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THEME: SECURING ANIMAL AGRICULTURE AMIDST GLOBAL CHALLENGES

EFFECT OF DIETARY SUPPLEMENTATION OF *VERNONIA AMYGDALINA* LEAFMEAL, *MORINGA OLEIFERA* LEAF MEAL AND MIXTURE OF *VERNONIA AMYGDALINA* AND *MORINGA OLEIFERA* LEAF MEALS ON HAEMATOLOGICAL PARAMETERS OF BROILER CHICKEN

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ABSTRACT

This study assessed the effect of dietary supplementation of Vernonia amygdalina leaf meal, Moringa oleifera leaf meal and mixture of Vernonia amygdalina and Moringa oleifera leaf meals on haematological parameters of broiler chicken. A basal diet divided into four portions designated diet 1 (the control) and diets 2,3 and 4 supplemented with 0%, 0.2% of bitterleafmeal (BLM), 0.2% of moringa leafmeal (MLM) and 0.2% mixture of bitterleaf and moringa leafmeal, respectively. One hundred and forty four day old broiler chicks were randomly assigned to the four experimental diets (36birds per diet; 12 birds per replicate) replicated thrice using a Completely Randomized Design (CRD) . All data collected in these studies were subjected to analysis of variance using SPSS. Duncan's Multiple Range Test of one way ANOVA was used to analyse the mean differences of the same parameters.The haemoglobin (Hb), White Blood Cell (WBC) and lymphocytes were significantly (P<0.05) influenced by the experimental diets while PCV, granulocyte, monocyte, MCHC, MCH, MCV and RBC were not influenced (P>0.05) by the experimental diets. The result of this study suggested that supplementation of BLM, MLM and mixture of bitter leafmeal and moringa leafmeal were effective in boosting the immune system of the birds and poses no danger to the health of the birds.

Keywords: *Vernonia amygdalina , Moringa oleifera,* Haematology, broiler chicken, Immunology

INTRODUCTION

In recent years, interest has developed in many countries in the collection and extended use of medicinal plant extract for an alternative production purposes. Antibiotics have been used in poultry feed for improving growth performances, some specific pathogenic microorganism and increasing some useful microorganism in intestinal microflora over the years (Pangasa *et al*., 2007). Medicinal plants having various phytochemicals and bioactive components such as trace metal ions, vitamins, alkaloids, polyphenols, fats, carbohydrates and protein are involved in the enhancement of long term health benefits (Sravantha and Rao, 2014).Administration of *Moringa oleifera* leaf extract inhibited the growth of pathogenic gram positive and gram negative bacteria and antioxidant activity (Sreelatha and Padma, 2009). There has been an increased interest in the utilization of the *Moringa oleifera* as a feed additive in poultry nutrition necessitates through investigation into its nutritional value as a measure of both nutritional and medicinal benefits of the leaves in broiler chicken. Bitter leaf contains bioactive compound vernolide and vernodalol. Both compounds exhibited a significant bactericidal activity against gram positive (Sani *et al*., 2012). Ban on the use of antibiotics as feed additives have accelerated and led to investigations of natural alternative feed additive in animal production (Polat *et al*., 2011). Phytogenic feed supplements are a large group of compounds having diversified chemical bioavailability and structure (Surai, 2014). These phytogenic bioactive compounds in the plants vary depending on some factors such as the specific part of the plant, the harvest season, production techniques or methods and geographical location (Ganguly, 2013). Phytochemicals have some biological properties (antioxidant, antistress, antimicrobial and immunomodulatory) that prompt their consideration for use as growth promoters in livestock production (Hashemi and Davoodi, 2010). The feeding trial was conducted to

assess the effect of dietary supplementation of *Vernonia amygdalina, Moringa oleifera* and mixture of *Vernonia amygdalina* and *Moringa oleifera* in broiler chicken.

MATERIALS AND METHODS

The feeding trial was carried out at the poultry unit of the Teaching and Research farm of the department of Agricultural Technology, Federal Polytechnic, Ado-Ekiti. The poultry house was thoroughly washed with soap and disinfected. It was allowed to stay for two weeks before the arrival of the experimental birds. A total number of one hundred and forty four birds of Arboacre commercial breed were used in the experiment.

Test Ingredients :The test ingredients bitter leaf meal (BLM) and moringa leaf meal (MOLM) were prepared by harvesting fresh and matured bitter leaves and moringa leaves of different ages before flowering. The fresh leaves were subjected to air-drying in an open cleaned concrete floor space until moisture content became constant at 13%. The air dried leaves were latter milled using a commercial feed milling machine. The leaves were analyzed for proximate composition according to (AOAC, 2010).

Experimental Diets :The compositions of two experimental diets are presented in Table1 and 2.0. The four experimental diets used for this study were compounded on the floor at the premises of the Teaching and Reseach farm , department of Agricultural Technology. The four diets were formulated to be iso-nitrogenous and iso-caloric. Diet 1 was the control diet (diet without any supplementation). Diet 2 and 3 contained 0.2% of bitter leaf meal and 0.2% of moringa leaf meal, respectively. Diet 4 contained 0.2% mixture of bitter leafmeal and moringa leaf meal (1:1). All diets were formulated according to NRC (1994).

