Haematological Indices of Pullets Fed with Varying Dietary Levels of Incorporated *Moringa oleifera* Leaf Meal

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ABSTRACT

The present study evaluates the haematological indices of pullets fed with varying dietary levels of incorporated *Moringa oleifera* leaf meal. One hundred pullets at point of lay were purchased from the Kogi State University Poultry department and were randomly allocated into five treatment groups of twenty pullets each, designated as T_1 (control), T_2, T_3, T_4 and T_5 respectively, housed in deep litter pen in the experimental poultry house of the same University and were fed with formulated feed containing 0%, 0.3%, %, 0.9% and 1.2% dietary levels of leaf meal incorporated diets and water provided ad libitium. The pullets were fed with the feed formulation for eight weeks after which blood samples were aseptically collected and analyzed for packed cell volume, haemoglobin, and red blood cells, mean corpuscular haemoglobin concentration, mean corpuscular haemoglobin, lymphocytes and heterophils. Data collected were statistically analyzed using one way analysis of variance (ANOVA) on statistical product and service solution (SPSS) version 20, at 95% confidence level ($p < 0.05$). Results showed that at four weeks, therewas a statistical significant difference ($p < 0.05$) in the white blood cells and heterophils while other parameters did not exhibit any statistical significant difference ($p > 0.05$). At 8 weeks, no statistical significant difference ($p>0.05$) was observed in all the parameters. This shows that *Moringa oleifera* leaf meal did not significantly affect the haematological profiles of the pullets at point of lay.

Key Words: *Moringa oleifera*, pullets, haematological indices.

INTRODUCTION

Poultry are generally raised for their meat and eggs, and are important sources of edible animal protein. Poultry meat accounts for 30% of global meat consumption (Appleby *et al.*, 1992). The worldwide average per capital consumption of poultry meat has nearly quadrupled since the 1960s (11kg in 2013 compared with 3kg in 1963, (Sherwin *et al.*, 2010). A major constraint to poultry production in Nigeria is very high cost of conventional feeding stuff (especially the primary energy and protein sources) which has resulted in declining productivity of poultry production (Kitalyi and Mayer, 1998). Leaf meals have been incorporated in the diets of poultry as a means of reducing the high cost of conventional protein source (Nworgu *et al.*, 2003).The inclusion of protein from leaf source in the diet for breed of Leghorn layers is rapidly increasing because of its relatively reduced cost, abundance, availability and a shift from the use of conventional to unconventional feed, thereby reducing pressure on conventional feed ingredients

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and accelerates the attainment of food security in Nigeria (Fajimi *et al.,* 1993).

Large number of alternative feed stuffs with promises as to poultry feed ingredient abound in Nigeria (Ologbolo, 1992). One of the common, cheap and quality alternative feed sources from indigenous plant species is *Moringa oleifera.*

Moringa oleifera is used as an African folk medicine for the treatment of ascites, rheumatism, venomous bites and pneumonia (Manaheji, 2011; Ndiaye, 2002), and in other places (Philippines) it is used for circulatory disorders, metabolic and endocrine disorders, and general nutrition deficiencies. It has some usage in the prevention of diabetes and glucose disturbances (Africa) and also wound healing (Satish, 2012) and as an aphrodisiac (Mutheeswaran, 2012).

Moringa oleifera leaves are rich in both essential and sulphur-containing amino acids (Benette *et al.,* 2003). Similarly, findings by Makkar and Becker (1997) suggest *Moringa oleifera* leaves could be a good source of protein supplement for high production of eggs. However, the fat content in *Moringa oleifera* leaves is considerable low, while the carbohydrate content is comparable with many of the carbohydrate rich cereals and vegetables after dehydration. (Joshi and Mehta, 2010).

Haematology refers to the study of the numbers and morphology of the cellular elements of the blood- the red cells (Erythrocytes), white cells (Leukocytes), and platelets (Thrombocytes) and the use of these results in the diagnosis and monitoring of disease (Merck, 2012). The blood transports or conveys nutrients and materials to different parts of the body. Therefore, whatever affects the blood;drugs, pathogenic organism or nutrition will certainly affect the entire body adversely or moderately in terms of health, growth, maintenance and reproduction (Oke *et al.,* 2007). A readily available and fast means of assessing clinical and nutritional health status of animals on feeding trials maybe the use of blood analysis, because ingestion of dietary components have measurable effects on blood composition (Church *et al*., 1984; Maxwell *et al*., 1990), and may be considered as appropriate measure of long term nutrition status (Olabanji *et al.,* 2007).

According to Togun and Oseni (2005), haematological studies have been found useful for disease prognosis and for the therapeutic and feed stress monitoring. Adamu *et al*., (2006), observed that nutrition has significant effect on haematological values like PCV, Hb and RBC. Bawak (2007) reported that when the haematological values fall below the normal range reported for the animal, it could be due to the harmful effects of high dietary contents. Physiological and nutritional status of animals could cause differences in values observed for PCV and MCV.

This study is to evaluate the effect of diet supplemented with varying levels of *Moringa oleifera* leaf powder on the haematological profiles of pullets.

