ADMINISTRATION OF AQUEOUS GINGER EXTRACT: EFFECT ON THE HAEMATOLOGY OF THREE STRAINS OF BROILER CHICKENS

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ABSTRACT

The haematology of broiler chickens administered varying levels of ginger extract was investigated using 270 chicks of the Arbor acre Plus, Cobb 500 and Ross 308 strains. The birds were randomly divided into nine groups of 30 each using a 3 X 3 factorial arrangement in a randomized complete block design. This makes up nine treatments of 30 birds with 3 replicates of 10 chicks. The factors were 3 levels of ginger via drinking water (0, 4 and 6%) and three strains (Arbor acre Plus, Cobb 500 and Ross 308). The 0% ginger were administered a levelled table spoonful of Oxytetracycline® in 2 litres of water following the manufacturer's recommendation. A single phase diet (22.34% CP; 2948.05 Kcal/Kg ME) was fed to the birds for 8 weeks. At the end of the experiment, blood samples were randomly collected from the veins of the bird for haematology evaluation. Results showed a significant ($P<0.05$) strain effect in haemoglobin concentration, packed cell volume, and red blood cells count of the birds; Arbor acre plus birds had better values of the parameters (18.00, 38.33, 2.52) than the other breed of birds. Level of inclusion of the aqueous ginger extract also significantly ($P<0.05$) influence the packed cell volume and red blood cells count of the birds with those given 6% aqueous ginger extract having better haemoglobin concentration and red blood cells count (17.17, 2.70). The study shows that administration of aqueous ginger extract did not negatively affect the haematological indices studied suggesting that it could help in conferring immunity on broiler birds.

Keywords: Haematology parameters, strain effect, immunity, level of administration, ginger.

INTRODUCTION

Haematological and serum biochemistry parameters are good indicators of the physiological state of animals and changes in them are used in examining the response of such animals to various physiological situations (Khan and Zafar, 2005). Also, changes in haematological parameters are often used to assess stress in animals due to environmental, nutritional and/or pathological factors (Afolabi *et al*., 2010). Antibiotics were the most commonly used feed additive in time past; however, the use of synthetic antibiotics is being regulated because of the development of resistant microorganisms and their negative effect on human health (Yahya *et al*., 2014; Joseph *et al*., 2015). In recent times, herbs and spices have gained useful applications in broiler chickens' production. This is due to their inherent antimicrobial effect, growth promoting ability and fat reducing properties. Ginger is one of these spices reported as a natural growth enhancer and it contains several compounds such as shogaols, gingerdione, gingerol, phenolic, and gingerdiol (Zhao *et al*., 2011). This study was therefore carried out to evaluate the effects of administering aqueous ginger extract on haematologic profiles of different strains of broiler chicken.

MATERIALS AND METHODS

The research work was carried out at the poultry unit of the Teaching and Research Farm of the Department of Animal Production, Federal University of Technology, Gidan Kwanu campus, Minna, Niger State, Nigeria. Fresh ginger were sourced, thoroughly washed with water, peeled, and cut into chips. The chips were then ground with a warring blender (Polystar electric blender, model PV-BL999B, Nigeria) into mash. The concentrated ginger juice obtained from the mash using an extractor was stored in a bottle and refrigerated at 4°C until the time of usage (Joseph *et al*., 2015). The chicken's diet was formulated to contain metabolizable energy of 2948.05Kcal/Kg with a protein level of 22.34% CP. The single phase diet was fed to the birds for 8 weeks. Two hundred and seventy (270) day old commercial broilers chicks (90 each of Arbor acre Plus, Cobb 500 and Ross 308) were

used for the experiment. The birds were randomly divided into nine groups of 30 each using a 3 X 3 factorial arrangement in a randomized complete block design. This makes up nine treatments of 30 birds with 3 replicates of 10 chicks. The factors were 3 levels of ginger via drinking water (0, 4 and 6%) and three strains (Arbor acre Plus, Cobb 500 and Ross 308). The 0% ginger were administered a levelled table spoonful of Oxytetracycline® in 2 litres of water following the manufacturer's recommendation Fresh water was provided to the chicken's free choice. preventive vaccination against Gumboro and Lasota were given on days 7, 14, 21, and 28, respectively.

