EFFECTS OF CRUDE OR SYNTHETIC ENZYMES ON THE HAEMATOLOGICAL AND BIOCHEMICAL VARIABLES OF BROILER FINISHER CHICKENS FED GROUNDNUT-COWPEA SHELL BASED DIETS

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Abstract

A 28 day assessment of the effects of crude or synthetic enzymes on the haematology and biochemical variables of broiler chickens (Cobb 500) fed groundnut-cowpea shells meal (GCSM) based diet was conducted using a total of two hundred and forty birds randomly allotted to five dietary treatments replicated four times with 12 birds each in a Completely Randomized Design (CRD). Diet T1 had 0% GCSM: 0%dried rumen content (DRC), 0% mushroom and 0ppm synthetic enzyme and served as the control; diet T2 had 25% GCSM, 0% DRC, 0% mushroom, and 0ppm enzyme; diet T3 contained 25% GCSM, 5% DRC, 0% mushroom and 0ppm synthetic enzyme; Diet T4 contained 25% GCSM, 5% mushroom 0% DRC and 0ppm synthetic enzyme and diet T5 had 25% inclusion of GCSM, 200ppm synthetic enzyme, 0% DRC and 0% mushroom. Feed and water. The haematological indices revealed no significant differences (P>0.05) except in PCV, MCH and MCHC and serum biochemistry indices showed significantly (P<0.05) different only in albumin (g/l) and total cholesterol (ml/l).

***Keywords**:* Haematology, Serum Biochemistry, Broilers, Enzymes, GCSM

INTRODUCTION

Many efforts have been positioned to ensured availability of food for global populace particularly the use of farm by-products to feed livestock. It was observed that malnutrition is more pronounced in developing nations (FAO, 2008) and this has for all time led to recurrence of curiosity in the sourcing of least cost alternative feed ingredients as replacement for the more costly conventional ones in livestock feed formulation. The importance of agro-industrial by-products and the so-called "wastes" in meeting the energy and protein needs of farm animals is best appreciated when it is realized that feeding alone accounts for about 60 to 85% of the cost of intensively reared mono-gastric animals (Sanni and Ogundipe, 2005). Alternative feed ingredients also known as non-conventional feedstuffs are mostly byproducts of agro industries. The author suggested that feeding of livestock reared indoor amounted to 60-65 % of the total cost of production of monogastric animals. Nevertheless, by products from agro-industries will be of high value in bridging the gap of inadequate protein and energy required by livestock (Sanni and Ogundipe, 2005). Ikani and Adesehinwa (2000), earlier reported that the answer upon difficulty of insufficient protein of animal source as well as rise in the price of well known feed ingredients in the nation depends on the rearing of high gainful livestock that are capable of converting feed into meat with small generation gap, and as well the use of feedstuffs that are economical and available in lessen the production expenditures. Similarly, according to Alu (2010), who opined that to improve the consumption of waste products from agro-industry by poultry and other non ruminant diets, the high fibrous materials ought to be degraded and it enhanced the constituent via processing method. One of the processing methods of achieving this is the use of enzyme supplementation or fermentation. The enzymes are recognized as bio-catalysts which occur naturally and often formed by living cells to achieve specific biochemical responses (McAllister *et al.,* 2001) Therefore, the aim of the research is to evaluate the effect of crude or synthetic enzymes on the growth performance of broiler finisher chickens fed groundnut-cowpea shell meal based diets

MATERIALS AND METHODS

Study Location

The experiment was conducted at **IBAS Poultry Farm Ltd** Keffi, Nasarawa State. Keffi is located on Latitude $8^{0}51$ and $8^{0}50$ north of the equator and Longitude $7^{0}50$ and $7^{0}51$ east of the Greenwich meridian. (Lyam, 2007).

Experimental diets

Five different experimental diets: T1, T2, T3, T4 and T5 were compounded to be iso-caloric (3000 kcal/kg ME) and iso-nitrogenous (18%CP) for broiler finisher chickens.

