

POTENTIALS OF REPLACING SOYBEAN MEAL WITH TOASTED AFRICAN YAM BEAN MEAL ON GROWTH PERFORMANCE OF BROILER FINISHER BIRDS

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ABSTRACT

Eighty-four (84) Anak finisher broilers were used to evaluate the potentials of replacing soybean meal with toasted african yam bean meal on growth performance of broiler finisher birds. There were twenty one (21) birds in each treatment and seven birds per replicated. Four treatment diets were formulated for the experiment. They were assigned as treatment I, II, III and IV respectively. Treatment I (0%) is the soybean based diet while Treatment II (25%), III (50%) and IV (75%) had quantitative replacement of soybean by toasted African yam beans Meal (TAYB). The parameters evaluated showed significant differences ($P < 0.05$) apart from initial body weight. Final body weight and daily weight gain (g) followed almost the same pattern. Finisher broiler chicks fed the control diet (0%AYB) and diet containing 25% toasted African yam bean were statistically similar but birds fed diet II (25%) was significantly different from those fed diets III (50%) and IV (75%). The high final body weight (g) and daily weight gain (g) in diet containing 25% toasted African yam bean (TAYB) meal suggest a better feed utilization. The feed intake increased as quantity of toasted African yam beans (TAYB) meal (test ingredient) increase in the diets. The feed conversion ratio for diet II (25% AYB) and III (50% AYB) were significantly lower than diet I (0% AYB) and IV (75% AYB). Decreasing feed production cost (₦/kg) (70.62, 65.51, 60.41 and 53.32) was observed as inclusion level of toasted African yam beans (TAYB) meal increased from 0 to 75%. Broilers earlier fed 25% toasted African yam bean meal (TAYB) diet at starter stage of life, could continue with a 50% (TAYB) diet up to finisher stage without any adverse affect on growth performance.

Keywords: Finisher Broiler, Growth Performance and Toasted African Yam Bean Meal

Introduction

Intensive poultry production in Nigeria has been greatly affected by the high cost of feeds and feed ingredients, especially the conventional energy and protein feed ingredients like maize, soybean cake, and groundnut cake (Ani, 2008). Global food security however is not steady, with increasing dependence on a few major staple crops (Ikhajiagbe and Mensah, 2012). A possible solution to the escalating cost of these ingredients is to explore the potentials of alternative feedstuffs as part or full replacement for the more expensive conventional feed ingredients. The alternative protein being considered in this study is African yam bean (*Sphenostylis stenocarpa*). African yam bean (*Sphenostylis stenocarpa*) is a

climbing legume adapted to lowland tropical conditions. It is one of the lesser-known legumes (NAS, 1979., Tindall, 1983., Apata and Ologhobo, 1990) and widely cultivated in the southern parts of Nigeria. The legumes are a good source of dietary protein (Sinha, 1977). The crude protein content ranges between 21-22.55% with lysine and Methionine level better than that of soybean (Evans and Boulter, 1974). Its yield ranges from 1860kg to 2000kg per ha (Evans and Boulter, 1974.) like other grain legumes lectins and others have been reported (Aletor and Aladetimi 1989). The need for detoxification before use become important, Toasting is the common detoxification process among rural users and hence attracts attention in the study.

The objective of this study includes, determining anti-nutritional factors and the optimal replacement of soybean meal with toasted African yam bean meal in broiler finisher diets.

Material and Methods

Experimental Site

The research project was carried out at the Teaching and Research Poultry Unit of College of Animal Science and Animal Production, Michael Okpara University of Agriculture, Umudike, Abia State. Umudike is located on Latitude 5°29' North and Longitude 7°33' East in the rainforest zone of Nigeria. The climate of the region is characterized by a daily temperature range of 27°C and 36°C throughout the year and an average rainfall of 2000mm per annum. The relative humidity during rainy season was well above 72%.

Procurement And Processing of African Yam Bean and Other Feed Stuffs

Africa yam bean (AYB) was purchased from Umuahia main market in Abia State of Nigeria. It was toasted to brownness for fifteen (15) minutes, milled and then incorporated into the diet. The rest of the feed ingredients and experimental

birds were purchased from Umuahia and Aba, both in Abia State.

Experimental Procedure

The same groups of Anak broilers used in the starter stage continue in their respective treatments and replicates at the finisher stage. There were no changes in the inclusion levels of the Africa yam bean (AYB) meal in the experimental diets except that finisher diets were formulated with Africa yam bean (AYB) as in Table 1. There were twenty one (21) birds in each treatment and seven birds per replicated. Four treatment diets were formulated for the experiment. They were assigned as treatment I, II, III and IV respectively. Treatment I (0%) is the soybean based diet while Treatment II (25%), III (50%) and IV (75%) had quantitative replacement of soybean by toasted African yam beans (Table 1). The birds were weighted at the beginning of the experiment and thereafter on weekly basis. Feed intake and feed left over were recorded daily. Vaccination and medication were administered throughout the experiment as need be. Feed and water were provided *ad libitum* for the four (4) weeks duration of the experiment.