MATERIALS AND METHODS

Geographical location of research

The research was conducted at the Poultry Unit of the Teaching and Research Farm of the Department of Animal Production, Faculty of Agriculture, Kogi State University, Anyigba. Anyigba is located on latitude 7 ^{0}30'N and longitude 6^{0}43'E with an altitude of 420m above sea level. The zone is characterized by 6-7 months of average annual rainfall of about 1600mm, the daily temperature range is about 25^{0}C- 35^{0}C (Ifatimehin, 2011).

Animal care and experimental design

One hundred pullets at point of lay were purchased from the Kogi State University Poultry department and

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were randomly allocated into five treatment groups of twenty pullets each designated as T_1 (control), T_2, T_3 , T_4 and T_5 respectively, were housed in deep litter pen in the experimental poultry house of the same University and were fed with formulated feed containing 0%, 0.3%, 0.6%, 0.9% and 1.2% dietary levels of leaf meal incorporated diets and water provided ad libitium. The Pullets were vaccinated according to schedule with Newcastle Disease Vaccine (Komarov) (Goni, 1974).

Experimental Diet formulation

Table 1 below show the composition of the experimental diet formulation

Table 1: Gross Composition of Experimental Diets for Pullets Fed incorporated *Moringa oleifera* leaf meal

INGREDIENTS	**COMPOSITION (%)**				
	T1 (0.0%)	**T2 (0.3%)**	**T3 (0.6%)**	**T4 (0.9%)**	**T5 (1.2%)**
Moringa leaf meal	0.00	0.08	0.16	0.24	0.32
Maize	31.82	31.82	31.82	31.82	31.82
FFSBM	26.43	26.36	26.27	26.19	26.11
BDG	14.00	14.00	14.00	14.00	14.00
Rice Offal	6.00	6.00	6.00	6.00	6.00
Maize Offal	11.00	11.00	11.00	11.00	11.00
Bone Meal	3.00	3.00	3.00	3.00	3.00
Lime Stone	7.00	7.00	7.00	7.00	7.00
Salt	0.25	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25	0.25
Vitamin/ Mineral Premix	0.25	0.25	0.25	0.25	0.25
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Where, FFSBM is Full Fat Soy Bean Meal and BDG is Brewers' Dried Grains

Blood collection and analysis

Blood (5 ml) each was collected from the pullet's wing vein at the eight weeks of the experiment using syringe and injectable into a set of well labeled sterile bottles containing Ethylene Diamine tetra-acetic acid (EDTA) as anti-coagulant. The blood samples were analyzed for haematological parameters (Packed Cell Volume (PCV), Red Blood Cell (RBC), White Blood Cell (WBC), Lymphocytes, Haemoglobin (Hb), Eosinophils, Mean Corpuscular Haemoglobin Concentration (MCHC), Mean Corpuscular Volume (MCV) and Mean Corpuscular Haemoglobin (MCH).

Statistical analysis

The results obtained were analysed by the analysis of variance (ANOVA) at 95 % confidence level ($p < 0.05$) using statistical product and service solution (SPSS) version 20.

RESULTS

The effects of feeding different levels of *incorporated Moringa oleifera leaf meal* (MOLM) to the pullets is

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shown in **Table 2**.

The results show that at 4 weeks post arrival of the Pullets, there was statistical significantly difference ($p < 0.05$) in the values for white blood cells and heterophils. However, no significant statistical difference ($p > 0.05$) was recorded in PCV, Hb, RBC, MCV, MCH, MCHC, and Lymphocyte. The WBC of T5 (1.2% *Moringa oleifera*) was statistical significantly difference ($p<0.05$) from the rest of the treatments. The heterophils of T4 (0.9% *Moringa oleifera*) and T2 (0.6% *Moringa oleifera*) were statistical significantly difference ($p < 0.05$) from T1 and T3 but not statistically significantly difference ($p > 0.05$) from T5.

Result of 8 weeks post arrival of the pullets, showed that, there was no statistical significant difference ($p > 0.05$) in PCV, WBC, RBC, MCV, MCH, MCHC, and Heterophils. However, statistical significant difference ($p < 0.05$) was recorded in Hb and Lymphocytes. For Haemoglobin, treatment T4 (0.9% *Moringa oleifera*) was statistical significantly difference ($p < 0.05$) from T2 (0.3% *Moringa oleifera*) but not statistically significantly difference ($p > 0.05$) from the rest. For Lymphocyte, treatment T3 (0.6% *Moringa oleifera*) there was a statistical significant difference ($p < 0.05$) from T1 but no statistical significant difference ($p > 0.05$) from the rest.

