HAEMATOLOGICAL PARAMETERS OF BROILER CHICKENS ON SUPPLEMENTED TURMERIC (Curcuma longa) DIETS

***IGENE F. U.**
Department of Animal and Food Sciences, Faculty of Agriculture, Natural Resources and Food Science, Ambrose Alli University, Ekpoma, Edo State, Nigeria
*Corresponding author: fredogene@yahoo.com; +2348055078093; +2349030915568

ABTRACT
This research was conducted to evaluate the haematological parameters of broiler chickens fed diets supplemented with turmeric powder. One hundred and twenty-eight (128), 2 weeks old brooded broiler chicks were randomly selected and allocated into 4 equal groups that were respectively assigned as follows to four treatment diets; 1, 2, 3 and 4. Diet 1 contained no turmeric powder while in Diets 2, 3 and 4, turmeric was added at 100, 200 and 300g/100kg feed. On the last day of the experiment, the birds were assessed for haematological values. All the results obtained for RBC, PVC, Haemoglobin, WBC and its differentials were not significantly affected (P>0.05) by treatment diets, but numerically values of most of the parameters were slightly higher in the chickens fed turmeric supplemented diets. For example, RBC values were 2.04, 2.34, 2.38 and 2.18(x10^6 mm^3) respectively in T_1 - T_4. PVC values were 26.81, 27.11, 27.62 and 26.92(%) in T_1 - T_4. Haemoglobin ranged from 8.16dl in T_1 - 8.96dl in T_3 while WBC was 6.45 x10^{6}mm^3 (T_1) and 7.88 x10^{6}mm^3 (T_4). Lymphocyte value was also least 78.11% in the turmeric free diet, while for neutrophils, the turmeric fed chickens had lower values. The overall results in this study showed that turmeric powder can successfully be included in broiler rations up to the level of 300g/100kg feed as was done in this study with no adverse consequences on health of the birds.
Keywords: Turmeric, Broiler Chickens, Haematological Parameters.

INTRODUCTION

Poultry meat constitutes the cheapest and easily accessed animal protein globally. According to Food and Agricultural Organization (FAO, 2010), poultry comes fourth among sources of animal proteins for human consumption and contributes about 27% of the national meat production (FAO, 2010). This justifies the claim by Akpabio *et al.* (2007) that poultry industry is the fastest means of solving the problem of animal protein deficiency in Nigeria. Besides bridging protein deficiency, poultry production provides a means of alleviating poverty and providing livelihoods in developing countries (Atuahene*et al.,* 2010). Broiler production is a popular aspect of poultry production which is globally recognized and acceptable as one of the cheapest means of animal proteins. Short gestation and early maturity with appreciable body weight are the main factors that fascinate interest in broiler production. In addition, broiler production offers a means of livelihood for majority of average and lower class individuals because of the return on investment.

In the past decades, broiler chicken producers were using antibiotics such as oxytetracycline to boost the growth of broiler chickens. However, the provocative effect of residue of antibiotics on human health stirred up campaign against the use of antibiotics as growth promoter in broiler chicken production. This has prompted the animal nutritionists and researchers to shift their attention to natural growth promoters most especially those from plant origin. According to Lillehoj *et al.* (2018), the use of herbs as a potential substitute for antibiotics in poultry production has caught the interest of researchers since the last two decades. Turmeric (*Curcuma longa* L.) has been effectively utilized as a suitable feed supplement for poultry because it includes bioactive secondary metabolites called curcuminoids. It has a wide range of beneficial effects on birds, including the improvement of several biochemical and haematological indicators, the rise in antibody titers following vaccination (e.g., against Newcastle disease), the reduction of heat stress through various mechanisms, and protection against the deleterious effects of aflatoxins ingested in conjunction with diet. This study aims at assessing the haematological indices of broiler chickens on supplemented turmeric (*Curcuma longa*) diets.

MATERIALS AND METHODS

Experimental Diets, Design and Management

The experiment lasted for eight (8) weeks. The test ingredient "turmeric rhizome" was purchased at the local market within the University environment. It was washed, sliced, sundried and ground into fine particles. The turmeric powder was thereafter stored in air-tight containers until use. A total of 128 Ross 308 chicks that were brooded for two weeks were allotted randomly to 4 experimental treatments. Thirty-two (32) chicks were randomly selected and allocated to each of the four (4) treatment groups (T_1, T_2, T_3 and T_4) in a completely randomized design (CRD). Each treatment group contained four (4) replicates with eight (8) birds per replicate. Four (4) experimental diets were prepared. Diet one (1) was a commercial broiler diet with no turmeric powder added while diets 2, 3 and 4 were commercial diets with turmeric powder added at 0, 100, 200 and 300g/100 kg of feed

respectively. The birds were respectively allowed free access to the treatment (T_1, T_2, T_3 and T_4) diets throughout the duration of the study, that is at the remaining starter phase (2 weeks) and finisher phase (4 weeks).
All routine management practices such as medication and vaccinations were carried out adequately.