Table 1: Composition of Experimental Diets (Finisher Phase)

Ingredient	0%(TAYB)	25%(TAYB)	50%(TAYB)	75%(TAYB)
Maize	51.94	51.94	51.94	51.94
Soybean	23.81	15.88	7.95	0.00
African Yam Bean	0.00	7.93	15.86	23.81
Fish meal	5.00	5.00	5.00	5.00
Bone Meal	3.00	3.00	3.00	3.00
Wheat Offal	15.00	15.00	15.00	15.00
Salt	0.50	0.50	0.50	0.50
Premix*	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Calculated values	100	100	100	100
CP%	22.29	20.31	18.19	15.60
ME(Kcal/g)	2849.99	2842.06	2834.13	2826.18

*Composition per 2.5kg vitamin A 10,000,000m vitamin D 2,000,000iu, vitamin E 20,000iu K 2,250mg Thiamine; Bi I,750mg, Riboflavin; B2 5,000mg, pyridorine, B6,750mg, vitamin B12 15mg, panthothenic Acid 7,500mg, Biotin 50mg, choline chloride 400g, Antioxidant 125g, manganese 80g, zinc 50g, Iron 20g, copper 5g, iodine 1.2g, selenium 200mg, cobalt 200mg.

Chemical and Data Analysis

Sample of toasted African yam beans (TAYB) meal was taken and analyzed for its proximate composition using the AOAC (1990) procedure.

Anti nutritional factors were also determined using standard methods. Trypsin inhibitors were extracted by the methods reported by Kakade *et al.* (1974). Data collected were subjected to

analysis of variance (ANOVA) in completely randomized design as described by Snedecor and Cochran (1980). While means were separated using Duncan's multiple range test (Duncan, 1955).

Results and Discussion

Finisher phase

Table 2 shows the result of the growth performance of finisher broiler birds fed diet containing varying levels of toasted African yam beans meal. The parameters evaluated showed significant differences ($P < 0.05$) apart from initial body weight.

Table 2: Growth Performance (Finisher Phase)

Parameters	TI (0%)	TII (25%)	TIII (50%)	TIV (75%)
Initial body weight (g)	696.33	697.67	699.67	694.00
Final body weight (g)	1960.00 ^{ab}	1991.6 ^a	1988.33 ^b	1868.33 ^b
Daily weight gain (g)	45.13 ^a	44.72 ^{ab}	46.02 ^a	41.90 ^b
Total feed intake (g)	3279.66 ^b	3310.00 ^{ab}	3325.00 ^a	3333.33 ^a
Daily feed intake (g)	117.00 ^b	118.21 ^a	118.75 ^a	119.50 ^a
Feed conversion ratio	2.59 ^{ab}	2.53 ^b	2.58 ^b	2.84 ^a
Cost/kg (₦)	70.62	65.51	60.41	53.32

^{a, b, c} Different superscripts on means within a row indicate significant differences ($P < 0.05$)

Final body weight and daily weight gain (g) followed almost the same pattern. Finisher broiler Birds fed the control diet (0% AYB) and diet containing 25% toasted African yam bean were statistically similar but birds fed diet II (25%) was significantly different from those fed diets III (50%) and IV (75%). The high final body weight (g) and daily weight gain (g) in diet containing 25% toasted African yam bean (TAYB) meal suggest a better feed utilization. Which further support heating to be effective in reducing haemagglutinin and trypsin inhibitor content of AYB (Emiola, 2004), The lower performance of birds fed diet containing 50 and 75% AYB could be attributed to the effect of residual anti-nutritional factors such as trypsin-inhibitor, tannin and phytate (Table 3). Trypsin inhibit digestive enzymes by irreversibly binding themselves to the enzymes thus, making the enzymes unavailable for the breaking down of protein (Linear, 1980), leading to poor protein digestibility with the resultant effect of growth depression (Maynard *et al.*, 1979). For total feed intake of birds fed the control diet and (25%) toasted African yam bean were statistically similar. And significantly lower than diets III (50%) and IV (75%). Daily feed intake increases with increase in toasted African yam bean meal in the diet fed as shown in Table 2. The feed intake increased as quantity of toasted African

yam beans (TAYB) meal (test ingredient) increase in the diets. This may be due to lower values of metabolizable energy of the diets containing toasted African yam beans (TAYB) meal, or could be that the birds increased feed intake to meet their energy requirements (Emenalom and Udedibie, 1998; Akinmutimi, 2004; Okereke *et al.*, 2013). Increase in the consumption of toasted yam bean diets could be an attempt of the broilers to meet nutrient requirements from a diet that contained some antinutritional substances as has been observed with broilers (Amaefule and Onwudike, 2000; Amaefule and Obioha, 2003; Onu and Okongwu, 2006, Okereke *et al.*, 2013). The feed conversion ratio for diet II (25% AYB) and III (50% AYB) were significantly lower than diet I (0% AYB) and IV (75% AYB). The significantly ($P < 0.05$) high values of diet I (0%) and IV (75%) when compared to diet II (25%) and III (50%) show poor nutrient utilization despite the high feed intake. The higher the feed conversion ratio, the poorer the diet (Ogbonna *et al.*, 2000) hence diet II and III was a superior diets followed by diet I and then diet IV. Decreasing feed production cost (₦/kg) (70.62, 65.51, 60.41 and 53.32) was observed as inclusion level of toasted African yam beans (TAYB) meal increased from 0 to 75% (Table 2).

Table 3: Anti-nutritional factors composition of test ingredient

Parameters	African Yam Bean Flour (AYB)
Tannin g/100 g	0.02
Trypsin-inhibitor g/100 g	1.12
Phytate g/100 g	2.39

Conclusion

The study analysed the potentials of replacing soybean meal with toasted african yam bean meal on growth performance of broiler finisher birds. Broilers earlier fed 25% toasted African yam bean meal (TAYB) diet at starter stage of life, could continue with a 50% (TAYB) diet up to finisher stage without any adverse affect on growth performance.

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