Table 2: Haematological Profile of Pullets fed with incorporated *Moringa oleifera* leaf meal (MOLM) at 4 weeks after the arrival of the Pullets

Parameter	**T1**	**T2**	**T3**	**T4**	**T5**	**SEM**	**LOS**
PCV (%)	39.31^{a}	36.92^{a}	35.04^{a}	40.90^{a}	37.10^{a}	2.82	NS
Hb (g/l)	178.00 a	170.50 a	144.50 a	199.00 a	180.00 a	21.31	NS
WBC ($X10^{9}/1$)	3.05^{b}	6.03^{ab}	4.17^{ab}	5.96^{ab}	8.65^{a}	1.69^{a}	S
RBC ($X\ 10^{12}/1$)	2.12^{a}	7.39^{a}	2.31^{a}	6.02^{a}	8.12^{a}	4.60	NS
MCV (f/g)	86.00^{a}	66.00^{a}	71.00^{a}	79.00^{a}	60.50^{a}	12.75	NS
MCH (p/g)	19.60^{a}	25.25^{a}	17.65^{a}	24.15^{a}	24.11^{a}	6.55	NS
MCHC (g/l)	159.50 a	207.00 a	249.50 a	167.00 a	209.50 a	35.60	NS
LYMPH (%)	35.50^{a}	35.00^{a}	36.00^{a}	39.00^{a}	33.21^{a}	6.68	NS
HETER (%)	38.00^{c}	50.00^{a}	43.00^{b}	50.00^{a}	46.50^{ab}	1.70	S

Where, PCV: Packed Cell Volume, Hb: Haemoglobin, RBC: Red Blood Cell, MCV: Mean Corpuscular Volume, MCH: Mean Corpuscular Haemoglobin, MCHC: Mean Corpuscular Haemoglobin Concentration, LYMPH: Lymphocyte, Heter: Heterophil. Values with same superscript a, and ab, are statistical significant, NS denotes no significance which S denotes significance.

Table 3: Haematological Profile of Pullets fed with incorporated *Moringa oleifera* leaf meal (MOLM) at 8 weeks after the arrival of the Pullets

Parameters	**T1**	**T2**	**T3**	**T4**	**T5**	**SEM**	**LOS**
PCV (%)	37.97^{a}	36.91^{a}	35.00^{a}	40.82^{a}	35.93^{a}	3.62	NS
Hb (g/l)	157.50^{ab}	149.00^{b}	161.50^{ab}	193.00 a	177.50^{ab}	15.92	S
WBC($X10^{9}/1$)	2.65^{a}	6.05^{a}	5.74^{a}	4.01^{a}	5.63^{a}	1.83	NS
RBC($X10^{12}/1$)	6.10^{a}	6.57^{a}	6.14^{a}	2.44^{a}	6.18a	4.33	NS
MCV (f/g)	75.00^{a}	75.00^{a}	65.50^{a}	75.00^{a}	72.50a	13.57	NS

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MCH (p/g)	19.15[a]	19.15[a]	21.55[a]	17.15[a]	24.55[a]	4.45	NS
MCHC (g/l)	195.00[a]	208.5[a]	181.00[a]	169.00 a	166.00[a]	56.21	NS
LYMPH (%)	33.50[b]	38.00[ab]	43.00[a]	41.00[ab]	38.50[ab]	3.44	S
HETER (%)	40.50[a]	47.50[a]	42.00[a]	46.50[a]	47.00[a]	6.80	NS

Where, PCV: Packed Cell Volume, Hb: Haemoglobin, RBC: Red Blood Cell, MCV: Mean Corpuscular Volume, MCH: Mean Corpuscular Haemoglobin, MCHC: Mean Corpuscular Haemoglobin Concentration, LYMPH: Lymphocyte, Heter: Heterophil. Values with same superscript a, and ab, are statistical significant, NS denotes no significance which S denotes significance.

DISCUSSION

All the haematological parameters measured in the present study were within the normal physiological ranges as reported for the pullets most especially haemoglobin, packed cell volume, red blood cells, white blood cells, heterophils, and lymphocytes (Jenkins, 1993; Hillyer, 1994). Madubuike and Ekenyem (2006) indicated that haematological characteristics of layers suggested their physiological disposition for the plane of nutrition. The PCV, RBC, Hb, WBC, MCV, MH, MCHC, platelets and leukocyte differential counts of Pullets fed with the formulated diets and the control were not statistically significantly influenced by the dietary treatments, except the neutrophils which were not higher in the pullets. This observation agrees with the results of Ghasi *et al.* (1999) and Ewuola *et al.* (2011) who reported that crude extract from *Moringa* leaves was found to be a potent hypocholesteroleic agent.

Haematological characteristics of pullets have been observed as factors determining the response of some Puppets to the diet in which they are fed (Khan *et al.,* 2005; Madubuike *et al.,* 2006). The results of this study showed no statistical significant difference ($p>0.05$) for most of the parameters measured. This finding is similar to the result of Ewuola *et al.* (2011) who reported that, there was statistical significant difference ($p > 0.05$) across the treatments for growing pullets fed with incorporated *Moringa oleifera* leaf meal. Also the result indicated that most of the parameters measured fell within the reference range for healthy chicken (Mitruka *and* Rawnsly, 1977).

In conclusion, it is deductible from the results of this work that incorporation of *Moringa oleifera* leaf meal fed to Pullets increased their general performance and did not show any negative effects on them. It is however recommended to producers of poultry feeds to incorporate *Moringa oleifera* to the feed of pullets. Further studies are on the above subjects using higher levels are hereby recommended.

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