PHYSIOLOGICAL RESPONSE OF PULLET CHICKS FED DIETS CONTAINING *Moringa oleifera, Ocimum gratissimum* and *Vernonia amgydalina* LEAF MEAL-BASED DIETS

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ABSTRACT
Blood reflects the pathological status of animals exposed to toxicants and other conditions. Blood examination helps to clinically investigate the presence of metabolites and other constituents in the body of animals and plays vital roles in the physiological, nutritional and pathological status of animals. Blood constituents change in relation to the physiological status of an animal.A total of 144 one-day-old Isa-brown pullet chicks were randomly picked, weighed and distributed to the 4 diets with 4 replicates of 9 chicks each from a total of 357 one-day-old Isa-brown pullet chicks in a completely randomized design (CRD). Four feeds were formulated to meet the NRC requirement and while T1 was the control, T2, T3 and T4 contained 2% of *Moringa oleifera, Ocimum gratissimum* and *Vernonia amgydalina* leaf meals respectively. At the end of the experiment which lasted for 8 weeks 2 birds were randomly selected from each replicate for haematological and serum biochemical examination.All the haematological parameters measured were not significant ($P>0.05$) except eosinophils and for serum biochemistry cholesterol and albumin globulin ratio were significantly different ($P<0.05$). The highest value (3.50 %eosinophils) was observed in the birds on diet 4 which had 2% of *Vernonia amgydalina* leaf meal and these birds also had the lowest (139.25 mg/dl) cholesterol value. It was therefore concluded that 2% of these leaf meals especially of *Vernonia amgydalina* can be incorporated in the diets of pullet chicks to reduce their blood cholesterol and boost their immunity.

Keywords: Haematology, Serum biochemistry, Pullet chicks, Leaf meals, Parameters.

INTRODUCTION
Blood is a vital special circulatory tissue which is composed of cells suspended in a fluid intercellular substance (plasma) with the major function of maintaining homeostasis (Isaac *et al.*, 2013). Haematology refers to the study of the numbers and morphology of the cellular elements of the blood – the red cells (RBC), white cells (WBC), and the platelets (thrombocytes) with their use in disease diagnosis and monitoring (Merck Manual, 2012). Haemtological studies function in diseases diagnosis and in investigating the level of damage to the blood (Onyeyili, *et al.*,, 1992; Togun *et al.*, 2007). Haematological components, which consist of RBC,WBC or leucocytes, mean corpuscular volume, mean corpuscular haemoglobin and mean corpuscular haemoglobin concentration are valuable in monitoring feed toxicity especially with feed constituents that affect the blood and of course the health status of farm animals (Oyawoye & Ogunkunle, 2004). RBC is a carrier of haemoglobin. It is this haemoglobin that reacts with oxygen carried in the blood to form oxyhaemoglobin during respiration (Johnston & Morris, 1996; Chineke *et al.*, 2006). The major functions of the WBC and its differentials are to fight infections, defend the body by phagocytocis against invasion by foreign organisms and to produce or at least transport and distribute antibodies in immune response. (Soetan *et al.*, 2013) and enhance adaptability to local environmental and disease prevalent conditions (Okunlola *et al.*, 2012; Isaac *et al.*, 2013). Feed components greatly influence blood parameters and especially now that so

many unconventional ingredients are mostly included in livestock diets to reduce cost of production or improve the products obtained from such livestock to meet consumers needs as they are mostly medicinal. The use of plant parts (roots, stems, leaves or a combination of one or more) in livestock feeds have been successfully carried out with great success Some of which are *Moringa oleifera (drumstick leaf), Ocimum gratissimum (saint leaf)* and *Vernonia amgydalina (bitter leaf).* Essential oils are present in these plants (Xu*et al.,* 2008) and antibacterial activities occur by reason of active substances in these essential oils (Cristani *et al.,* 2007).*Moringa oleifera* is a good source of vitamins, amino acids and has medicinal uses (Francis *et al.,* 2005) which have been used in the treatment of numerous disease conditions (heart disease and obesity) due to its hypo-cholesterolemic property (Ghasi *et al.,* 2000; Matthew *et al.,* 2001).Oil from the leaves of *Ocimum gratissimum* has been found to possess antiseptic, antibacterial and antifungal activities (Edeoga, 2001). *Vernonia amygdalina* has been used as anti-malaria, purgative, anti-parasitic, treatment of eczema and for maintaining blood glucose levels (Nwanjo *et al.,* 2004). It is rather unfortunate that despite these properties and functions records are hardly available on the effect of the use of these medicinal plants on pullet chicks. This project was therefore designed to investigate the effects of using *Moringa oleifera, Ocimum gratissimum* and *Vernonia amgydalina* leaf meals on the blood parameters of pullet chicks.

MATERIALS AND METHODS

Test ingredients: Branches from matured trees/ shrubs of *Moringa oleifera, Ocimum gratissimum* and *Vernonia amgydalina* were cut at the vegetative phase and leaves were removed by hand. The leaves were air dried to constant weight hand-crushed and milled before incorporation into the diets.

Experimental diets: Chick mash was formulated to meet the specification of NRC . T1 being the control, T2 to contain 2kg MOLM/100kg feed, T3 to contain 2kg OGLM/100kg feed T4 to contain 2kg VALM/100kg feed (chick mash) respectively.

