SERUM INDICES OF BROILER CHICKS FED TOASTED AFRICAN YAM BEAN (*SPHENOSTYLIS STENOCARPA*) SEEDS (AYBS) SUPPLEMENTED WITH PROTEASE ENZYME

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Abstract
A total of 200 day old broiler chicks marshal® strain were purchased at Obasanjo Farms Nigeria limited, Igboora branch, Oyo state. 195 broiler chicks were used for the study. Blood serum indices of broiler chicks fed toasted African yam bean (sphenostylis stenocarpa) seeds (AYBS) supplemented with protease enzyme was investigated. Raw African yam bean seeds were obtained from Bodija market, Ibadan North local government, Ibadan, Oyo State, Nigeria and was toasted between 3-5 minutes by using frying pan (74.5cm by 38cm). Five treatments were formulated with various levels of toasted African yam bean seeds and enzyme was supplemented at the rate of 150 g / 1000 kg of feed. Experimental broiler chicks were randomly allotted to five experimental treatments with 39 birds per treatment, replicated three times with 13 birds per replicate in a Completely Randomized Design (CRD). Experimental feed and water were given at ad-libitum from day old till five weeks of the experimental period. Blood was collected by using disposable needle and syringe into the bottle that had no EDTA between 8-10 am and kept inside cooler that already contained ice block and transferred to the laboratory for serum assay. There were no significant ($P<0.05$) differences between total protein, albumin, globulin, cholesterol, creatinine except albumin globulin ratio that significantly ($p>0.05$) affected , toasted African yam bean seeds with protease enzyme supplementation is recommended as an alternative protein source to soybean meal (conventional plant protein source) and can be used up to 40% inclusion level. Further level of inclusion should be considered in broiler chicks diets.

Keywords: Broiler starter, Toasted African yam bean seed, enzyme and blood indices

Introduction

African yam bean seeds were novel feed stuffs and little work has been done on the utilization of African yam bean seed in the nutrition of monogastrics. The reason might be due to anti-nutritional factors on the nutritional composition of the component parts of the African yam bean seeds. Hematological analysis, for instance, is significant in nutritional studies because blood, the metabolites and their concentrations provides information for indirect nutritional assessment due to the fact that food or feed components affect body constituents (Harper *et al.*, 1979). Blood analysis is a readily available and fast means of assessing the health status (Anosa, 1983), clinical evaluation for survey of physiological or pathological conditions (Bush, 1991) and a diagnostic evaluation of various diseases in animal (Nottidge *et al,*. 1999). There is paucity of information on the effect of inclusion of toasted African yam bean seed with protease enzyme in the diets on serum indices status of broiler. Therefore, this study was designed to investigate serum indices of broiler chicks fed toasted African yam bean (*sphenostylis stenocarpa)* seeds supplemented with protease enzyme.

Materials And Methods

Experimental site

The experiment was carried out at the Poultry Unit, Teaching and Research Farm, Oyo State College of Agriculture and Technology, Igbo-Ora, Oyo State, Nigeria, latitude 7°15 'N and longitude 3°30 E with average annual rainfall of 1278mm and average temperature of 27°C.

Procurement of African yam bean seeds and other ingredients

African yam bean seeds were procured at Bodija market, Ibadan, while other ingredients like maize, soybean meal, methionine, lysine, di-calcium phosphate and limestone were obtained from Adom feed mill, Orogun area, Ibadan, Oyo state, Nigeria.

Sorting and processing of test ingredient

African yam bean seeds were sorted to remove stone, dirt and other spices apart from African yam bean seed (brown variety) and toasted by using frying pan of 74.5cm by 38.00cm and placed on firewood as the source of energy for frying and evenly distribution of heat was attained in 3 to 5 minutes when beans turned to crispy.

Chemical composition of toasted African yam bean seeds.