Table 1: Gross composition of experimental diets of broiler chicks (Finisher)

Ingredients	T1 0G, 0D 0M+0S	T2 25G, 0D, 0M+0S	T3 25G, 5D, 0M+0S	T4 25G, 0D, 5M+0S	T5 0G, 0D, 0M+200S
Maize (%)	32.00	37.00	33.00	34.25	37.00
Soya bean (Full fat) (%)	17.00	20.00	23.00	23.00	20.00
Groundnut cake (%)	16.00	5.00	3.00	1.75	5.00
Maize bran (%)	16.00	0.00	0.00	0.00	0.00
Rice bran (%)	10.00	2.00	0.00	0.00	2.00
Groundnut shells (%)	0.00	15.00	15.00	15.00	15.00
Cowpeas shells (%)	0.00	10.00	10.00	10.00	10.00
Bone meal (%)	2.00	0.00	0.00	0.00	0.00
Blood meal (%)	1.00	5.00	5.00	5.00	5.00
Salt (%)	0.25	0.25	0.25	0.25	0.25
Palm oil (%)	5.00	5.00	5.00	5.00	5.00
Lysine (%)	0.25	0.25	0.25	0.25	0.25
Methionine (%)	0.25	0.25	0.25	0.25	0.25
Premix (%)	0.25	0.25	0.25	0.25	0.25
Dried Rumen Content (DRC) (%)	0.00	0.00	5.00	0.00	0.00
Mushroom (%)	0.00	0.00	0.00	5.00	0.00
Enzyme	0.00	0.00	0.00	0.00	++
Toxin binder	0.25	0.25	0.25	0.25	0.25
Total	**100**	**100**	**100**	**100**	**100**
Nutrient and energy composition					
Energy kcal/kg (ME)	3090.89	3009.03	2992.04	2964.45	3009.03
Crude protein	20.49	20.07	20.16	20.08	20.07
Crude fibre	4.22	5.14	5.45	8.24	9.14
Ether extract (%)	8.53	10.89	11.702	10.89	10.98
Ash (%)	2.99	3.26	3.29	3.01	2.99
Calcium	1.11	0.42	0.44	0.52	0.42
Phosphorus	0,81	0.36	0.34	0.46	0.36
Lysine (%)	1.12	1.27	1.28	1.27	1.27
Methionine (%)	0.51	0.54	0.53	0.53	0.54

G= %Groundnut cowpea shell meal **M=**%Mushroom (*Ganoderma lucidum*)**, S=**ppm Synthetic enzyme, **D**=%Dried rumen content

Collection and processing of experimental materials

The mushroom, cowpea and groundnut shells were collected from the rural farmers in Kokona Local Government Area of Nasarawa State, Nigeria. The cowpea and groundnut shells were milled into powder and sun-dried at 35^{o}C for five (5) hours as recommended by Ogbe and George (2012) as well as mushroom *(Ganoderma lucidum*) was milled into powder form using pestle and mortar manually and Dried Rumen Content sun dried for 3 days.

Experimental Birds, Management and Design

Two hundred and forty (240) unsexed broiler chickens (Cobb 500 Strain) were used and their initial body weights were taken. The birds were reared under deep litter system. Feed and water were given *ad-libitum* and all the management routine practices were strictly adhered to for ultimate performance. The design for the research was Completely Randomized Design (CRD) and the birds were distributed randomly to five treatments at the rate of 12 birds per replicate. Each treatment was replicated four times.

Hematological and serum biochemical indices analysis

At the end of the experimentation, two set of bottles were used to collect blood samples from the jugular vein of the sampled birds (two birds per treatment). One set of bottle contain anticoagulant while the other is anticoagulant free. The blood samples collected into bottles containing anti-coagulant: Ethylene Diamine Tetracetic Acid (EDTA) as indicated by Jain (1986) was used for hematological indices: packed cell volume (PCV) using hematocrit technique described by Wintrope

(1933), concentration of hemoglobin (HB) outlined by Brown (1973), white blood cell (WBC), red blood cell (RBC) as outlined by Dacie and Lewis (1991). The specimen in the other set of bottles was used to find biochemical indices. The albumin, globulin and serum protein, were analyzed using SIGMA kits (Feteris, 1965). The cholesterol was measured using the method outlined by Roeschlauet *et al.*, (1974)

Chemical analysis Samples of the DRC, mushroom, groundnut and cowpea shells were analyzed using standard methods (AOAC, 1990).

