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(Short Communication)

Hematological profile of Weaner Rabbits fed graded levels of Sweet Potato

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Target Audience: Rabbit producers, Livestock researchers and Animal physiologist/scientist

Abstract

The study assesses the impact of the replacement of maize with graded levels of sweet potatoes on hematological parameters so as to establish its threshold level in rabbit's feed. Twenty-four New Zealand white weaners of similar age and weights (average weight 840g) were at random, divided into four graded dietary treatment groups designated T1-(0%), T2 (25%), T3 (50%) and T4 (75%) (n=6 per group) in a completely randomized experimental design (CRD). The results showed significant variations (P<0.05) in the values of hemoglobin (HB), packed cell volume (PCV), red blood cell (RBC), white blood cell (WBC) and platelets except for leucocytes and neutrophils that were not significantly affected (P>0.05) by the dietary treatments. A significant increase (P<0.05) in mean hemoglobin (HB) was observed in Treatments 2 and 3. Treatments 4 and 1 were not significantly affected by the treatment. The mean PCV values showed a similar trend. Treatments 2 and 3 were significantly higher (P<0.05) than Treatments 4, while Treatments 1 and 4 were not significantly (P<0.05) different. Leucocytes had no significant difference (P>0.05) amongst the treatment groups. RBC was significantly higher in treatment 3 (P<0.05) than in treatments 4, 1 and 2 respectively. White blood cell (WBC) was significantly higher in T1 than in T2, T3, and T4. The effect on neutrophil was not significantly different (P>0.05) amongst the treatment groups. Blood Platelets was significantly higher (P<0.05) in T1, 2 and then in Treatment 4. The study concludes that replacement of maize up to 75% with sweet potatoes in weaner rabbit diets was adequate and does not have an adverse impact on the hematological parameters.

Key words: Hematology, weaner rabbits, sweet potatoes.

Description of Problem

One of the major challenges facing livestock production in the tropics remains the high costs of conventional feeds due to high cost of grains (energy sources) (1,2) and competyetion between human, industrial and confectionaries for its use (2). Several past studies have been carried out to find solution to this problem by trying to find out cheap and easy alternatives to conventional feeds raw materials which are cheap and available (2,3). This is because reduction in the cost of feeds will significantly reduce the overall cost of production and increased profitability.

Sweet potato, (*Ipomia batatas)*, is such an important untapped tropical food crops that is capable of filling the gap. It is an ancient tropical food plants aborigine of tropical America and Pacific Island observed as a potential livestock energy supplement

especially in the tropics with ease of cultivation and greater yield. It is rich sources of protein, carbohydrates and fats (5).(6) reported that it is more economical to feed rabbits sweet potatoes as energy supplements than conventional rabbit's pellets. (7) Observed hemopoietin effect of sweet potatoes leaves at 3mls and 5mls body weights stimulation of hemopoietin organs (liver and bone marrow). In poultry model, (8) recommended an inclusion level of 5% sweet potatoes for enhanced weight gain, feed conversion and up to 10% for enhanced haematological parameters in broiler chicken diets.

The choice for domestic rabbits (*Oryctolagus cunniculus*) is as a result of its obvious unique comparative advantages than other farm animal species such as hind gut fermenters with well adapted digestive tract suitable for digesting large quantity of forages that is typical of herbivores, they can survive on vegetation ranging from grasses, legumes, shrubs and tree leaves unlike other non-ruminants (9), source of healthful food with low cholesterol and high in protein (10).

Animal's blood parameter provides the opportunity to analyse its physiological, nutritional and pathological status (11) and it aids in diagnosing nutritional and or environmental stress (12).

There are relatively information dearth on rabbits blood parameters fed sweet potatoes considering its relatively high energy contents, there is need therefore to assess its impact on blood characteristics to ascertain its safety as a potential replacement for maize in livestock feeds. The aim of this study is to determine haematological status of weaner rabbits fed graded levels sweat potatoes.

