BLOOD AND SERUM CHARACTERISTICS OF GROWING RABBITS (*Oryctolagus cuniculus*) FED PLANTAIN LEAF MEAL AS A DIETARY SUPPLEMENT

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ABSTRACT
This research was done to ascertain the effect of plantain leaf meal supplement on the blood and serum characteristics of growing Oryctolagus cuniculus. A ten (10) week feeding trial was carried out using twenty-four (24) growing rabbits of Chinchilla Breed having an age range of 7 to 9 weeks and initial average weight range of 610.14 to 624.49g. A well structured Completely Randomized Design (CRD) was used with four treatments of six experimental animals each. They were replicated into three (3) of two (2) rabbits in each. The control treatment (diet 1) had no plantain leaf meal supplement (PLMS) while diets 2, 3 and 4 had 200, 300 and 400g of plantain leaf meal supplement (PLMS) respectively. Result on the blood parameters revealed that white blood cell, packed cell volume, haemoglobin and mean corpuscular volume were significantly (P<0.05) imparted while red blood cell, mean corpuscular haemoglobin, and mean corpuscular haemoglobin concentration were not significantly (P>0.05) influenced by the treatment diets. Alanine aminotransferase, total protein and cholesterol were shown to be significantly (P<0.05) affected whereas aspartate amino transferase, albumin, globulin, creatinine and urea were not significantly (P>0.05) by the experimental diets. The blood and serum indices in this research deduced that they were within ranges for normal wellbeing of the animals suggesting that the experimental ingredient was tolerated.
Keywords: Blood, Serum, *Oryctolagus cuniculus,* Treatment.

INTRODUCTION

Incorporation of herbaceous plants may be a lee way out of the problems associated with feeding of the farm animal in Nigeria and beyond. Food nutrients exert serious impact on the growth and performance of livestock irrespective of the stage/stages of production. Etchu *et al*. (2017) observed that the rabbits are specially endowed with a feeding habit that may not pose direct competition with man for available food ingredients. The domestic rabbit will eat most type of green vegetables, grain, tuber and root. Therefore, the ration may consist almost entirely of ingredients from plant sources, kitchen wastes such as uncooked vegetables, cereals and remains of meals. Its production knows no bounds as it is generally acceptable across religions and tribes. Rabbit is a very good source of protein in human diet and could effectively alternate other animals' protein sources (Irekefe-ekeke *et al*., 2023). Among the topmost characteristics promoting the rearing of *Oryctolagus cuniculus* are high fecundity, growth rate and the ability to utilize forages and turn out low cost feeding materials into high quality proteins (Biobaku and Dosumo, 2003). Egbo *et al.* (2001) stated that rabbits are good converters of feed to meat and utilize up to 30% fibre as against 10% by most poultry species.

Efforts must be made to incorporate herbs and other plant parts in feeding and management practices. Odoemelan *et al*. (2013) posited that up to one-third of all commercial swine and chicken rations in Europe use mixtures of herbs and spices to accelerate growth and maintain good health. Plantain *(Musa paradisiaca)* is a local plant found virtually in all rural agrarian communities across Africa. It produces long and overlapping leafs with young stem(s) (Oladiji *et al*., 2010). *Musa paradisiaca* leaves, roots, stem and fruits have been reported to have useful traditional pharmaceutical purposes in the management and treatment of diarrhoea, dysentery, ulcerative colitis, diabetes, nephritis, gout, hypertension, cardiac disease etc (Ghani, 2003). The need to determine the effect of plantain leave meal (PLM) on the haematology and serum of growing rabbit has become overwhelmingly imperative as it is a common and locally available herbaceous plant that the animal consume.

MATERIALS AND METHODS

Experimental Location

The experiment took place at the Rabbit Unit of the Teaching and Research Farm of Dennis Osadebay University, Asaba, Delta State, Nigeria. The farm is situated on longitude 60° 45°E and latitude 60° 12° N in the derived Savanna Vegetation zone. That is, about four kilometers from the River Niger with a day temperature range of 27.50°C to 30.90°C (Federal Ministry of Aviation; Department of Metrological Services, Asaba, 2014). The annual rainfall spans 1800mm-3000mm which alternates with dry season.

