

EFFECTS OF TURMERIC (*Curcuma longa*) AND QUANTUM BLUE® ENZYME ON SERUM BIOCHEMISTRY OF BROILER FINISHER CHICKENS

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ABSTRACT

The effects of turmeric (*Curcuma longa*) and Quantum blue® as phytogenic and exogenous enzyme supplements on the serum biochemistry of broiler finisher chickens were studied using one hundred and eighty day old chicks in a 2 x 2 factorial arrangement fitted into CRD as thus; T1 (0g Turmeric; 0ppm Enzyme), T2 (5g Turmeric; 0ppm Enzyme), T3 (0g Turmeric; 0.05ppm Enzyme) and T4 (5g Turmeric, 0.05ppm Enzyme). Feed and water were provided ad libitum during the 7 weeks period. Parameters measured were albumin, globulin, alanine aminotransferase, aspartate aminotransferase and creatinine. The results showed significant ($P < 0.05$) difference in albumin (17.00), globulin (28.67) for birds on diet T4, alanine aminotransferase (30.41) for birds on diet T4, aspartate aminotransferase (37.33) and creatinine (65.18), with T4 having the best results implying that all the tested parameters were normal compared to the control probably due to the enzymes.

Keywords: Turmeric, Phytogenic, Broiler finisher chickens, Serum parameters

INTRODUCTION

The world population is on the upsurge it is predictable to reach over 10 billion by the end of 2060 (Galan, 2025) imposing high food security challenges. Undernourishment is still widespread in most developing countries and Nigeria in particular owing mainly to increase population, drop in protein intake occasioned by scarcity and high cost of animal protein food sources (Ajayi *et al.*, 2007). Virtually half of the world population is undernourished due to the shortfall in consumption of animal protein which is 3.24g per day one person (Ajayi *et al.*, 2007). Efforts are now targeted at carbon-based, prebiotic and probiotic alternatives such as herbs and enzymes. There is the need therefore to investigate more on the use of phytogenic feed additives and exogenous enzymes supplemented diets on the healthiness of broilers as supplementation

MATERIALS AND METHODS

Experimental Site

The experiment was conducted at the Teaching and Research Farm of the Department of Animal Science, Faculty of Agriculture, Nasarawa State University, Keffi, Shabu-Lafia campus. Metrological data were obtained from Metrological Station of the Faculty of Agriculture, Nasarawa State University, Keffi, Shabu Lafia campus.

Sources and processing of test ingredients

Turmeric rhizome was bought from a local farmer in Kubacha, Kagarko Local Government Area of Kaduna State while other ingredients such as maize, guinea corn, rice bran, groundnut cake, fish meal, limestone and Quantum Blue® were purchased from a market dealer in Lafia and Karu, Nasarawa State. Turmeric was washed with clean water; cooked at 100°C for 45 minutes and oven dried for 24 hours. It was grounded into powdered form, sieved and preserved in an air tight container to prevent growth of mold.

Experimental diets

The experiment was designed as a single diet for all the birds to provide 3002.13kcal/kg, ME and 22.06% crude protein for the starter diet while 3102.80 kcal/kg, ME and 18.22% crude protein for the finisher diets. The test ingredients; turmeric (*Curcuma longa*) and commercial enzyme (Quantum Blue®) were supplemented in different proportions thereby forming the treatment groups diets presented in Tables 1 and 2.

Experimental Design

The experimental design is a 2x2 factorial arrangement fitted into a completely randomized design. Each of the experimental treatment was replicated three times with each cage having 15 birds.

Experimental Birds and Management

A total of 180-day old broilers were purchased from a commercial hatchery. Prior to the arrival of the birds, the cages were washed with strong disinfectant to destroy micro-organisms that could pre dispose the birds to disease infection. The feeders and drinkers were thoroughly cleaned with disinfectant. Light bulbs were used as heat

source. Records of feed consumption, weight gain, feed intake and faecal samples were taken. The starter diets was fed for 4 weeks (1 – 28th day), while the finisher diet was fed for 3 weeks (29-49days).

Data Collection

Serum biochemical Indices Analysis (Finisher phase)

At the end of the experiment sample bottles were used to collect blood from sacrificed birds this was used to determine biochemical indices. The serum protein, albumin and globulin was analysed using SIGMA kits (Feteris, 1965).

Statistical Analysis

All data obtained were analysed using general linear model (SPSS version 20). Duncan Multiple Range Test (Duncan, 1955) was used to separate means where significant difference exists.