Materials and Methods:

The study was approved by Department of Animal Science, Faculty of Agriculture Research Committee, and University of Port Harcourt. The experiment was carried out at the rabbitry Unit of the Faculty of Agriculture demonstration farm, University of Port Harcourt. Port Harcourt lies along Bonny River, an upstream ofGulf of Guinea.The animals (New Zealand white breeds) were housed in hutches in rabbit's pens characterized by enough air spaces for proper dissipation of heat and ventilation. They were allowed to acclimate for one week, during which they were fed conventional rabbit grower's pellet and clean tap water on *ad libum* bases.

Experimental Design

Twenty-four New Zealand white rabbit weaners of similar age and weights (average weight 840g) were used for the study. The rabbits were randomly divided into four dietary treatment groups (n=6 per group) in a completely randomized experimental design (CRD) with each rabbit as a replicate. The treatments were dietary replacement of maize on weight basis with sweet potato at graded levels of 0%, 25%, 50% and 75% for diets T1, T2, T3 and T4 respectively. The rabbits were weighed at the beginning of the experiment to obtain the initial body weight. The experimental diets were offered ad libitum throughout the eight weeks experimental period.

Test ingredient-

Sweet potatoes obtained from Crop Science Department, University of Port Harcourt, were sun dried and grounded into powder, was used to replace maize as the energy source in rabbit pelleted diets. Other ingredients used for the formulation of the diets are maize, groundnut cake, palm kernel cake, soya bean meal, wheat bran, salt, vitamin/mineral premix, bone meal, and Soya oil (Table 1).

Table 1: Composition of Experimental Diets

Ingredients (%)	Treatment 1	Treatment 2 (25%)	Treatment 3 (50%)	Treatment 4 (75%)
Maize	35	26.5	17.5	8.5
Sweet potato	0	8.5	17.5	26.5
Palm kernel cake meal	15.25	15	16	16
Soya bean meal	8	8.25	8.25	9.25
Groundnut cake meal	8	9	10	10
Wheat bran	25	25	26	25
Brewer's Dry Grain	5	4	2	2
Soya oil	2	2	1	1
Bone meal	1	1	1	1
Vit/min premix	0.25	0.25	0.25	0.25
Salt	0.5	0.5	0.5	0.5
Total	100	100	100	100
Calculated Nutrient Composition of Dietary treatments				
Crude protein	18.40	18.34	18.25	18.22
Energy	2520.06	2387.7	2163.3	2033.47
Oil	6.24	5.92	4.63	4.28
Crude Fibre	7.45	7.09	6.83	6.51
Lysine	0.68	0.69	0.70	0.71
Methionine	0.28	0.27	0.27	0.26
Calcium	0.48	0.48	0.48	0.48
Phosphorus	0.69	0.68	0.67	0.64

Collection of blood samples

After eight weeks feeding trial, blood samples were collected with a syringe and decanted into well labelled Ethylene-deamine-tetra-acetic acid (EDTA) reinforced sample containers and stored at -20^{o}C until analysed. WBC (Leucocytes) was analysed by blood smear and Giemsa dye. White cell differential count was determined by making a thin smear film, and allowed to dry and thereafter, stained with Leishman stain for 2 minutes, the stain diluted with buffered water for 8 minutes and washed off with distilled water, air dried and observed using oil immersion objective (x100). Haemoglobin was measured using hemotest. Haematocrit assessed according to Wintrobe methods (13).Erythrocytes and platelets were analysed using (14) method.

Statistical analysis

Data obtained from the laboratory analysis were subjected to analysis of variance (ANOVA) using (15).

Results

The influence of sweet potato on the haematological characteristics of the test rabbit animals is presented in Table 2. The result shows significant variation ($P<0.05$) in the values of haemoglobin (HB), packed cell volume (PCV), red blood cell (RBC), white blood cell (WBC) and platelets except leucocytes and neutrophils that were not significantly affected ($P>0.05$) by the treatments. Significant increase ($P<0.05$) in mean haemoglobin (HB) was observed in Treatments 2 and 3. Treatments 4 and 1 were not significantly affected by the treatment. The

mean PCV values showed a similar trend. Treatments 2 and 3 were significantly higher (P<0.05) than Treatments4, while Treatments 1 and 4 were not significantly (P<0.05) different.

