

HAEMATOLOGICAL AND SERUM BIOCHEMICAL INDICES OF BROILER CHICKEN FED OF BLACK PEPPER (*Piper nigrum*) AND TURMERIC (*Curcuma longa*) AS ADDITIVE

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Abstract

An eight weeks experiment assessed the impact of black pepper and turmeric additive (in ratio 1:1) on haematological and serum biochemical characteristics of broiler chicken. Four diets containing 0%, 0.25%, 0.50%, and 0.75% of the additive were fed to one hundred and sixty (160) 1-day old Ross 308 chicks equally and randomly allotted into four dietary treatments of 40 birds/treatment in Completely Randomized Design with each treatments consisting 4 replicates. Data collected were: white blood cell counts (WBC), red blood cell counts (RBC), haemoglobin concentration (HGB), packed cell volume (PCV), mean corpuscular haemoglobin (MCH), mean corpuscular volume (MCV), mean corpuscular haemoglobin concentration (MCHC), platelets, total protein, globulin, albumin, creatinine, cholesterol, aspartate aminotransferase (AST), alkaline phosphatase (ALP) and alanine aminotransferase (ALT). Data collected were analyzed by One-way analysis of variance using SPSS. Results revealed that dietary treatments had no effect on WBC, RBC, PCV, HGB, MCV, platelets, TP, albumin, globulin, AST, ALT, urea and creatinine except MCH, MCHC, ALP and cholesterol. All the birds fed the phyto-additives had similar MCHC values with the control. Birds fed 0.25% and 0.5% combination of the additives also had similar MCH with the control while those given 0.75% had lower ($P < 0.05$) value than the control. Cholesterol was lower ($P < 0.05$) in birds fed combination of additives than in the control group. In conclusion, addition of combination of turmeric and black pepper reduced the serum cholesterol level of broiler chicken without any negative effect on broiler chicken blood composition.

Key words: Haematology; Serum biochemistry; Broiler chicken; Black pepper; Turmeric

DESCRIPTION OF PROBLEM

Turmeric and black pepper are among the promising herbal alternatives to the use of antibiotics. These phyto-additives have been used for ages in tradomedicine and have been reported to have beneficial effects on livestock when added to their feeds as additive. These include improvement in production performance, increase in the endogenous digestive enzyme secretion, activation of immune responses, antimicrobial effects and antioxidant activities (10), (4). These effects have been attributed to curcumin in turmeric and piperin that are contained in it. Black pepper (*Piper nigrum*) is another medicinal plant that is used in black pepper. Combination of black pepper and turmeric has been reported to increase absorption of phyto-chemicals in turmeric most especially curcumin. This study was therefore carried out to

evaluate the effect of combination of turmeric and black pepper (1:1) on haematological and serum biochemical characteristics of broiler chickens.

MATERIALS AND METHODS

Experimental Site: The experiment was carried out at the Poultry Unit of Teaching and Research Farm, Ladoke Akintola University of Technology, Ogbomosho, Oyo State, Nigeria.

Source and Processing of Test Ingredient: The test ingredients (turmeric and black pepper) were purchased at Oja Igbo Market, Ogbomosho Oyo, State, Nigeria. They were sun-dried, ground and mixed in ratio 1:1 before and the added to the feed.

Experimental diets: Four diets were formulated which contained 0, 0.25, 0.50, and 0.75% percent combination of turmeric and black pepper (1:1)

respectively. The composition of the diets is shown in Table 1.

Experimental Birds and Management: One hundred and sixty (160) day-old unsexed broiler chicks (ROSS 308) were used for the experiment. The birds were randomly assigned to four dietary

treatments consisting of four replicate each (i.e. 40 birds per treatment with 10 birds per replicate). The birds were fed experimental diets and water *ad libitum* throughout the duration of the study that lasted for 8 weeks.

Table 1: Ingredient composition of experimental diets at starter and finisher phases.

Diets (%)	STARTER				FINISHER			
	T1	T2	T3	T4	T1	T2	T3	T4
Maize	57.00	57.00	57.00	57.00	51.00	51.00	51.00	51.00
GNC	18.00	18.00	18.00	18.00	15.00	15.00	15.00	15.00
WO	6.5	6.5	6.5	6.5	12.00	11.75	11.50	11.25
SBM	11.00	11.00	11.00	11.00	15.00	15.00	15.00	15.00
FM	2.50	2.50	2.50	2.50	0.00	0.00	0.00	0.00
BM	4.00	4.00	4.00	4.00	6.00	6.00	6.00	6.00
Lysine	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Meth	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
B.Premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
T/BP (1:1)	0.00	0.25	0.50	0.75	0.00	0.25	0.50	0.75
Total	100kg	100kg	100kg	100kg	100kg	100kg	100kg	100kg
Analysis								
*ME	2923.13	2925.77	2931.09	2933.59	2776.74	2779.01	2780.01	2783.59
CP	21.33	21.34	21.36	21.37	20.19	20.20	20.00	20.21
Crude Fibre	3.33	3.31	3.29	3.27	3.77	3.75	3.70	3.73

GNC= Groundnut Cake; wheat offal; SBM=Soy Bean Meal; FM=Fish Meal; BM=Bone Meal; Meth= Methionine; M E= Metabolizable energy; T/BP = Turmeric/ Black Pepper CP= crude protein; T1=Control; T2 =0.25% T/BP; T3=0.5% T/BP; T4=0.75% T/BP