At the end of the experiment, a total of twenty seven (27) blood samples were collected from the jugular vein of the birds and hematological indices were analyses using a Cell-Dyn 3500 haematology system (Abbott Laboratories, Abbott Park, IL, USA) to measure total and differential white blood cells count, and blood quality parameters: haemoglobin concentration, packed cell volume, red blood cells count, and mean corpuscular haemoglobin. Data generated were analyzed using SPSS statistical software version 20.0. Where significant differences were observed between the means ($P<0.05$), least significant difference was used to separate them.

RESULTS AND DISCUSSION

Figure 1 shows the results of the effect of breed on haematological indices of the different strains of broiler chickens administered varying levels of aqueous ginger extract. There were significant ($P<0.05$) differences in the values obtained for haemoglobin concentration, packed cell volume and red blood cells count of the broiler strains used. The Arbor acre plus strain had the highest value for haemoglobin concentration (18.00) while the Cobb 500 recorded the lowest value (15.17). Packed cell volume ranged from 29.50% (Cobb 500) to 38.33% (Arbor acre plus) while red blood cells count was lowest in Cobb 500 (1.99 X 106/mm3) and highest in Ross 308 birds (2.72 X 106/mm3). However, the white blood cells count, basophil, eosinophil and mean corpuscular haemoglobin showed no significant ($P>0.05$) differences. The values recorded for Hb across the three strains were higher than the normal physiological values reported by Wikivet (2012). The values observed for packed cell volume were within the range (25-45%) for broiler chickens reported by Al-Nedawi (2018). The values obtained for red blood cells count in the Arbor acre Plus and Ross 308 strains were within the normal range (2.5-3.5×102/L) reported by (Jain, 1993), and the 2.50 - 3.9×10^2/L recorded by Harrison and Lightfoot (2005); however, that of Cobb 500 was lesser. The differences observed in the white blood cells count of Ross 308 and Cobb 500 birds compared to that of the Arbor acre Plus birds could be due to differences in strain and weight of the birds. Adeyemo *et al.* (2018) opined that weight, age, sex, diet type, strain and climate were factors that could cause variation in the haematological indices of chickens.