Experimental design: 144 one-day-old Isa-brown pullet chicks were randomly picked, weighed and distributed to the 4 diets with 4 replicates of 9 chicks each from a total of 357 one-day-old Isa-brown pullet chicks in a completely randomized design (CRD). They were mass brooded for 8 weeks in a well ventilated poultry house on deep litter. Water and feed were provided *ad libitum*. Routine vaccination was done according to the hatchery's recommendation. This experiment lasted for 8weeks.

Data collection: Blood were collected at the 8th week for haematological examination, 2 birds per replicate were bled using hypodermic needle and syringe. Blood was drained into bottles pre-treated with EDTA, an anticoagulant and carefully labeled for haematological investigation. Packed cell volume (PCV) and Haemoglobin (Hb) (Mitruka and Rawnsley, 1977).Erythrocyte count (RBC) and Leukocyte count (WBC) (Schalms *et al.*, 1975). Blood constants: Mean Cell Volume, Mean Cell Haemoglobin and Mean Cell Haemoglobin Concentration (Jain, 1986)

Proximate analysis: The test ingredients and the feeds samples were analyzed using methods recommended by Association of Official Analytical Chemists (A.O.A.C.1990).

Statistical analysis: Statistical analysis was carried out using one way analysis of variance of SAS (SAS, 1999) package.

Results and discussion: Of all the parameters measured for the three leaf meals, only the eosinophils which is one of the components of the white blood cells that functions in the allergic conditions, asthma, hay fever, urticarial, parasitism and skin diseases (scabies, eczema, psoriasis, pemphigus) was significant ($P< 0.05$).The highest value (3.50 %) was observed in the birds on diet 4 which had 2% of *Vernonia amgydalina* leaf meal it also had the lowest (139.25 mg/dl) cholesterol value , followed by those on diet 2 with a value of (2.87 %)

observed in chicks fed 2% *Moringa oleifera* leaf meal and (162.63 mg/dl) cholesterol value, the next were those on the control diet with a value of (2.12 %) but it had the highest value (177.88 mg/dl) for cholesterol and the least value was observed in bird fed 2% *Ocimum gratissimum* (2.00 %) with(152.75 mg/dl) cholesterol. This is in agreement with the report of Nworgu *et al.* (2013) that ocimum reduced the blood cholesterol of growing pullets but some other parameters were significant in his work which were not significant in this work. This variation may be due to age difference of the pullets used. Though the normal blood parameters for pullet chick are yet to be well documented. Mitruka and Rawnsley (1977) reported a decrease in eosinophil count in acute infections and marked intoxication and since the leaf meals used contained some anti-nutrients (alkaloids, tannins, saponins *e.t.c.*), it is not then suprising that there was an increase in the eosinophils observed in the blood of the chicks fed the leaf meals compared with the control diet.

CONCLUSION: It can therefore concluded that 2% of these leaf meals especially of *Vernonia amgydalina* can be incorporated in the diets of pullet chicks to reduce their blood cholesterol and boost their immune system.

RECOMMENDATION

Further researches should be conducted on pullet chicks in the tropics in other to establish a database for blood parameters of tropical birds.

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TABLE 1: Haematology and some serum biological parameters of the experimental birds at the chick phase (8WKS)

TREATMENT	T1	T2	T3	T4	SEM
Packed cell volume (%)	27.75	25.87	27.37	28.25	1.55
Haemoglobin (g/dl)	9.21	8.10	8.93	9.05	0.55
Red blood cell (10^6/mm^3)	3.08	2.94	3.01	2.97	0.25
White blood cell (10^3/mm^3)	17.51	16.54	16.48	16.48	1.11
Platelet (10^3/mm^3)	123.00	135.25	140.13	132.88	0.61
Lymphocytes (%)	66.25	68.375	64.87	67.50	1.99
Heterophils (%)	28.50	26.12	29.50	26.50	2.22
Monocyte (%)	2.87	2.25	3.25	2.37	0.42
Eosinophils (%)	2.12^{b}	2.87^{ab}	2.00^{b}	3.50^{a}	0.32
Basophils (%)	0.2	0.37	0.37	0.12	0.12
Mean cell volume (fl)	91.00	88.24	91.63	95.93	4.39
Mean cell haemoglobin concentration (g/dl)	33.18	31.04	32.02	32.10	0.77
Mean cell haemoglobin (pg)	30.18	27.35	29.95	30.82	1.51
Total protein **(g/dl)**	5.13	4.87	4.56	4.55	0.21
Albumin **(g/dl)**	1.65	1.86	1.70	1.55	0.11
Globulin **(g/dl)**	3.16	2.68	2.83	3.00	0.15
Ag ratio	0.51^{ab}	0.66^{a}	0.60^{ab}	0.47^{b}	0.05
Cholesterol **(mg/dl)**	177.88^{a}	162.63^{ab}	152.75^{ab}	139.25^{b}	9.06
Tryglyceride **(%)**	178.88	174.75	145.38	154.63	14.19
High density lipoprotein **(%)**	67.75	62.75	57.87	70.37	5.30
Low density lipoprotein **(%)**	74.35	64.93	52.38	51.45	10.43

[abc]Means within the row with different superscripts differs significantly (P< 0.05).