Blood Collection, Haematological and Blood Serum Analysis: At the end of the finishing phase, two birds from each replicate (2 bird/treatment) were randomly selected for blood collection through wing web veins into vacutainer tubes containing ethylene diamine tetra-acetic acid (EDTA) as anti-coagulants while blood samples for serum biochemical measurements were collected into EDTA free tubes and allowed to clot. Haemoglobin concentration (HGB) concentration was measured by cyanmethaemoglobin method as highlighted by (5). Red Blood Cell (RBC) and White Blood cells counts (WBC) were determined as described by (3). The Packed Cell Volume (PCV) was determined as described by (1). The MCV, MCH and MCHC were calculated (3). Total serum protein (TP), globulin concentrations and serum albumin were also determined using the methods of (6). Cholesterol

was determined spectrophotometrically from plasma; creatinine was determined by kinetic method using alkaline picrate. Serum aspartate aminotransferase (AST) and Alkaline phosphatase (ALP) were measured by the methods described by (8)

Statistical Analysis: Data collected were subjected to One-way analysis of variance (ANOVA) of (9). Significant means were separate using Duncan multiple Range test option of the same software. Significance was determined at 5% probability level.

RESULTS AND DISCUSSION

The results of haematological and Serum Biochemical characteristics of the birds fed combination of turmeric and black pepper is showed in Table 2. No significant effect ($P>0.05$) of the combination of these two phyto-additives was observed on PCV, WBC, HGB, RBC, MCV,

platelets, blood serum TP, Albumin, Globulin, AST, ALT, Urea and Creatinine. This indicates that combination of these phyto-additives had no adverse effect on the major haematological and serum biochemical parameters. However, the result of the present study contradicts the report of (2) who observed higher RBC in broiler chickens given 0.5 and 1 % turmeric powder compared with control group and also the report of (11) who also reported higher HGB in broiler chicken given only black pepper powder compared with the control experiment. The difference could be due to interactive effects of turmeric and black pepper in the present study. Significant effects ($P < 0.05$) of these phyto-additives were however observed on MCH and MCHC, ALT and Cholesterol values of the blood. Birds that received 0.25% and 0.50% combination of turmeric and black pepper had similar values with the control group with respect to these parameters while those that received 0.75% had lower ($P < 0.05$) values. This contradicts the report of (2) who reported that MCH and MCHC of broiler chicken blood given 0.5 and 1 percent turmeric powder were not

different from those given control diet. The groups that received combination of turmeric and black pepper (T2, T3 and T4) had lower ($P < 0.05$) cholesterol values than the control group. This contradict earlier reports by (7) that broiler chicken given turmeric powder had similar blood cholesterol with those given control diet and the report of (11) who also reported no difference in the total blood cholesterol of broiler chicken given only black pepper powder as additive and those given diet without any additive. The difference in the results of these authors and the present study can be attributed to interactive effects of turmeric and black pepper. Lower blood serum cholesterol as observed in the present study will be an advantage to broiler meat consumers as this will reduce their chances of contracting heart diseases. Lower ($P < 0.05$) ALP value was observed in broiler chickens given 0.25% combination of turmeric and black pepper powder compared to those given control diet. The ALP values observed in this study was however within the level reported for normal chicken by (5).

Table 2: Effect of varying levels of turmeric and black pepper on the haematological and blood serum biochemical parameters of broiler chicken at finisher phase.

Parameters	T1 (0%)	T2 (0.25%)	T3 (0.5%)	T4 (0.75%)	P—Values
PCV (m/z)	31.33	26.67	2930	31.00	0.34
WBC ($\times 10^3/\text{mm}^3$)	8133.33	8500.00	8630	8666.67	0.91
HGB (g/dl)	10.43	8.90	9.20	10.30	0.36
RBC ($\times 10^6/\text{mm}^3$)	3.47	2.97	3.42	3.47	0.34
MCV (μ^3)	90.40	89.60	89.50	89.57	0.17
MCH (uug)	30.10 ^a	29.90 ^{ab}	29.60 ^{ab}	28.70 ^b	0.04
MCHC (g/dl)	33.27 ^{ab}	33.33 ^a	33.18 ^{ab}	32.20 ^b	0.03
Total Protein (g/dl)	56.00	59.00	65.20	69.00	0.35
Albumin (g/dl)	38.67	41.33	45.10	45.00	0.65
Globulin (g/dl)	17.33	17.67	20.30	24.00	0.13
ALP (U/L)	109.33 ^a	86.76 ^b	106.30 ^a	108.33 ^a	0.04
AST (iu/l)	54.33	59.33	60.02	61.67	0.79
ALT (iu/l)	9.67	13.00	13.06	13.33	0.53
Cholesterol (mg/dl)	116.00 ^a	90.33 ^b	97.10 ^b	89.33 ^b	0.03
Urea (mg/dl)	14.13	11.66	13.40	16.20	0.59
Creatinine (mg/dl)	1.15	0.53	0.65	0.75	0.33

^{ab}: Means along the same row with different superscripts are significantly ($p < 0.05$) different, WBC: white blood cell; RBC: red blood cell; HC: haemoglobin Concentration; PCV: pack cell volume; MCV: mean corpuscular volume; MCH: mean corpuscular haemoglobin; MCHC: mean corpuscular haemoglobin concentration

Conclusion and Application

In conclusion, addition of combination of turmeric and black pepper reduces the serum cholesterol level of broiler chicken without any negative effect on broiler chicken blood composition.

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