The effects on leucocytes revealed no significant difference (P>0.05) amongst the treatment groups. RBC was significant different in treatment 3(P<0.05) thantreatments4, 1 and 2. White blood cell (WBC) was significantly higher in T1, than T2, T3 and T4.The effect on neutrophil were not significantly different (P>0.05) amongst the treatment groups.Blood Platelets were in T1, 2 and 3 were significantly higher (P<0.05) than in Treatment 4.

Table 2: Effect of haematological parameters on growing Rabbit offered different levels of sweet potato

Parameters	1 (Control)	2	3	4	SEM
Haemoglobin	9.9^{ab}	10.57^{a}	10.57^{a}	7.57^{b}	0.77
Packed Cell Volume	29.67^{ab}	31.67^{a}	31.3^{a}	22.67^{b}	2.37
Leucocytes	36.0	44.33	45.00	42.67	3.46
Red Blood Cell	4.17^{ab}	4.20^{ab}	4.40^{a}	2.87^{b}	0.48
White Blood Cell	7.23^{a}	6.77^{b}	4.23^{c}	3.23^{d}	0.13
Neutrophil	64.00	55.67	55.00	57.33	3.46
Platelet	210^{a}	223.33^{a}	236.67^{a}	156.67^{b}	14.89

Mean in the same horizontal axis with different superscript$^{a,b,c,d.}$differs significantly (P < 0.05)

Discussion

Haematological characteristics of animals are greatly influenced by the quantity and quality of feed consumed by animals (16). Although, haemoglobin (HB), packed cell volume (PCV), red blood cell (RBC) and white blood cell (WBC) concentrations showed variation between treatment groups (P < 0.05), the values obtained for all groups were within normal ranges as described by (17). The observed increments in the values of haemoglobin, Packed cell volume (PCV), Red blood cell (RBC) and White blood cell (WBC) concentrations in treatments 2 and 3 demonstrates how well tolerated the test animals handled the sweet potatoes supplemented diets. The observed significant improvement in haemoglobin in treatments 2 and 3 demonstrates an increase in the transportation of oxygen from the lungs to the various body tissues. The sweet potato could have impacted positively in enhancing feed conversion efficiency thereby increasing blood production. This supports earlier study (7), that reported hemopoietin effect and stimulation of hemopoietin organs (liver and bone marrow) of sweet potatoes leaves at concentration of 3mls and 5mls body weights. Also (18) opined that an increase in RBC profilemay be connected with freedom of diseases. The PCV values obtained in this study showed that the rabbits were well nourished and this corroborates the findings of (19) who reported that the physiology of farm animals is affected by several factors, such as nutrition.

The results of the diferential WBC count (Neutrophils and Leucocytes) which showed no significant impact indicated that the sweat potato treated groups are not battling with any toxicological or disease impact from the treatment, and is not poisonous nor contain an irritant as to initiate any negative immunological responses. White blood cells (WBC) are used to predict the immune

response of an animal to stress from an irritant antigen and or poison. Also (20) observed that normal WBC range indicated that the animals are healthy; a decrease in WBC below normal range is an indication of allergic conditions, anaphylactic shock and certain parasitism. Also (21) reported that reduced WBC count, reflects fall in the production of body defence system toinfection. From this study, the treatment had no significant influence on the treated groups and theirvalues were within reported normal standard suggesting that sweet potato at inclusion levels of up to 75% is safe for use as feed supplements.

Conclusion and Application

Based on the result obtained,

1. It appeared that the replacement of maize up to 75% in weaner diet was adequate as performance enhancer as it did not elicit any adverse effect on the hematological parameters.

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