Haematological Studies

At day 56, blood samples (2.5mls. each) were collected from 4 birds in each replicate per treatment with needles and syringes through the wing veins into well labeled sterile Bijou bottles containing ethylene diaminetetraacetic acid (EDTA) labeled bottles to prevent clotting. All blood samples collected were subjected to haematological analysis immediately at the Laboratory.

Statistical Analysis

Data generated were subjected to a one-way analysis of variance (ANOVA) and treatment means that significantly differed were compared using the Duncan's Multiple Range Test (DMRT) as outlined by Steel and Torrie (1990) using the SPSS (2014) package, IBM version 20.

RESULTS AND DISCUSSION

Turmeric did not affect significantly (P>0.05) the concentration of red blood cells (RBCs) of broilers in this study as shown in Table 1. This is in agreement with the study conducted by Sugihartoet *al.*(2011) but in contrast with the study by Daramola *et al.(*2020), who reported significant (P>0.05) increase in birds on diet 2 (0.5%) and 3 (1%) than in birds on control diet (0%). The major component of RBCs is haemoglobin. Haemoglobin concentration (Hb) is not statistically affected (P>0.05) by turmeric in this study and this is in agreement with the study by Daramola *et al.* (2020). Packed cell volume (PCV) measures the volume of entire blood in percentage (%) and it is affected by RBCs concentration in the blood (Reece, 2009). In this study PCV was not affected significantly (p>0.05) by dietary turmeric inclusion in feed. This finding is in agreement with that of Daramola *et al.*(2020), who reported that turmeric had no effect on broiler birds fed at the rate of 0%, 0.5% and 1.0% for eight (8) weeks and Emadi *et al.*(2007), who also reported that addition of turmeric had no effect on PCV level of broiler birds measured at day-21 and day-42.

Table 1. Effect of Turmeric Supplemented Diets on Heamatological Parameters of Broiler Chickens

Parameters	T_1, 0g/100kg TM	T_2,100g/100kg TM	T_3, 200g/100kg TM	T_4, 3000g/100kg TM
RBC (x 10^6 mm^3)	2.04	2.34	2.38	2.18
PVC (%)	26.81	27.11	27.62	26.92
Haemoglobin (dl)	8.16	8.31	8.96	8.55
WBC (x 10^6 mm^3)	6.45	7.49	7.62	7.88
L (%)	78.11	79.01	79.02	80.04
N(%)	20.83	19.89	19.66	18.82
M(%)	1.02	1.08	1.09	1.11
B(%)	0.01	0.01	0.02	0.01
E(%)	0.03	0.02	0.02	0.02

The WBC count, granulocyte and lymphocyte count in this study were not affected statistically (P>0.05) by turmeric and this finding grees with the study by Daramola *et al.*(2020) and Paul *et al.*(2020), who reported that the WBC values of broilers fed diets with turmeric level of 1.5%, 3.0% and 4.5% were statistically not significant (P>0.05) but the values were higher than what was obtained for those on control group. Although monocyte was not affected statistically (P>0.05) in this study, this finding is in contrast with the report by Daramola *et al.(*2020), that value of monocyte increased with increase in the dietary inclusion of turmeric and there was significant (P<0.05) increase in birds on diets 2 (0.5%) and 3 (1.0%) than birds on control diet (0%). Lal (2012), concluded that inconsistencies in haematological values of turmeric fed chickens may be attributed to the different turmeric inclusion levels in diets, different bioactive substances in the turmeric plant used which could be due to the plant species, type of soil, harvest season and preparation process of the turmeric as well as the experimental period and location, breed of bird, immune stimulatory effect of turmeric etc. The fact that the white blood cells of the turmeric fed chickens in this study were not significantly increased above the control chickens is an indication that the immune system and health of the birds were not compromised.

There were no significant (P>0.05) effects of turmeric powder on all the Haematology profile measured. PCV (packed cell Volume), RBC (Red Blood Cells), WBC (White Blood Cells), L (Lymphocytes), N (Neutrophils), M (monocytes), B(Basophils), E (Eosinophils)

CONCLUSION AND RECOMMENDATION

This study revealed that turmeric powder inclusion in diets of broiler chickens had no negative effects on haematological constituents of the chickens. The use of turmeric powder as alternative to synthetic antibiotics in broiler diet is therefore recommended.

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