

EFFECT OF TURMERIC (*CURCUMA LONGA*) AS FEED ADDITIVES ON HAEMATOLOGICAL PARAMETERS OF BROILER CHICKENS

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ABSTRACT

The experiment was conducted to investigate the effect of turmeric (*Curcuma longa*) on haematological parameters of broiler chickens. A total of 108 day old arboacre broiler chicks were divided into three treatment groups in completely randomized design with a total of 12 experimental unit. The birds were assigned at the rate of 36 birds per treatment in 4 replicates of 9 chicks per replicate. Turmeric powder was supplemented to the feed at the rates of 0, 0.5 and 1% throughout the experiment (8weeks). Blood samples (3 birds per treatments) were collected through the jugular veins at the termination of the experiment. All data generated were subjected to analysis of variance ($p=0.05$). The samples were taken to medical laboratory to determine PCV, RBC, HB, MCV, MCH, MCHC, granulocyte, lymphocyte, monocyte and white blood cell. Result showed that turmeric supplementation positively affected the vital haematological constituents like Pcv, Hb and Rbc of birds fed 0.5 and 1.0% of turmeric but there was increased in monocytes values for birds on diets 2 and 3 which may be attributed to endogenous corticosteroid. It can be concluded that turmeric has the potential to improve immune response in broiler chickens and its use at 1.0% inclusion is hereby recommended for better results.

Keywords : Turmeric, haematology, feed additives, growth promoters and broiler chickens

Introduction

The ban of antibiotics growth promoters was problematic for growth performance and this has led to outbreak of diseases especially sub-clinical necrotic enteritis which led researcher to discover alternatives to synthetic antibiotics (Huyghebaert *et al.*, 2011). Different natural growth promoters are used as an alternatives to replace antibiotic growth promoter e.g enzymes antioxidants, herbs and medicinal plants. Herbs, medicinal plants and their extracts are excellent alternatives due to the different beneficial activities (Das *et al.*, 2012; Rana *et al.*, 2014). Phytogetic feed additives are ideal for poultry because they are natural residue free. Phytogetic growth promoter showed antimicrobial, antiparasitic and antitoxic effects. They enhanced feed consumption, improved digestion and growth performance, minimized the incidence of disease and increased profitability (Yitbreak, 2015). Due to its antimicrobial, antiparasitic and antitoxic properties, the use of turmeric in poultry feed become extensive during the last decade (Khan *et al.*, 2012). The active ingredient present in turmeric root is curcumin. Turmeric contains 3 different analogues of curcumin which contains 5% bis-demethoxycurcumin, 18% demethoxycurcumin and 77% diferuloylmethane curcumin is insoluble in water and soluble in methylsulfoxide, ethanol, oils and acetone (Aggarwal, 2007). Turmeric has good pharmacological properties and can be a useful antimicrobial and antitoxic and safe alternative to antibiotics. The aim of the study was to investigate the effect of different levels of turmeric (*Curcuma longa*) on the haematological parameters of broiler chickens.

MATERIALS AND METHODS

The experiment was conducted at Teaching and Research farm in Federal Polytechnic, Ado-Ekiti. The poultry was thoroughly washed and disinfected. The house was allowed to stay for two weeks before the arrival of the experimental birds. A total number of one hundred and eight broiler chicks of arboacre commercial breed were obtained from a reputable hatchery. In the poultry house used for this study, enough provision was made for space, ventilation and protection against predators and extremes of weather. The birds were used to assess the different levels of turmeric on the haematological parameters of broiler chickens. Three experimental diets used for this study were formulated according to (NRC 1994) at the premises of Teaching and Research farm, The Federal Polytechnic, Ado-Ekiti. Diet 1 was the control diet with no turmeric supplementation, diet 2 contained 0.5% of turmeric supplementation and diet 3 contained 1% of turmeric supplementation. All diets were supplemented with methionine and lysine. The treatments were given to the birds for the period of the experiment (8weeks). There were three treatments with four replicates per treatment. Nine birds were allotted per replicate amounting to 36 birds per treatment. During the brooding exercise, the chicks were given all the recommended vaccination and medication. The turmeric used for this study

was purchased from a local market in Ado-Ekiti, the test ingredient was washed, sliced and sun dried and later ground with grinding machine.

