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Effect of Replacing Soybean Meal with Lima Bean Meal on Finishing Broiler Chicken.

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ABSTRACT

Lima beans (*Phaseolus lunatus*) was processed by soaking and toasting before usage to feed 75 broiler birds for 28 days. The birds were randomly assigned to five treatment diets with each treatment being replicated three times and containing five birds per replicate in a completely randomised design. The bean was soaked for twenty four (24) hours, oven-dried and then toasted. It was milled and then incorporated into diets. Except diet 1, each of the diets (2-5) contained quantitative replacement of soyabean with the processed lima bean at 5%, 10%, 15% and 20% levels respectively. The result showed a significant ($P<0.05$) difference in values obtained for growth performance. There were also significant ($P<0.05$) differences in values of gizzard, spleen, kidney, proventriculus, heart and liver. Among cut parts, it is only the values of drum-stick that did not differ significantly ($P>0.05$). But for all the other parameters, there were significant differences ($P<0.05$). From the result, it is deduceable that feed intake of the birds decreased as the quantity of processed lima beans increased in the diet. It was only the birds on the diet II where only 5% of soyabean was replaced by lima beans that compared favourably with those fed with control diet. Hence, quantitative replacement of soyabean with lima bean should not exceed 5% to avoid poor performance.

KEYWORDS: Broiler chicken, lima bean, growth performance, carcass yield.

INTRODUCTION

Shortage and high cost of conventional feedstuff particularly protein sources such as soyabean and groundnut cake constitute a limiting factor to economic production of poultry (Ogbonna *et al*, 1998) in Nigeria. studies then are directed towards identifying cheap ingredients that are rarely consumed by man but can meet nutritional requirement of farm animals (Akinmutimi *et al*, 1998). Lima beans (*Phaseolus lunatus*), a legume cultivated with promising yield of about 3000-5000kg/ha (kay, 1979) readily comes to mind as a potential solution to this problem. It has crude protein content of about 22% and thrives well in low land tropical rain forest especially on poor soils where most crops don't thrive (NAS, 1979).

Lima beans like other grain legumes contain various compounds which when consumed raw by animals may be harmful and has low nutritional value (Ologhobo *et al*, 1993). These compounds include tannin, haemagglutining, lectin cyanogenic glycosides and protease inhibitors (Ologhobo *et al*, 1983; Aletor, 1984). Hence the need for processing. Processing methods such as toasting, cooking and soaking have been used and their performances reported (Ojo, 1988; Ologhobo, 1992 and Akinmutimi *et al*, 1998). Presently there is a dearth of information on dietary effect of lima beans that has been subjected to combined processing methods like soaking and toasting.

This combined treatment happens to be commonly practiced among rural dwellers. The present study therefore is aimed at determining the effect of a combination of soaking and toasting as a processing method on the nutritive value of lima beans, using broiler finisher birds.

MATERIALS AND METHODS

The experiment was conducted at the poultry section of the livestock farm of Michael Okpara University of Agriculture, Umudike. The lima bean used was purchased from Idanre, Ondo State of Nigeria. Seventy-five (75) Anak broiler of 28 days of age were used for the experiment. Prior to the experiment, the birds were brooded from day old during when they

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were fed commercially obtained feed. At the end of the brooding and preparatory stage, which lasted for 28 days, the birds were randomly allocated to fifteen pens each containing five birds. They where provided with light to enable them eat both day and night. Feed and water to all birds were provided *ad libitum*. Necessary prophylactic treatments were administered as at when due.

Birds were allocated to (5) dietary treatments with each treatment having three replicates of five birds per replicate. These were arranged in a completely randomised design. The beans were soaked in water from twenty four hours after which they were oven-dried at 60^0c. This was followed by toasting to brownness and milling before being incorporated in the diet. There were five diets designated as 1, II, III, IV and V. Diet 1 was the control that contained no lima bean. But diets II-V contained quantitative replacement of soya beans by soaked and toasted lima beans respectively at 5%, 10%, 15% and 20% levels as shown in table 1.

The experiment lasted for 28 days and data for weight gain and feed intake were collected weekly. Carcass quality was examined using the method of Ojewola and Longe (1999). Gross energy of the feed was determined using Adiabatic bomb calorimeter. Samples of feed were analysed for proximate composition according to the methods of AOAC (1980) and values are shown in (Table 1). Data were all subjected to analysis of variance (ANOVA) according to Steel and Torrie (1980). Differences between treatment means were determined by the New Multiple Range Test (Duncan, 1953).

RESULTS AND DISCUSSION

Table II shows values of growth performance of birds. There were significant ($P<0.05$) differences in the values obtained for feed intake, weight gain, feed conversion ratio and finishing live weight of the birds. Values of feed conversion ratio obtained in this study were for all groups poorer than those reported by Ologhobo (1992) for seeds of some species of legume but the differences are in line with trend reported by same author which indicates that no two legumes produced similar values of production parameters of birds.

Values of feed intake and weight gain reduced with increase in the dietary level of the lima beans. This was also reported by other authors (Ologhobo, 1992; Akinmutimi *et al*, 2000 and Akinmutimi, 2001) who generally attributed the phenomenon to poor content of sulphur containing amino acids like methionine and the presence of residual anti-nutrients. The comparatively poorer performance of chickens fed treated lima beans is in agreement with report of Aletor (1984) who suggested that conventional processing methods may not completely remove the effect of anti-nutrients of these legume species. Values of weight gain followed a pattern that is similar to that of feed intake probably for similar reasons.

