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Performance, Serum Biochemical and Haematological Response of Broiler Chicken Fed Mixture of Ginger (Zingiber Officinale) and Garlic (Allium Sativum) in Diets

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Key words: Performance body weight, serum biochemial and haematological indices, *Allium sativum*, *Zingiber officinale*

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Abstract: Performance, serum biochemical and haematological response of broiler chicken fed mixture of ginger (*Zingiber officinale*) and garlic (*Allium sativum*) in diets was investigated in a feeding trials using completely randomised design that lasted for eight weeks. A total of 135 1-day broiler chicks of Abor acre strain were randomly allotted to three dietary treatments of 45 chicks per treatment and replicated 15 chicks per treatment Three isocaloric and isonitrogenous diets were formulated and fed. Control diet was without mixture of ginger and garlic. The two other diets were T_1 7.5 g ginger plus 7.5 g Garlic mixture/25 kg diet and T_2 15 g ginger plus 15 g Garlic mixture/25 kg diet. The experimental diets were offered to the respective birds with water ad libitum. The body weight gain (Kg) feed intake and Feed Conversion Ratio (FCR) of birds control, T_1 and T_2 respectively were similar ($p>0.05$). Birds on diet. T_2 recorded the highest liveability percentage (96 Mixture of ginger and garlic in ratio 1:1 up to 7.5 g each in 25 kg diets slightly but insignificantly ($p>0,05$) increased performance body weight gain and livability improved Feed Conversion Ratio (FRC) but reduced feed intake. Variation in the experimental diets had no significant ($p>0.05$) difference on serum biochemical and haematological indices except for Glucose and Alkaline Phosphate and White Blood Cell count Lymphocytes and Basophil which showed significant ($p<0.05$) difference with the level mixture of ginger and garlic ip diets. Mixture of ginger and garlic in the diets of broiler chicken had no adverse effect on the serum biochemical and haematological indices.

INTRODUCTION

In pursuit of improved broilers health and in order to fulfil consumer expectation in relation to food quality, poultry farmers include natural herbal materials in the diet of their stock[1]. The use of blood examination to assess physiological, Brea pathological and nutritional and health status animals have been well documented.

The routine collection and processing of blood samples allow the evaluation of serum biochemical and haematological response to nutrition and disease[2]. Blood examination can be used to detect nutritional disorder sinceit provide information on animal health, nutritional deficiency and changes in growth with time. The nutritional value of diets could be a reflection through changes in performance, serum biochemical and haematological indices animal base on treatment effects. Ginger, (*Zingiber officinale, Zingbeacea*) and Garlic, *Allium sativum*, (*Liliaceae*) are herbal materials with good nutritional and medicinal properties. The plants and their extract possess antioxidant, anticancer, immune-modulatory, anti-inflammatory hypoglycaemic, antifungal, antiviral, anti-dental caries and cardiovascular effects[3]. Previous study has demonstrated positive effects of herbal materials on the performance, serum biochemical and haematological indices of birds[4]. In the present study, mixture of ginger and garlic was added to broiler diets in two graded levels to evaluate effects on the performance, serum biochemical and haematological indices.

MATERIALS AND METHODS

This study was carried out at Teaching Farm, Department of Agricultural Education, Federal College of Education (Technical) Akoka-Yaba Lagos. A total of 135 1-day broiler chicks of Abor acre strain (45 chicks per treatment and 15. chicks per replicate), reared in an open-sided deep litter pen previously cleaned, disinfected fumigated and covered with wood shavings to 5 m depth before their arrival. The chicks on arrival were allowed to adapt to their new environment for 7 days in order to reduce variation in performance due to hatchery and t high mortality due to treatment effects. The test materials, gingerand Garlic were purchased i from the open markets in Lagos metropolis, ritsed using distilled water, sundried for 5 days and blended using an electric Mortal and Pestle miller (Model MR 200 Pascall) into powdered form. The "milled powdered materials was packed inside transparent polythene bags and added broiler starter and finisher diets in ration 1:1 of ginger and garlic. Dietary treatments. were T: 7.5 g ginger plus 7.5 g garlic/25 kg diet and T.: 15 g ginger plus 15 g garlic/25 kg diet. The gross composition of starter and finisher diets are shown in Table 1. The birds were allotted to the two treatment groups in a completely randomized design with three replicates per group containing 15 birds each. The experimental diets were made. isonitrogenous and isocaloric. Recommended vaccination and medication schedules from the hatchery were strictly observed. Starter diets was fed for 4weeks (0-4 weeks) and finisher 4 weeks (5-8 weeks). Experimental diets water was provided ad-libitum throughout 52 days of the study. Body weight changes and feed intake were measured on weekly basis to determine body weight gain and feed conversion ratio. At the end of week 8 of feeding trials, 2 birds from each dietary treatment per replicate were randomly sampled to determine serum biochemical and haematological responses. Five milliliter samples of blood were taken from the wing vein of randomly sampled birds from each dietary treatment per replicate. Two point five milliliter of the sampled blood was put in labelled Sterile Universal Bottles containing anti-coagulant (Ethyl Diamine-Tetra-Acetate powder (EDTA)) to determine haematological indices. aematological indices such as Packed Cell Volume (PCV) (56), Red Blood Cells (RBC) (T/L) and White Blood Cells (WBC) (G/L), Haemoglobin (g/1), Neutrophils (%), Basophils (%), Lymphocytes (9), Eosinophil (%). Monocytes (6), Mean Corpuscular Volume (MCV) (1), Mean Corpuscular Haemoglobin (MCH) (pg) and Mean Corpuscular Haemoglobin Concentration (MCHC) (g dL^{-1}) according to the procedure[2]. The remaining 2.5 mL of the sampled blood was put in labelled Sterile Universal Bottles without anti-coagulantto: determine serum biochemical indices such as Total Protein (mg dL^{-1}), Albumin (g dL^{-1}), Alkaline Phosphate (ALP) (μ L^{-1}) and Ureic acid (mg dL^{-1}) and Glucose (mg dL^{-1}). Data obtained were subjected analysis of variance and significant means were separatedusing statistical package