The chemical composition of toasted African Yam

Bean Seeds were determined in the laboratory by using (AOAC, 2010) method. The metabolizable energy was calculated as described by Puazenga (1985), (37 × CP) + (81.8× Cfat) + (33.5 × NFE). Nitrogen Free Extract (NFE) was calculated using the following formula; 100–(CP–CF–Fat Ash-MC). CP= Crude protien; CF = Crude fibre; NFE = Nitrogen Free Extract; MC=Moisture content. Protease enzyme used for the experiment was purchased in Ibadan. Manufacturer instruction. was strictly followed, i.e it was used at150g/1000kg of feed (one tonne of feed).

Experimental diets

Five diets were formulated, soybean meal and Toasted African yam bean seeds meal (TAYBSM) served as sources of protein. Diet one contained soybean meal without TAYBSM+E i.e. (control) while TAYBSM was added to treatments (T) 2, 3, 4, and 5 at the rate of 10, 20, 30 and 40% inclusion rate respectively to replace soybean meal (nutrient to nutrient) and enzyme was supplemented into the T2, T3, T4 and T5 as prescribed by manufacturer.

Experimental birds, design and management

Two hundred Marshal R broilers chicks were purchased from Obasanjo hatchery, Igboora in Oyo state, Nigeria and 195 birds were used for the study. The birds were divided into five equal groups of 39 birds in a treatment with three birds per replicate in a Complete Randomized Design. Each replicate was house in a floor pen cover with wood shaving as litter materials and equipped with feeders and drinkers. Feed and fresh water were supplied *ad-libitum* throughout starting phase (5 weeks). Routine vaccines and medication were administered as at when due.

Blood collection

At the 5th weeks, one bird per replicate was randomly selected, fasted overnight and bled early in the morning (8-10am) by the wing web vein from which blood was collected through disposable needle and syringe into carefully labeled specimen bottles without ethylene demine tetra acetic acid (EDTA) and packed into ice pack and transferred into the laboratory for serum assay.

Statistical analysis

Data collected were subjected to analysis of variance (SPSS, 2012) means were separated by using Duncan multiple range test of the same software.

Table 1: Percentage composition of broiler starter (0-5 weeks)

Ingredients (kg)	T1(Control)	T2 (10%)	T3 (20%)	T4 (30%)	T5 (40%)
Maize	61.00	58.71	56.42	54.13	51.84
Soybean	35.00	31.50	28.00	24.50	21.00
AYBS	0.00	5.79	11.58	17.37	23.16
DCP	2.00	2.00	2.00	2.00	2.00
Limestone	1.00	1.00	1.00	1.00	1.00
Methionine	0.25	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25	0.25
Premix (B)	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00
Enzyme (g)	0.00	15.00	15.00	15.00	15.00
Calculated analysis					
ME (Kcal/kg)	3005.40	3048.91	3058.08	3067.25	3076.42
Crude Protein (%)	22.00	21.27	21.04	20.81	20.58
Ether Extract (%)	3.70	3.74	3.82	3.90	3.97
Crude Fibre (%)	1.92	1.74	1.61	1.53	1.50
Ash (%)	0.80	1.05	1.31	1.57	1.83
Calcium (%)	0.90	0.90	0.91	0.92	0.93
Phosphorus (%)	0.54	0.55	0.57	0.59	0.61

AYBS= African yam bean seed. DCP: Di-calcium phosphate. ME= Metabolizable energy

Vitamin-mineral premix cont ains the following: Vitamin A,15000000i.u; Vitamin D3 3,000000i.u, Vitamin E, 30,000i.u, Vitamin K, 2,500mgr, Thiamin, B1,2,000mgr, Riboflavin, B2, 6,000mgr;Pyridxine B6 4,000 Niacin, 4,000mgr; Vitamin B12,20mgr; Pantothenic Acid,10,000mgr; Biotin,80mgr;Ch olin Chl0ride 500mgr; Antioxidant, 125gr;Manganese 96gr; Zinc,60gr; Iron 24gr; Copper 60gr; Iodine 1.4gr;Selenim 240gr; Cobalt 120gr.

