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# Haematological Indices of ISA Brown Birds Fed diets Containing Guinea Hen Weed (*Petiveriaalliacea*) leaf and Root Meals

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**Abstract**

*Haematological indices of ISA brown growerbirds fed diets incorporated with Petiveriaalliacea leaf meal (PLM) and Petiveriaalliacearoot meal(PRM) were investigated in a 21-weeks trial. A total of 450 birds were divided into ten treatments groups of forty-five birds with three replicate of fifteen birds. The diets contained PLM and PRM at five levels of inclusion; (0, 1000, 1500, 2000 and 2500 mg/kg). The experiment was arranged in a 2 × 5 factorial layout in a completely randomized design (CRD).Amidst varying inclusion of PLM and PRM, birds fed diets containing 1500 mg/kg of PLM showed decreased (P<0.05) PCV. Birds fed diets containing 1500 and 2500 mg/kg of PLM reduced (P<0.05) RBC in comparison to other inclusion levels of plant parts. When compared to birds fed varying inclusion of PLM and PRM; least (P<0.05) WBC were obtained in birds fed diets containing 1000 and 2000 mg/kg of PRM. In conclusion, addition ofPetiveria leaf and root meal affected haematology indices as values obtained fell within normal range for healthy birds.*

## Introduction

The use of antibiotic-based growth promoters is presently facing serious criticism and has raised global concern as some reports revealed their ill effects among which are the development of microbial resistance to the products and their potential harmful effects on human health (Rahmatnejad *et al*., 2009). These shortcomings has led to the search for alternatives substances that eliminates these threats. Recently, there is an increasing interest in the utilization of growth promoters from natural origin (Holden *et al*., 1998., Grela and Klebanuik, 2007). Rahmatnejad *et al*.(2009) reported that medicinal plants and herbs are one of the natural feed additives currently used in poultry diets to enhance the performance and immune response of birds.Biovet, (2005) opined that many active ingredients present in the plant are considered as pro-nutrients and recently been tried in animal feeds.

## Materials and Method

*Petiveriaalliacea* was harvested around the Federal University of Agriculture, Abeokuta (FUNAAB). The roots were washed, chopped into bits followed by sun drying for 14 days (≤ 90% DM). *Petiveriaalliacea* leaves were washed, air dried under a shed (29±2$^0$C) until they were crispy to touch, while retaining their greenish colouration. Both the leaves and roots were milled (1mm sieve) using a laboratory mill to obtain a product referred to as *Petiveria* leaf meal (PLM) and *Petiveria* root meal (PRM). The entire test ingredients were stored in an air tight container at room temperature until when needed.

A total of 450 (16 weeks) point of lay ISA brown were obtained from a reputable source in Ogun state for the study. The birds were fed the test diets and managed intensively on dip litter throughout the duration of the experiment. The birds were subjected to ten treatment groups of 45 grower chicks. Each treatments was further divided into three replicate of fifteen birds each in a 2 × 4 factorial arrangements of; 2 plant parts (leaf and root) and 4 inclusion levels of PLM and PRM (0 mg/kg, 1000 mg/kg, 1500 mg/kg and 2000 mg/kg and 2500 mg/kg).

At the 21stweek of the study, blood samples were drawn from the wing (bronchial vein) of the birds into (EDTA) bottles for haematological indices according to method of Jain, (1986) and Davice and Lewis, (1991) respectively. Data obtained were laid out in a 2 × 5 factorial arrangement and significant means were separated using Duncan multiple range tests (Duncan, 1955).

## Results

The interactive effects of plant part and levels of inclusion of plant parts on haematological indices of laying *birds* (37 weeks) showed significant (P<0.05) effects on PCV, RBC, WBC, heterophil, eosinophil, basophil and monocyte. Amidst varying inclusion of PLM and PRM, birds fed diets containing 1500 mg/kg of PLM showed decreased (P<0.05) PCV. Birds fed diets containing 1500 and 2500 mg/kg of PLM reduced (P<0.05) RBC when compared to other inclusion levels of plant parts. When compared to birds fed varying inclusion of PLM and PRM; least (P<0.05) WBC were obtained in birds fed diets containing 1000 and 2000 mg/kg of PRM.