RESULTS AND DISCUSSION

The composition and calculated analysis of starter and finisher diets are shown in Table 1. The crude protein and metabolizable energy content diets respectively were within the range recommended by Oluyemi and Roberts[5]

The effect of mixture of ginger and garlic in diets on the body weight development of broiler. chicken is presented in Table 2. The final mean body weight gain and feed intake (kg) and Feed Conversion Ratio (FCR) values (kg) for birds on control, T_1 and T_2 diets respectively were similar ($p>0.05$). Inclusion of mixture of 7.5g ginger plus 7.5 g garlic mixture 25 kg diet slightly increased body weight gain of birds. Bird fed. Fifteen

Table 1: Gross composition of starter and finisher diets

Feed ingredients	Starter diet	Finisher diet
Maize	46.71	61.00
Soyabean meal	21.29	17.00
Groundnut cake	15.00	12.00
Fish meal (72%)	3.00	2.00
Wheat offal	10.00	4.00
Di-calcium phosphate	1.70	1.70
Limestome	1.20	1.30
Lysine	0.25	0.25
Methionine	0.25	0.25
Broiler premix	0.25	0.25
Salt	0.25	0.25
Total	100.00	100.00
Calculated analysis		
Metabolizable energy (kcal kg^{-1})	2713.41	2918.76
Crude protein (%)	24.00	20.37

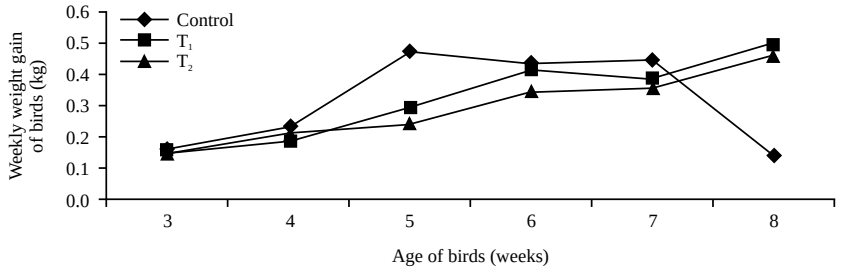

Fig. 1: Weekly body weight (kg) gain of broiler chicken

Table 2: Body weight of broiler chicken fed mixture of ginger and garlic in diet

Parameters	Control	T_1	T_2	SEM
Initial weight (g) at 2nd week	0.17	0.16	0.18	0.01
Final weight (kg)	2.02	2.06	1.92	0.91
Weight gain (kg)	1.85	1.90	1.74	0.07
Feed intake (kg)	4.77	4.22	4.02	0.32
Feed conversation ratio (feed/weight)	2.70	2.22	2.31	0.21
Live ability	91.00	96.00	92.00	1.49

Control: Experiential diet, T_1: 7.5 g ginger+7.5 g garlic/25 kg experimental diet, T_2: 15 g ginger+15 g garlic/25 kg experimental diet

Table 3: Serum biochemical indices of broiler chicken fed mixture of ginger and garlic in diet

Parameters	Control	T_1	T_2	SEM
T P (g dL^{-1})	32.81	37.90	35.27	1.47
Glucose (mg dL^{-1})	213.93	290.91	228.85[a]	23.57
UA (mg dL^{-1})	6.27	5.22	7.00	0.52
ALB	2.32	1.59	1.48	0.26
ALP (µ L^{-1})	1134.36	1450.38	1261.32[a]	91.81