Table 2: Serum indices of experimental birds (0-5 weeks)

Parameters	T1 (0%)	T2 (10%)	T3 (20%)	T4 (30%)	T5 (40%)	SEM
Total protein(g/dl)	5.20	6.47	6.33	5.63	5.03	0.27NS
Albumin (g/dl)	0.80	1.83	1.63	1.33	0.83	0.16NS
Globulin (g/dl)	3.4	4.53	4.70	4.30	4.20	0.24NS
Alb/glo ratio	0.13^{a}	0.37^{b}	0.27^{ab}	0.27^{ab}	0.17^{ab}	0.33*
Creatinine (g/dl)	0.60	0.73	0.70	0.63	0.60	0.08NS
Cholesterol	152.67	173.67	179.00	135.67	197.33	12.81NS

^{a,b,c,d,e} values in same row with different superscripts are significantly different (P<0.05)

NS=Non-significant *= Significant. SEM=Standard error of mean. ALB/GLO=Albumin/globulin ration

Results And Discussion

The results of serum indices of broiler starters are shown in table 2. There were no significant (P>0.5) differences among parameters measured except albumin globulin ratio that significantly affected (P<0.05). Total protein ranged between 5.03g/dl to 6.47g/dl with least (P>0.05) value of 5.03g/dl in birds fed on 40% toasted African yam bean seeds meal with enzyme (TAYBSM+E) while birds fed on 10% TAYBSM+E (T2) had highest (P>0.05) value of 6.47g/dl. Albumin recorded highest (P>0.05) value of 1.83g/dl on 10% TAYBSM+E (T2) while control (T1) gave least (P>0.05) value of 0.80g/dl. Globulin revealed highest (P>0.05) value of 4.70g/dl on 20% TAYBSM+E (T3) but lowest (P>0.05) value of 3.40g/dl was recorded on control (T1). Albumin globulin ratio recorded least significant (P<0.05) value of 0.13g/dl on control (T1) while highest significant (P<0.05) value of 0.37g/dl was recorded on 10% TAYBSM+E (T2). Creatinine showed lowest (P>0.05) value of 0.60g/dl on both control (T1) and 40% TAYBSM+E (5) but highest (P>0.05) value of 0.73g/dl was observed on 10%TAYBSM+E (T2). Cholesterol showed least (P>0.05) level of 135.56g/dl in birds fed on 30% TAYBSM+E (T4) while highest (P>0.05) value of 197.33g/dl was obtained on 40% TAYBSM+E (T5). The increase in total protein concentration of birds in this study is in consonance with reports of Annison and Choct, 1991, Iyayi and Losel, 2000 who opined increased in total protein and albumin concentration that might be as a result of better protein intake due to the hydrolylic effect of enzyme on non-starch polysaccarides (NSPs) and protein-bound tannin respectively as well as detoxification of cyanide. The values of cholesterol obtained reveals that no muscular wastage which might have been possibly caused by inadequacy of protein in birds hence this is in accordance with the report of Udoyong *et al.*, (2010). The non-significant (P>0.05) differences in the values of blood parameters in this study could be related to the nutritional adequacy and safety of the test diets.

Conclusion

Based on the results obtained in this study, toasted African yam bean meal seeds with protease enzyme supplementation can replace soybeans meal up to 40% levels of inclusion with provision of adequate nutrients and without any deleterious effect on the health status of the birds. This suggests that when dietary inclusion levels of toasted African yam bean seeds meal with enzyme supplementation is used by farmers it can reduce high competition between man and poultry birds and is an eye opener, especially now that soybean meal is scarce and costly in the country. This is indicative of a way out for broiler producers in terms of availability of cheaper plant protein sources.

Recommendation

Therefore, 40% inclusion level of toasted African yam bean seeds with protease enzyme supplementation is recommended for broiler production. Further levels of inclusion of toasted African yam bean seeds with protease enzyme supplementation should be researched on.

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