Table 1: Composition of experimental diets (%)

Ingredients	0%	5%	10%	15%	20%
	I	II	III	IV	V
Maize	54	54	54	54	54
Soyabean	22.3	17.3	12.3	7.3	2.3
Lima bean	-	5	10	15	20
Palm kernel cake	14	14	14	14	14
Fish meal	3	3	3	3	3
Bone meal	3	3	3	3	3
Blood meal	1	1	1	1	1
Oystershell	2	2	2	2	2
Vit. Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Methionine	0.10	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10	0.10
CP	19.586	17.486	15.386	13.286	11.186
ME (kcal/kg)	3011.9	2856.9	2701.9	2546.9	2391.9
Proximate Composition of Feed					
Dry matter (%)	91.075	89.545	89.315	90.17	90.9
Crude protein (%)	19.715	19.3	28.475	19.04	19.985
Ether extract (%)	4.22	4.165	4.11	4.02	4.32
Crude fibre (%)	6.14	7.22	7.03	5.74	6.335
Ash (%)	11.775	12.205	17.71	13.285	19.25
Dry matter (%)	91.075	89.545	89.315	90.17	90..9
G.E (kcal/g)	3.4815	3.283	3.305	3.4215	3.4025

Table II: Growth performance and carcass quality of broiler finisher fed on the control diet and four dietary levels of soaked toasted lima bean

Parameters	Control	5%	10%	15%	20%	SEM
Initial weight (g)	346.12	458.64	400.84	384	362.12	
Final weight (g)	1500[a]	1490[a]	1030[a]	1000[b]	0970[b]	
Feed intake g/day	164[a]	133[b]	131[b]	117[b]	124[b]	4.71
Weight gain (g/day)	41.21[a]	33.62[b]	22.47[c]	22[c]	21.71[c]	2.22
Feed conversion ratio	4.0[b]	3.99[b]	5.85[a]	5.31[a]	5.79[a]	0.24

Values with different superscripts within a row d'ffer significantly (P<0.05)

Table III: Mean values of organs as a percentage of body weight

	Control	5%	10%	15%	20%	SEM
Proventriculus	0.39[b]	0.54[b]	0.65[b]	0.63	0.65[b]	0.07
Gizzard	3.62[b]	3.62[b]	3.60[b]	3.86[b]	5.02[a]	0.18
Spleen	0.11[b]	0.08[c]	0.14[a]	0.09[c]	0.15[a]	0.01
Kidney	0.65[b]	0.54[c]	0.73[ab]	0.7[b]	0.82[a]	0.03
Heart	0.53[a]	0.56[a]	0.53[a]	0.44[b]	0.53[a]	0.01
Liver	1.82[c]	1.75[c]	2.10[ab]	1.93[c]	2.26[a]	0.06

Values with different superscripts within a row differ significantly (P<0.05)

Mean value of most cut parts showed no particular trend (Table IV).

Table IV: Mean value of cut parts as a percentage of body weight

	Control	5%	10%	15%	20%	SEM
Thigh	9.74[a]	8.33[b]	9.22[a]	8.31[b]	9.4[a]	0.18
Drumstick	9.22[a]	10.54[a]	9.32[a]	9.55[a]	9.87[a]	0.18
Breast cut	16.37[a]	13.72[b]	12.96[b]	15.39[a]	15.98[a]	0.39
Back cut	16.09[a]	17.47[a]	15.47[a]	16.71[b]	18.75[a]	0.35
Wing	8.22[b]	8.27[b]	8.45[a]	8.14[b]	8.92[a]	0.08

Values was different superscripts with a row differ significantly (P<0.05)

Weight of organs expressed as percentage of live weight of birds are shown on table III. In magnitude, values were within the range reported by Ologhobo (1992) and Ologhobo *et al* (1993). They were generally higher with increase dietary content of lima beans. This trend which is in line with observations reported by Ologhobo (1992), may have resulted from the adverse effect of higher dietary content of the lima beans. Exhaustive explanation to this phenomenon may be obtained from a histology study which is a subject of further research.

Cost of feed were 33.56, 33.31, 32.46, 31.61 and 30.76 naira per 1kg respectively for diets, soyabeans contents of which, was replaced in 0,5,10,15 and 20% by lima beans. The cost therefore reduced with increase in dietary content of the beans. This may be because unit cost (#35.00/1kg) of lima beans included in the test diets is lower than that (#52.00/1kg) for soyabeans that was included in the control diets. This has been the trend reported by most workers when using the cheaper non-conventional legumes seeds (Apata *et al*, 1999 and Bamigbose *et al*, 2000).

Cost of feed used to obtain 1kg of live weight were 102.92, 83.25, 115.6, 103.55 and 110.16 Naira respectively for diets soyabean content of which, was replaced in 0,5,10,15 and 20% by lima beans. Lowest cost was obtained for the birds fed diet containing 5% of the test beans. This may be the product of a favourable weight gain and moderate feed cost. Therefore, a considerable reduction in cost may be achieved in production of broiler chickens when only 5% of soyabeans is replaced with soaked and toasted lima beans.

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