Management Practices : A total of one hundred and forty four day old unsexed chicks of commercial broiler strain Arbor-acre were obtained from a reputable hatchery for this study. During the brooding, enough provision was made for space, ventilation and protection against predators and extremes of weather. The birds were allotted to four treatments replicated thrice with twelve birds per replicate. During the brooding exercise, the chicks were given all recommended vaccination and medication. The experiment was Completely Randomized Design (CRD).

Blood collection : Blood samples collection was done in the morning after the birds were starved overnight in order to attain a stable haematological evaluation. Blood samples of birds were collected at the end of experiment. The samples were taken to the laboratory to determine the Packed Cell Volume (PCV), Haemoglobin (Hb), White blood cell, Granulocytes, Lymphocytes, Monocytes, Mean Corpuscular Haemoglobin Concentration (MCHC), Mean Corpuscular Volume (MCV) and Red Blood Cell (RBC).

Statistical Analysis: All data collected in this studies were subjected to analysis of variance using SPSS. Duncan's Multiple Range Test of one way ANOVA was used to analyse the mean differences of the same parameters. Significant differences were considered where necessary at a level ($p<0.05$).

RESULTS AND DISCUSSION

There were no significant differences ($p>0.05$) on PCV, granulocytes, monocytes, MCHC, MCV, MCH and RBC. The Hb, WBC and lymphocytes of birds were significantly ($p<0.05$) influenced by the experimental diets. The variations recorded in the white blood cell values and its differentials (lymphocytes) may indicate the immunomodulatory effects of the phytogenic supplements in the experimental birds as reported by Oloruntola *et al*. (2016). The white blood cells play a significant role in the fighting against an infection. However, the rise in (lymphocytes) of the birds fed the mixture of bitter leafmeal and moringa leaf meal could trigger a complex but beneficial immunomodulatory response in the birds. The phytochemicals such as flavonoids has been shown to possess immune-stimulatory properties by improving the activities of lymphocytes (Alipour *et al*., 2015).

CONCLUSION

The result of current study suggested that supplementation of bitter leaf meal, moringa leaf meal and mixture of bitter leafmeal and moringa leaf meal at 0.2% increase the level of packed cell volume and red blood cell, though the WBC and one of the differential's (lymphocyte) of birds on diets 3 and 4 were reduced, implies that bitter leaf meal, moringa leaf meal and the mixture were effective in boosting the immune system of the birds and poses no danger to the health of the birds.

RECOMMENDATION

Supplementation of broiler diets with moringa leafmeal increased the level of PCV and RBC than bitterleafmeal and the mixture of bitter leafmeal and moringa leaf meal. More studies are needed to elucidate other effects of bitter leaf meal, moringa leaf meal and mixture of bitterleafmeal and moringa leaf meal on the immune system of broiler chicken.

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Table 1.Composition of basal diet for broiler starter(g/100g)

Ingredients	**Compositions (%)**
Maize	55.0
Soybean meal	26.0
Groundnut cake	10.0
Fish meal	3.00
Bonemeal	3.00
Oyster shell	2.00
Nacl	0.25
Methionine	0.25
Lysine	0.25

Premix	0.25
Calculated nutrients (%)	
Crude protein	22.72
Metabolizable energy	2940.5
Calcium	2.1
Phosphorus	0.7

Table 2.Composition of basal diet for broiler finisher (g/100g)

Ingredients	**Compositions (%)**
Maize	65.0
Soybean meal	15.0
Groundnut cake	11.00
Fish meal	2.00
Bonemeal	4.00
Oyster shell	2.00
Nacl	0.30
Methionine	0.30
Lysine	0.20
Premix	0.20
Calculated nutrients (%)	
Crude protein	20.31
Metabolizable energy	2984.70
Calcium	2.33
Phosphorus	0.80

Table 3. Haematological indices of broiler chicken fed experimental diets

Parameters	**Treatment groups**				**SEM**	***p* -value**
	1(0%)	**2(0.2%)**	**3(0.2%)**	**4(0.2%)**		
PCV (%)	31.00	30.00	32.33	30.33	0.68	0.70
Hb (g/10L)	8.83^{c}	9.23^{c}	11.09^{a}	9.87^{b}	0.26	0.01
WBC ($\times10^{9}$/L)	4616.67^{a}	2966.67b	2000.00c	2833.33b	291.97	0.01
Granulocytes ($\times10^{9}$/L)	0.13	0.14	0.13	0.13	0.01	0.98
Lymphocyte($\times10^{9}$/L)	2.71^{a}	2.72^{a}	2.70^{a}	2.52^{b}	0.03	0.01
Monocytes ($\times10^{9}$/L)	0.12	0.12	0.14	0.14	0.01	0.62
MCHC (g/dl)	33.03	32.90	33.13	32.97	0.06	0.62
MCH (g/dl)	42.23	42.67	42.50	42.77	0.28	0.94
MCV(g/dl)	123.77	125.40	124.07	123.90	0.43	0.58
RBC($\times 10^{12}$/l)	2.23	2.33	2.30	2.36	0.06	0.91

Means within a row with different superscript differ significantly ($P<0.05$)
PCV packed cell volume, Hb haemoglobin, WBC,White blood cell, MCHC mean corpuscular haemoglobin concentration, MCH mean concentration volume, RBc red blood cell.