Experimental Design and Animals

The feeding trial was experimented using completely randomized design (CRD) in four (4) dietary treatments. The control (diet 1) had no plantain leaf meal supplement (PLMS) while diets 2, 3 and 4 had 200, 300 and 400g of PLMS. Twenty-four (24) growing rabbits of Chinchilla Breed about 7 to 9 weeks old with an initial average weight of 610.14 to 624.49g were used for the experiment. They were purchased from a reputable farm in Agbor, Delta State, Nigeria. The animals were balanced for their weight to ensure weight equalization. The animals were separated into three (3) replicates of two (2) rabbits in each per treatment. Before the arrival of the animals, the pens were thoroughly washed, cleaned and adequately disinfected. They were allowed two weeks' acclimatization period before the commencement of the feeding trial. To reduce stress arising from journey, they were given vitalyte extra. The animals were allowed access to experimental feed *ad libitum* throughout the 10-week experimental period. The pens were adequately protected and alluminium feeders and waterers were strategically located and pinned to the cage. They were proper care (medication, feeding, sanitation etc).

Sample Source and Preparation

Young leaves of about-to fruit plantain plants were harvested from the school compound of Dennis Osadebay University, Asaba and were air dried at room temperature (20-25^{oC}). They were considered dried when they began to break and were crushed to produce PLMP and incorporated into the experimental diets shown below.

Table 2: Ingredient and calculated composition of the experimental diets

Ingredients (%)	T_1 000g PLM	T_2 200g PLM	T_3 300g PLM	T_4 400g PLM
Maize	50.00	50.00	50.00	50.00
Palm kernel meal	13.50	13.50	13.50	13.50
Wheat offal	12.00	12.00	12.00	12.00
Fish meal	5.00	5.00	5.00	5.00
Soybean meal	15.00	15.00	15.00	15.00
Bone meal	2.50	2.50	2.50	2.50
Oyster shell	1.00	1.00	1.00	1.00
Palm oil	0.50	0.50	0.50	0.50
Vit. & Min. Premix	0.25	0.25	0.25	0.25
Common salt	0.25	0.25	0.25	0.25
	100	**100**	**100**	**100**
Calculated composition				
Metabolisable energy (Kcal/g)	2.56	2.56	2.56	2.56
Crude protein	18.23	18.23	18.23	18.23

Data Collection

At the terminus of the experiment, three rabbits were selected from each treatment making a total of twelve rabbits for blood samples collection. Blood samples were collected through the ear vein of each rabbit using a sterilized disposable syringe and needle before their meal. Some samples (2 ml) of blood were collected into labelled sterilized tube containing ethylene diamine-tetra-acetic (EDTA) as anti-coagulant which was used for haematogical determination while another set (2 ml) of blood samples were collected from the rabbits into labeled heparinised tubes without EDTA and for the serum biochemical assessment. Alanine amino transferase, and aspartate amino transferase activity were assessed using spectrophotometric method. The red blood cell (RBC), white blood cell (WBC), haemoglobin (Hb) concentration and packed cell volume parameters were determined as described by Improved Neubaur after dilution and cyanomethamoglobin methods as described by Dacie and Lewis (1991). Other parameters such as mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), and mean corpuscular haemoglobin concentration (MCHC) and serum metabolites such as total protein (TP), albumin, creatinine and urea were determined using appropriate method as described by Hyduke (1995). Globulin was calculated as the difference between albumin and serum TP (Dacie and Lewis, 1991).

Data Analysis

Data generated for determination were subjected to analysis of variance (ANOVA) and significant differences were compared using Duncan Multiple Range Test as outlined by Steel and Torrie (1990) with the aid of SAS (1999) package.

RESULTS AND DISCUSSION

Table 3 below revealed the haematological indices of growing *Oryctolagus cuniculus* fed supplemented diets of plantain leaf meal. While the test ingredient significantly (P<0.05) imparted on some blood characteristics (white blood cell, packed cell volume, haemoglobin and mean corpuscular volume); it revealed no significant (P>0.05) difference on other parameters (red blood cell, mean corpuscular haemoglobin and mean corpuscular haemoglobin concentration) tested.