[a,b]Means with different superscripts in the same row are significantly ($p<0.05$) different. TP: Total protein, UA: Uric acid, ALB: Albumin, ALP: Alkaline phosphate

gram ginger plus 15 g garlic mixture/25 kg diets had the lowest body weight gain due to higher level the mixture. Broiler chicken fed control diets increased in weekly body weight gain rapidly between 4th and 6th week and decline from week 7 Birds fed T_1 and T_2 diets steadily increase in weekly body weight gain behind those fed control diet (Fig. 1). The differences in weekly body weight gain could be attributed probably to high fiber and some anti nutritional factor in the mixture of ginger and garlic included in the diets. The increasing positive beneficial growth potential of birds on T_1 and T_2 diets could possibly due to improvement in feed digestion, additive. advantage of nutrients and anti-microbial property of the mixture of ginger and garlic in the diets[3,6]. Mortality was moderate and evenly spread. ranging from 9-4%. Birds on diet T, survived the most (96% live ability) suggestive of the advantage of the antibiotic property of mixture of ginger and garlic in the diets.

The results of serum biochemical and haematological indices are presented in Table 3 and 4, respectively. Variation in the experimental diets had no significant ($p>0.05$) difference on TP, UA and Alb except for Glu

Table 4: Haematological indices of broiler chicken fed mixture of ginger and garlic in diets

Parameters	Control	T_1	T_2	SEM
Hb (g L^{-1})	75.00	71.42	51.44	7.33
RBC (T L^{-1})	2.55	2.45	1.65	0.29
WBC (G L^{-1})	16.16	23.24	19.60	2.04
PCV (%)	22.50	21.50	15.50	2.19
MCV (f L^{-1})	88.19	87.96	104.50	5.48
MCH (pg)	29.48	29.23	34.70	1.80
MCHC (g d L^{-1})	333.38	332.213	32.22	0.39
Neut (%)	43.00	32.50	31.00	3.78
Lymp (%)	46.00	62.50	62.50	5.50
Mon (%)	6.50	3.50	4.00	0.93
Eos (%)	3.00	1.50	2.50	0.44
Baso (%)	1.50	0.00	0.00	0.50

[a,b]Means with different superscripts in the same row are significantly ($p<0.05$) different. Hb: Haemoglobin, RBC: Red blood cells, WBC: White blood cells, PCV: Packed cell volume, MCV: Mean corpuscular volume, MCH: Mean corpuscular haemoglobin, MCHC: Mean corpuscular haemoglobin concentration, Neut-Neutrophils., Lymp-Lymphocytes, Mon-Monocytes, Eos-Eosinophil, Baso-Basophils

and ALP which showed significant ($p<0.05$) difference with the level mixture of ginger and garlic in diets. The haematological indices (HB, RBC, PVC, MCV, MCH. MCHC, Neut, Mon and Eos) of all treatment were similar except for WBC, Lymp and Baso which were significantly ($p>0.05$) different. The values of serum biochemical and haematological indices obtained in this study are comparable with similar results. The progressive decreases in Hb value could indicate nutritional inadequacies as the level of mixture of ginger and garlic increased in the diets. This is in agreement with the decreased feed intake of bird as mixture of ginger and garlic increased in the diets. The nutrient intake restriction effect of decreased voluntary feed intake may have result in the deficiency of blood nutrient composition.

The similarity of the PCV values obtained indicates that the treatment had no adverse: effect on the blood level and birds were not anaemic RBC values were similar for all treatment and shows that the blood level and immunity status of birds were not negatively affected by experimental diets. However, WBC values significantly ($p>0.05$) increased with increasing level of mixture of ginger and garlic in diets. The values of RBC and WBC obtained in this study are comparable with

those reported by Iskiwenu *et al*.[4] and are within thenormal range values Variation in the level of mixture of ginger and garlic in the diets had no significant ($p>0.05$) on serum biochemical (TP. UA and Alb) and haematological (HB, RBC, PVC, MCV, MCH, MCHC, Neut, Mon and Eos) indices. This is an indication that mixture of ginger and garlic in diets does not contain factors that are deleterious to the normal blood formation and does not impart negatively on the physiological, pathological and nutritional status of broiler chicken.

CONCLUSION

The findings from this study shows that mixtureof ginger and garlic (in ratio 1:1) up to 7.5 g each in 25 kg broiler chicken diets slightly but I insignificantly ($p>0.05$) increased final body weight performance and liveability, improved Feed Conversion Ratio (FGR) but reduced feed intake. Also, mixture of ginger and garlic at same quantity had no adverse effect on the serum biochemical and haematological indices of broiler chicken.

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