On the last day of experiment (56day), blood samples collection was done in the morning after the birds were starved overnight in order to attain a stable haematological evaluation. Four birds were randomly selected from each experimental diet and blood samples were collected from the jugular vein of the birds. About 3ml of blood samples were collected from each bird in labeled ethylene diamine tetra-acetate (EDTA) bottles to determine the haematological indices. The tubes were immediately capped and the contents mixed gently for about 1minute by repeated inversion. The samples were taken immediately to the laboratory to determine packed cell volume (PCV), total red blood cell (RBC) count, haemoglobin concentration (Hb), mean corpuscular haemoglobin concentration (MCHC), mean cell haemoglobin (MCH), mean corpuscular volume (MCV) was calculated as described by Lamb (1981). The white blood cell, neutrophils (N), lymphocytes (L), monocytes (M) and Eosinophils were determined by the micro-haematocrit method (Dacic and Lewis, 1991). The experiment was completely randomized design (CRD) with a total of 12 experimental units. All data collected in these studies were subjected to analysis of variance. Duncan's Multiple Range Test of one way ANOVA (SPSS17.0 for windows) was used to analyse the mean differences of the same parameter, significant differences were considered where necessary at a level of ($P < 0.05$).

Composition of experimental diets (g/100g) for

Broiler starter/finisher diets.

RESULTS AND DISCUSSION

The effect of the turmeric supplementation on haematological parameters is presented in Table 1. The mean RBC was significantly ($P < 0.05$) increased in birds on diets 2 and 3 than birds on control diet suggesting that turmeric supplementation at 0.5 and 1% found to stimulate RBC production at a slightly increased level of supplementation. The mean monocyte was significantly ($P < 0.05$) increased in birds on diets 2 and 3. The increased values of monocyte for birds on diets 2 and 3 may be attributed to endogenous corticosteroid which may be due to stress. The PCV, MCHC, MCV, MCH, HB, granulocyte, lymphocyte were not significantly ($P > 0.05$) influenced by turmeric supplementation. There were increase in PCV, HB and RBC values which are comparable with the findings of Ajit *et al.* (2014) and Vivian *et al.* (2015) who opined that the increase in the vital constituents like PCV, HB and RBC in birds fed with herbal ingredients like turmeric, garlic, ginger is an indication of improved oxygen carrying capacity of the cells which translated to a better availability of nutrients for utilization by the birds consequently affecting their wellbeing with an active immune system. They were also no sign of anaemia as the degree of anaemia is determined by HB, PCV and RBC count which were in the normal range. Thus, this findings strongly agree with Nagalakshmi *et al.* (1996) and Gowda *et al.* (2008) who reported that bitter principles of medicinal plants possess a strong influence on haematological traits depending on their nutritional status.

Conclusion and Recommendation

It can be concluded that turmeric has the potential to improve immune response in broiler chickens and its use at 1.0% inclusion is hereby recommended for better results

Table 1: Haematological indices of broiler chickens fed experimental diets

Table 1. Haematological parameters of broiler chickens fed experimental diets					
Parameters	Diets			± SEM	P-value
	1	2	3		
	Control diet	Turmeric inclusion			
		0.5%	1%		
PCV (%)	26.33	26.58	26.82	0.59	0.48
RBC (×10 ⁶ mm ³)	15.70 ^b	16.54 ^a	16.68 ^a	0.41	0.05
HB (g/100ml)	8.77	8.80	8.82	0.21	0.37
MCV (fl)	16.89	16.37	16.07	0.54	0.85
MCH (pg)	5.62	5.67	5.65	0.16	0.99
MCHC (g/dl)	33.33	33.33	33.15	0.01	0.01
granulocyte (%)	24.00	23.00	20.67	1.45	0.69
lymphocyte (%)	77.00	74.00	76.33	2.78	0.92
monocyte (%)	2.66 ^b	5.33 ^a	5.40 ^a	0.57	0.07
WBC (mm ³)	2.43	2.53	2.30	0.14	0.84

Means with different superscript on the same row differ significantly ($p < 0.05$). PCV= Packed cell value; Rbc= Red blood cells; Hb=Haemoglobin concentration; MCV= Mean corpuscular volume; MCHC= Mean cell haemoglobin concentration, MCH =Mean cell haemoglobin; WBC=White blood cell

Ingredients	Diet	
	Starter diet	Finisher diet
Maize	46	63
Soybean	26	17
GNC	16	11
Fish meal (72%)	2.0	2.0
Bone meal	6.0	4.0
Oyster shell	3.0	2.0
Premix	0.3	0.2
Methionine	0.3	0.3
Lysine	0.3	0.2
Salt	0.2	0.3
Total	100	100

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