Table 1. **Gross composition (%) of experimental layers diets (16-37 weeks)**

| **PLM (mg/kg)** | **PRM (mg/kg)** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Ingredients** | 0 | 1000 | 1500 | 2000 | 2500 | 0 | 1000 | 1500 | 2000 | 2500 |
| Maize | 48.00 | 48.00 | 48.00 | 48.00 | 48.00 | 48.00 | 48.00 | 48.00 | 48.00 | 48.00 |
| Wheat offal | 14.00 | 14.00 | 14.00 | 14.00 | 14.00 | 14.00 | 14.00 | 14.00 | 14.00 | 14.00 |
| SBM | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 |
| GNC | 8.75 | 8.75 | 8.75 | 8.75 | 8.75 | 8.75 | 8.75 | 8.75 | 8.75 | 8.75 |
| FM (72%) | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 |
| PKC | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| BM | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 |
| Oyster Shell | 8.50 | 8.50 | 8.50 | 8.50 | 8.50 | 8.50 | 8.50 | 8.50 | 8.50 | 8.50 |
| Lysine | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Methionine | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| *Premix | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| Salt | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| PLM | - | + | ++ | +++ | ++++ | - | - | - | - | - |
| PRM | - | - | - | - | - | - | + | ++ | +++ | ++++ |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| **Calculated Proximate composition (%)** | | | | | | | | | | |
| M.E (kcal/kg) | 2672.00 | 2672.00 | 2672.00 | 2672.00 | 2672.00 | 2672.00 | 2672.00 | 2672.00 | 2672.00 | 2672.00 |
| C.P | 17.07 | 17.07 | 17.07 | 17.07 | 17.07 | 17.07 | 17.07 | 17.07 | 17.07 | 17.07 |
| C.F | 4.03 | 4.03 | 4.03 | 4.03 | 4.03 | 4.03 | 4.03 | 4.03 | 4.03 | 4.03 |
| E.E | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 | 3.28 |
| Ash | 2.54 | 2.54 | 2.54 | 2.54 | 2.54 | 2.54 | 2.54 | 2.54 | 2.54 | 2.54 |

Vit./ Min. Premix contains: Vits. A, 10 000 000iu; $D_3$, 2 000 000iu; E, 13 000iu; $K_3$, 1 500mg; $B_{12}$, 10mg; riboflavin, 5 000mg; pyridoxine, 1 300mg; thiamine, 1 300mg; D-Pantothenic acid, 8 000mg; nicotinic acid, 28 000mg; folic acid, 500mg; biotin, 40mg; Cu, 7 000mg, Mn, 48 000mg; Zn, 58 000mg; Fe, 58 000mg; Se, 120mg; I, 60mg; Co, 300mg; choline, 275 000mg; methionine, 20 000mg; BHT, 5 000mg. PLM: *Petivera* Leaf Meal. PRM: *Petivera* Root Meal. – = exclusion levels – = exclusion levels. += 1000 mg/kg, ++ =2000 mg/kg, +++ = 2500 mg/kg.

Table 2. **Effects of PLM and PRM inclusion on haematological indices of laying birds (37 weeks)**