Table 1: Composition of Experimental Starter Diets kg/100kg

Ingredients	T1	T2	T3	T4
<i>Basal diet</i>				
Maize	38.15	38.15	38.15	38.15
Sorghum	9.50	9.50	9.50	9.50
Rice bran	4.00	4.00	4.00	4.00
Maize bran	4.00	4.00	4.00	4.00
GNC	34.0	34.0	34.0	34.0
Soya oil	2.25	2.25	2.25	2.25
Fish meal	4.40	4.40	4.40	4.40
Limestone	1.00	1.00	1.00	1.00
Bone meal	2.00	2.00	2.00	2.00
Premix	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10
Meth	0.10	0.10	0.10	0.10
Salt	0.25	0.25	0.25	0.25
Total	100	100	100	100
<i>Calculated values</i>				
CP%	22.06	22.06	22.06	22.06
ME/Kcal/Kg	30002.13	30002.13	3002.13	3002.13
Dry matter%	88.90	88.90	88.90	88.90
Crude fibre%	5.57	5.57	5.57	5.57
Ether extract	7.55	7.55	7.55	7.55
Lysine	0.91	0.91	0.91	0.91
Methionine	0.44	0.44	0.44	0.44
M+C	0.73	0.73	0.73	0.73
Calcium	1.04	1.04	1.04	1.04
Phosphorus	0.68	0.68	0.68	0.68
Price ₦/Kg feed	213.68	213.68	213.68	213.68
<i>Supplementation</i>				
Turmeric(g)	0.00	5.00	0.00	5.00
Enzyme(ppm)	0.00	0.00	0.05	0.05

*Premixto provide the following per kg of diet Calcium 27.3%.crude fibre 0.02%,vitamin A(E672)4000000IU,Vitamin D3(E671)1000000IU.Vitamin E(all-rac- α -tocopheryl acetate)(3a700)6000IU.Vitamin B1(thiamine mononitrate)600mg.Vitamin

Table 2: Composition of Experimental finisher Diets kg/100kg

Ingredients	T1	T2	T3	T4
<i>Basal diet</i>				
Maize	42.75	42.75	42.75	42.75
Sorghum	10.00	10.00	10.00	10.00
Rice bran	4.75	4.75	4.75	4.75
Maize bran	4.75	4.75	4.74	4.75
Groundnut cake meal	30.0	30.0	30.0	30.0
Soya oil	3.50	3.50	3.50	3.50
Fish meal	1.30	1.30	1.30	1.30
Limestone	0.75	0.75	0.75	0.75
Bone meal	1.50	1.50	1.50	1.50
Premix	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10
Methionine	0.10	0.10	0.10	0.10
Salt	0.25	0.25	0.25	0.25
Total	100	100	100	100
<i>Calculated values</i>				
CP%	18.85	18.85	18.85	18.85
ME/Kcal/Kg	3102.80	3102.80	3102.82	3102.82
Dry matter %	88.77	88.77	88.77	88.77
Crude fibre%	5.50	5.50	5.50	5.50
Ether extract %	8.43	8.43	8.43	8.43
Lysine	0.71	0.71	0.71	0.71
Methionine	0.37	0.37	0.37	0.37
M+C	0.64	0.64	0.64	0.64
Calcium	0.75	0.75	0.75	0.75
Phosphorus	0.57	0.57	0.57	0.57
Price ₦/Kg feed	250	250	250	250
<i>Supplementation</i>				
Turmeric(g)	0.00	5.00	0.00	5.00
Enzyme(ppm)	0.00	0.00	0.05	0.05

*Premix to provide the following per kg of diet Calcium 27.3%, crude fibre 0.02%, vitamin A(E672)4000000IU, Vitamin D3(E671)1000000IU, Vitamin E(all-rac- α -tocopheryl acetate)(3a700)6000IU, Vitamin B1(thiamine mononitrate)600mg, Vitamin B2(riboflavin)1600mg, Vitamin B6(pyridoxine hydrochloride) (3a831) 1200mg, Vitamin B12 (cyanocobalamin) 6000 μ g, vitamin K3(menadione nicotinamide bisulfite)800mg, Pantothenic acid(calcium-D-pantothenate) (3a841) 3200mg, Niacinamide (3a314) 8000mg, Biotin(3a316) 4000mg, Iodine(E2;as calcium iodite anhydrous) 600mg, copper (E4;as cupric sulphate pentahydrate) 16000mg, folic acid(3a316)200 μ g, Choline (3a890) .manganese(E8;as manganous oxide)3200mg, Zinc (E6;as zinc oxide)20000mg, Selenium(E8;as sodium selenite)60mg. g-grams, ppm-part per million