Table 2: Chemical composition of groundnut shells, cowpea shells, died rumen content and mushroom

Nutrient	Groundnut shell	Cowpea shell	Dried Rumen Content	Mushroom *(G. lucidum)*
Crude protein (%)	5.43	19.82	9.25	16.07
Ether extract (%)	0.71	0.63	2.95	1.43
Crude fibre (%)	55.60	33.01	30.28	8.02
Ash (%)	3.17	4.11	11.41	9.01
Dry matter (%)	90.31	88.46	90.33	88.85
Nitrogen Free Extract (NFE) (%)	25.41	36.99	36.44	35.92

RESULTS AND DISCUSSIONS

Haematological and serum biochemistry of broiler finisher chickens fed crude or synthetic enzymes

The highest values for RBC and HBC for birds fed T3 diet were also due to inclusion DRC in the diets. This indicated that birds under this group were supplied with more energy. This observation is contrary with that of Odetola *et al.* (2012) who observed a reduction in RBC and HB in birds fed with 20 % leaf meal of *Moringa oleifera*. The non-variation in the PCV, MCH and MCHC were due to addition of enzymes in the diets and the values fall within the normal physiological ranges of broiler chickens. Better Cholesterol was indicated in diet T4 due to the inclusion of Mushroom.

Table 3: Effects of crude or synthetic enzyme on heamatological variables and serum biochemistry of broiler finisher fed groundnut-cowpea shells based diet.

PARAMETERS	T1 0G, 0D, 0M+0S	T2 25G, 0D, 0M+0S	T3 25G, 5D, 0M+0S	T4 25G, 0D, 5M+0S	T5 0G, 0D, 0M+200 S	SEM	LOS
HEAMATOLOGICAL INDICES							
White blood cell ($X10^{9/L}$)	136.10^{b}	236.82a	232.50^{ab}	268.85^{a}	177.75^{ab}	18.00	*
Red blood cell ($X10^{6/L}$)	2.42^{a}	2.24^{ab}	2.47a	1.82^{c}	2.09^{b}	0.82	*
Heamoglobin concentration (g/dl)	10.15^{ab}	9.25^{bc}	10.40^{a}	8.25^{c}	9.65^{ab}	0.27	*
Parked cell volume (%)	34.50	30.50	34.50	39.00	33.00	0.90	NS
Mean corpuscular heamiglobin (fl)	42.00	41.35	42.10	45.35	42.25	0.63	NS
Mean corpuscular volume (pg)	142.45^{b}	136.55^{b}	139.70^{b}	159.30^{a}	144.10^{b}	2.89	*
Mean corpuscular heamiglobin conc. (%)	29.4	30.36	30.10	28.40	29.30	0.29	NS
SERUM BIOCHEMISTRY							
Total Protein (g/dl)	36.30	27.05	24.60	26.35	22.75	2.69	NS
Uric acid(ml/l)	496.10	179.05	445.80	356.15	321.15	49.38	NS
Albumin (g/l)	12.61^{b}	15.45^{b}	13.95^{b}	18.20^{ab}	44.90^{a}	4.79	*
Aspatate aminotransferase (u/l)	359.80	303.05	326.95	325.80	355.65	10.42	NS
Globulin (ml/l)	23.21	12.09	3.88	9.98	15.12	3.05	NS
Total Cholesterol (ml/l)	3.31^{ab}	2.81^{b}	5.35^{a}	2.70^{b}	2.78^{b}	0.40	*

CONCLUSION AND APPLICATIONS

From the results obtained in this study, it is concluded that the inclusion of GCSM supplemented with crude or synthetic enzymes in diets of broiler chickens the more the adverse effects on the haematological and serum biochemical profile except better Cholesteol in birds fed diet T4.

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