Table 3: Blood Indices of *Oryctolagus cuniculus* as influenced by the dietary supplement of plantain leaf meal

Induces	T_1 000g	T_2 200g	T_3 300g	T_4 400g	SEM
WBC (x 10^6/ml)	4.79^b	4.82^b	5.48^a	5.56^a	0.01
RBC (x 10^6/ml)	6.88	6.87	7.00	7.14	0.02
PCV (%)	41.00^c	42.51^b	42.57^b	43.73^a	0.01
Haemoglobin (g/dl)	13.15^b	14.06^a	14.29^a	14.83^a	0.01
MCH (pg)	19.50	19.47	20.00	20.02	0.01
MCHC (%)	5.33	5.79	5.79	6.00	0.01
MCV (fl)	62.44^a	60.23^b	60.25^b	60.14^b	0.02

abc: means in the same row with different superscripts are significantly (P<0.05) different.
* WBC == white blood cell; RBC == red blood cell; PCV == packed cell volume; MCH == mean corpuscular haemoglobin; MCHC == mean corpuscular haemoglobin concentration; MCV == mean corpuscular volume.

The result obtained for PCV was at variance with the findings of Enyenihi *et al.,* (2019) but agreed with their report on white blood cell parameter which indicated significant (P<0.05) difference. Other indices that were significantly (P<0.05) influenced include haemoglobin and mean corpuscular volume. It could be deduced that the result for test ingredients were better compared to the control diet (treatment 1) for haemoglobin. This does not however conform with the values for mean corpuscular volume which showed that the control diet was better than the treatment diets (2, 3 and 4) implying that the test ingredient did not exert influence on MCV. The findings of this research on RBC, MCH and MCHC corroborate with the result of Enyenihi *et al,* (2019) whose report revealed no significant (P>0.05) difference with values that are within the acceptable ranges.

Table 4: Serum Indices of *Oryctolagus cuniculus* as Influenced by the Dietary Supplement of Plantain Leaf Meal

Indices	T_1 000g	T_2 200g	T_3 300g	T_4 400g	SEM
AST (u/l)	35.64	35.91	36.18	36.35	0.01
ALT (u/l)	29.04^a	26.46^b	25.81^b	25.34^b	0.03
Albumin (g/dl)	2.17	2.51	2.70	2.70	0.01
Total protein (g/dl)	5.39^b	6.11^a	6.44^a	6.75^a	0.01
Globulin (g/dl)	2.14	2.22	2.32	2.44	0.01
Cholesterol (mmol/l)	1.86^b	1.91^b	2.15^a	2.63^a	0.01
Creatinine (mg/l)	0.86	0.89	0.89	0.91	0.01
Urea (mmol/L)	4.54	4.32	4.45	4.59	0.01

abc: means in the same row with different superscripts are significantly (P<0.05) different. * aspartate amino transferase, alanine amino transferase.

Table 4 above depicts the effect of plantain leaf meal supplement on some serum characteristics of growing *Oryctolagus cuniculus*. Aspartate amino transferase (AST) showed no significant (P>0.05) difference across treatments including the control while alanine amino transferase (ALT) revealed significant (P<0.05) difference between the experimental diets and the control diet. Values for albumin, globulin, creatinine and urea were not influenced significantly (P>0.05). This is in agreement with the report of Irikefe *et al.,* (2023) with slight discrepancies in their values. This result revealed that values obtained were within the acceptable range for each of the parameters assayed. Urea had values ranging from 4.32 to 4.59 (mmol/l) which is also within the recommended (4.6 – 10.4 (mmol/l)) range. The experimental treatments proved better than the control diet on the total protein parameter suggesting that the ingredient must be naturally endowed with protein and that it was well utilized by the experimental animals. Result obtained for cholesterol showed that there was a progressive dose related (1.86 to 2.63 mmol/l) increment of cholesterol with increased supplementation of PLM. This may suggest that the test ingredient was hypolipidemic.

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