| Treatment | | PCV (%) | Hb (g/dl) | RBC ($\times10^{12}$/l) | WBC ($\times10^{9}$/l) | HET (%) | LYM (%) | BAS (%) | EOS (%) | MON (%) | MCV (fl) | MCH (Pg) | MCHC (g/dl) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Plant parts | Levels of Inclusion | | | | | | | | | | | | |
| PLM | | 32.00 | 10.50 | 2.66 | 13.46 | $34.00^{b}$ | 64.00 | $0.60^{b}$ | 0.30 | 1.00 | 120.66 | 39.63 | 32.85 |
| PRM | | 34.00 | 11.08 | 2.88 | 12.87 | $37.60^{a}$ | 60.20 | $1.00^{a}$ | 0.40 | 0.80 | 119.21 | 38.82 | 32.57 |
| SEM | | 0.907 | 0.278 | 0.084 | 0.466 | 1.074 | 1.505 | 0.164 | 0.083 | 0.152 | 2.998 | 0.966 | 0.737 |
| | 0 | $35.75^{a}$ | 11.53 | 2.98 | 13.12 | $34.75^{b}$ | 63.25 | $0.75^{bc}$ | $0.25^{bc}$ | $1.00^{ab}$ | 120.13 | 38.75 | 1.49 |
| | 1000 | $34.25^{a}$ | 11.10 | 2.75 | 12.55 | $34.75^{b}$ | 62.25 | $0.50^{bc}$ | $0.75^{a}$ | $1.50^{a}$ | 124.73 | 40.43 | 1.50 |
| | 1500 | $30.00^{b}$ | 10.13 | 2.50 | 14.42 | $40.75^{a}$ | 57.75 | $0.25^{c}$ | $0.25^{bc}$ | $1.00^{ab}$ | 120.05 | 40.50 | 1.54 |
| | 2000 | $32.50^{ab}$ | 10.53 | 2.80 | 12.80 | $36.00^{b}$ | 62.75 | $1.00^{ab}$ | $0.00^{c}$ | $0.25^{c}$ | 118.60 | 38.35 | 1.46 |
| | 2500 | $32.50^{ab}$ | 10.68 | 2.82 | 12.92 | $32.75^{b}$ | 64.50 | $1.50^{a}$ | $0.50^{ab}$ | $0.75^{bc}$ | 116.18 | 38.10 | 1.79 |
| | SEM | 1.324 | 0.429 | 0.127 | 0.708 | 1.553 | 2.459 | 0.150 | 0.072 | 0.183 | 4.849 | 1.556 | 1.211 |
| PLM | 0 | 36.00 | 11.50 | $3.05^{ab}$ | $13.10^{ab}$ | $33.50^{bc}$ | 64.00 | $1.00^{c}$ | $0.00^{c}$ | $1.50^{b}$ | 117.90 | 37.70 | 31.95 |
| | 1000 | 33.00 | 10.65 | $2.60^{bc}$ | $13.55^{ab}$ | $33.50^{bc}$ | 64.00 | $0.50^{d}$ | $0.50^{b}$ | $1.00^{c}$ | 127.10 | 41.00 | 32.25 |
| | 1500 | 29.00 | 9.95 | $2.40^{c}$ | $13.60^{ab}$ | $39.00^{ab}$ | 59.00 | $0.00^{e}$ | $0.50^{b}$ | $1.50^{b}$ | 120.85 | 41.45 | 34.20 |
| | 2000 | 31.50 | 10.45 | $2.80^{abc}$ | $15.10^{a}$ | $34.00^{bc}$ | 65.50 | $0.00^{e}$ | $0.00^{c}$ | $0.50^{d}$ | 112.95 | 37.40 | 33.15 |
| | 2500 | 30.50 | 9.95 | $2.45^{c}$ | $11.95^{ab}$ | $30.00^{c}$ | 67.50 | $1.50^{b}$ | $0.00^{c}$ | $0.50^{d}$ | 124.50 | 40.60 | 32.60 |
| PRM | 0 | 35.50 | 11.55 | $2.90^{abc}$ | $13.15^{ab}$ | $36.00^{abc}$ | 62.50 | $0.50^{d}$ | $0.50^{b}$ | $0.50^{d}$ | 122.35 | 39.80 | 32.50 |
| | 1000 | 35.50 | 11.55 | $2.90^{abc}$ | $11.55^{bc}$ | $36.00^{abc}$ | 60.50 | $0.50^{d}$ | $1.00^{a}$ | $2.00^{a}$ | 122.35 | 39.85 | 32.55 |
| | 1500 | 31.00 | 10.30 | $2.60^{bc}$ | $15.25^{a}$ | $42.50^{a}$ | 56.50 | $0.50^{d}$ | $0.00^{c}$ | $0.50^{d}$ | 119.25 | 39.55 | 33.15 |
| | 2000 | 33.50 | 10.60 | $2.80^{abc}$ | $10.50^{c}$ | $38.00^{ab}$ | 60.00 | $2.00^{a}$ | $0.00^{c}$ | $0.00^{e}$ | 124.25 | 39.30 | 31.65 |
| | 2500 | 34.50 | 11.40 | $3.20^{a}$ | $13.90^{ab}$ | $35.50^{bc}$ | 61.50 | $1.50^{b}$ | $0.50^{b}$ | $1.00^{c}$ | 107.85 | 35.60 | 33.00 |
| SEM | | 1.905 | 0.623 | 0.160 | 0.760 | 2.067 | 3.585 | 0.046 | 0.020 | 0.052 | 6.925 | 2.265 | 1.889 |
| P-values | | | | | | | | | | | | | |
| Plant parts | | 0.0926 | 0.1367 | 0.0625 | 0.3854 | 0.0070 | 0.0832 | 0.0349 | 0.2120 | 0.2500 | 0.7469 | 0.5726 | 0.8021 |
| Levels of Inclusion | | 0.0454 | 0.1951 | 0.1400 | 0.4416 | 0.0052 | 0.3376 | 0.0021 | <.0001 | 0.0022 | 0.8098 | 0.7127 | 0.9130 |
| Plant parts x Levels of Inclusion | | 0.1825 | 0.4067 | 0.0379 | 0.0059 | 0.0275 | 0.5962 | <.0001 | <.0001 | <.0001 | 0.7019 | 0.7497 | 0.9965 |

[abcde]means on the same row having different superscript were significantly (P<0.05) different. SEM: Standard Error of Mean, Conc: Concentration, PCV: Packed Cell Volume, Hb; haemoglobin, RBC: Red Blood Cell, WBC: White Blood Cell, HET: Heterophil, LYM: Lymphocyte, EOS: Eosinophil, BAS: Basophil, MON: Monocyte, MCV: Mean Corpuscular Volume, MCH: Mean Corpuscular Haemoglobin, MCHC: Mean Corpuscular Haemoglobin Concentration.

## Discussion

Haematological characteristics of livestock have been discovered as factors determining the response of livestock to the diet they are fed (Madubuike *et al.,*2006). The RBC at 1500 mg/kg of PLM was lower when compared with other inclusion levels of PLM and PRM. Increase in the count of RBC, Hb and PCV is suggestive of polycythemia and positive erythopoisis (Okpuzor *et al*., 2009). Hence, the values obtained for this parameters were within reported range of (1.58-3.82 $x10^{6}$/µL RBC and 9.2-28.6 $x10^{3}$/$mm^{3}$WBC) as recorded by Mitruka and Rawnsley (1981). Masood*et al.*(2013) opined that a number of natural compounds such as saponin, tannins and flavonoids have been reported for their antioxidant. Elevated WBC counts have been recorded under diseased condition, infection or immune system disorder (Maroufyan *et al.,* 2010). The observed differences obtained in WBC differentials such eosinophil; basophil and monocyte are within the reported range of eosinophil and monocytes of $0-0.5$ and $0-5\times10^{3}$/l respectively for clinically healthy birds (Aiello *et al.,* 1998).

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