effect.

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