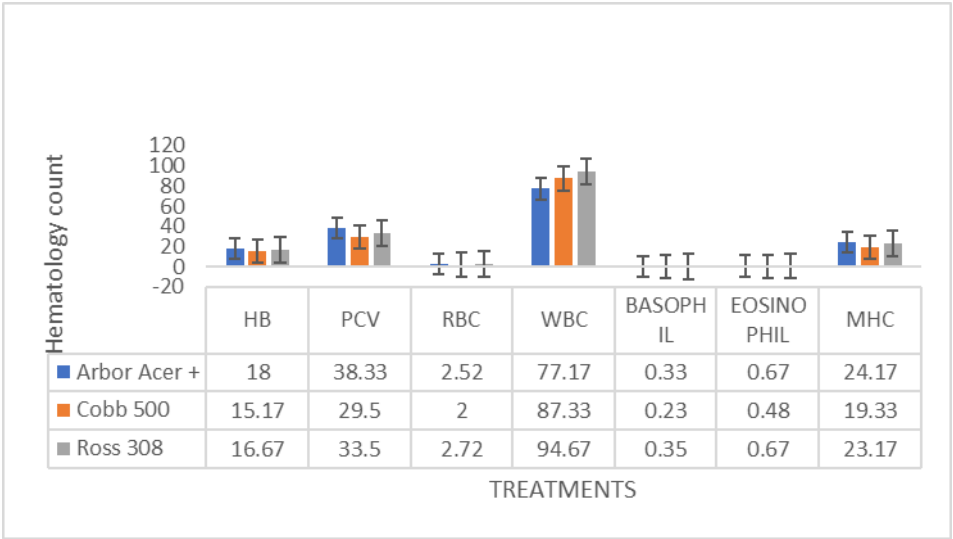
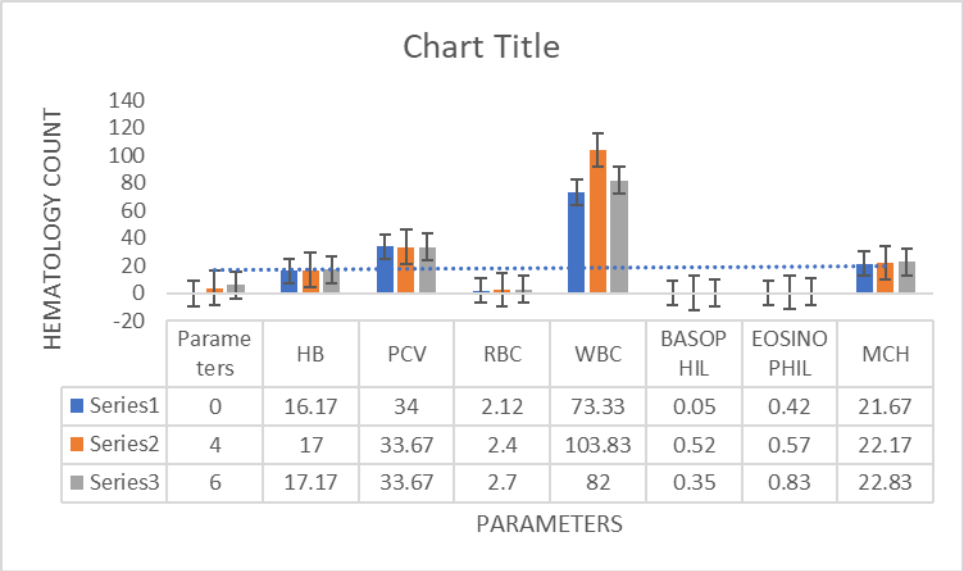


Figure 1. Effect of ginger on haematological parameters of broiler chickens administered varying levels of aqueous ginger extract

Figure 2 shows the results of the effect of level of administration of the aqueous ginger extract on haematological indices of the different strains of broiler chickens. There were significant (P<0.05) differences in the values obtain for red blood cells count and white blood cells count of the birds. Red blood cells count was lowest in birds administered 0% aqueous extract of ginger (2.12 X 106/mm3) and highest in those administered 6% of the extract (2.70 X 106/mm3) even though it is statistically similar to those given 4% of the extract. For white blood cells count, the highest value was recorded in birds administered 4% aqueous ginger extract (103.83 X 103/µl) while the lowest was recorded in birds administered 0% aqueous ginger extract (73.33 X 103/µl). There were no significant (P<0.05) differences in the values obtained for haemoglobin concentration, packed cell volume, basophil, eosinophil and mean corpuscular haemoglobin of the birds used for the experiment.



Parameters	HB	PCV	RBC	WBC	BASOPHIL	EOSINOPHIL	MCH
Series1 0	16.17	34	2.12	73.33	0.05	0.42	21.67
Series2 4	17	33.67	2.4	103.83	0.52	0.57	22.17
Series3 6	17.17	33.67	2.7	82	0.35	0.83	22.83

Figure 2. Effect of ginger on haematological parameters of broiler chickens administered varying levels of aqueous ginger extract

The administration of aqueous ginger extract did not cause anaemia in the birds. The increases in packed cell volume, and red blood cells count of the broilers chickens administered the varying levels of aqueous ginger extract is an indication that the oxygen carrying capacity of the blood was enhanced as a result of ginger administration. This result observed for white blood cells count is in disagreement with the reports of Ademola *et al.* (2009) who observed that ginger administered to chickens at a concentration of 1.0% significantly led to decrease in the total number of white blood cells.

CONCLUSION

Administration of aqueous ginger extract up to 6% in the drinking water of the three strains of broiler chickens did not cause anaemia but rather improved the haemoglobin concentration, packed cell volume, red blood cells count, white blood cells count and mean haemoglobin count of the chickens.

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