RESULTS AND DISCUSSION

Table 4 shows the interactive effects of turmeric and enzyme supplementation indicating significant ($P < 0.05$) increase in albumin (17.00g/l) for birds fed diet T2 whereas birds fed diet T4 had significant ($P < 0.05$) increase in the values of globulin (28.67g/l), alanine aminotransferase (30.41u/l) and creatinine (65.18). Similarly, birds fed on diet T3 had higher ($P < 0.05$) value of aspartate aminotransferase (37.33u/l). The results obtained in the present study fell within the normal range for healthy mature broiler chickens. The values are also in tandem with the earlier reports of Hajati (2010) who reported that enzyme supplementation improved activity in the liver and kidney and possess no harm to animals.

Table 3: Proximate Analysis and Metabolisable energy of Starter Diet

	DM%	CP %	EE%	CF%		ASH %	NFE %	ENERGY(Kcal/kg, ME)
				MOIS%				
T1	92.5	21.70	5.20	3.50	7.50	38.80	54.05	3142.88
T2	92.3	22.90	5.40	4.10	7.70	6.42	53.48	3183.24
T3	92.5	21.00	5.50	4.00	7.50	7.07	54.93	3172.52
T4	93.0	22.30	5.20	3.90	7.00	8.00	53.58	3148.39

NFE-Nitrogen free extract, CP-Crude protein, EE-Ether extract, CF-Crude fibre, ME-Metabolisable energy, DM-Dry matter, MOIST-Moisture, *Metabolizable Energy: using paузenga formula (1985) ME=37 x % CP+81 x % EE+35.5 x % NFE

Table 4: Effects of Turmeric (*Curcuma longa*) and Quantum Blue® as Phytogenic and Exogenous Enzyme Supplement on the Serum biochemistry of Broiler Chickens at Finisher phase.

Treatments	Parameters								
	TC Mmol/ l	SP (g/l)	Albumi n (g/l)	Globuli n (g/l)	Urea (Mmol/l)	ALT (u/l)	AS T(u/l)	Creatinin e (µmol/L)	
Turmeric			38.8						
	0g	5.68	3	15.33	23.33	2.66	27.81 ^b	32.74	56.87 ^b
	5g	5.97	3	16.33	25.83	2.47	29.60 ^a	31.32	62.85 ^a
	SE								
Enzyme (ppm)	M	0.36	1.14	0.50	1.12	0.15	0.22	0.57	1.05
			38.5						
	0	5.68	0	15.67	25.17	2.80 ^a	27.37 ^b	30.15 ^b	56.08 ^b
	0.05	5.97	7	16.00	24.00	2.32 ^b	30.05 ^a	33.91 ^a	63.64 ^a
urmeric*enzyme	SE		40.1						
	M	0.36	1.14	0.50	1.12	0.15	0.22	0.57	1.05
			37.6						
	T1	5.50	7	14.33 ^b	27.33 ^{ab}	2.87	25.95 ^c	28.15 ^c	51.65 ^b
SoV	T2	5.87	3	17.00 ^a	23.00 ^{bc}	2.73	28.79 ^b	32.15 ^b	60.51 ^a
	T3	5.87	0	16.33 ^{ab}	19.33 ^c	2.44	29.68 ^a	37.33 ^a	62.10 ^a
	T4	6.07	3	15.67 ^{ab}	28.67 ^a	2.20	30.41 ^a	30.48 ^b	65.18 ^a
	SE		40.3						
Enzymes	M	0.50	1.61	0.71	1.58	0.21	0.31	0.80	1.49
		ns	ns	Ns	ns	Ns	*	ns	*
		ns	ns	Ns	ns	*	*	*	*
Turmeric*Enzymes		ns	ns	*	*	Ns	*	*	*

ALT-Alanin aminotransferase , AST-Aspartate aminotransferase

abc -means on the same row having different superscript are significantly different (p<0.05); SEM-Standard error of means,

T –Treatment ,ns = not significantly different (p>0.05),TC-Total cholesterol, SP -Serum protein

RECOMMENDATION

Use of enzyme (Quantum Blue®) supplementation in diets of broilers improved activity in the liver, it is therefore recommended for improve liver activity.

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