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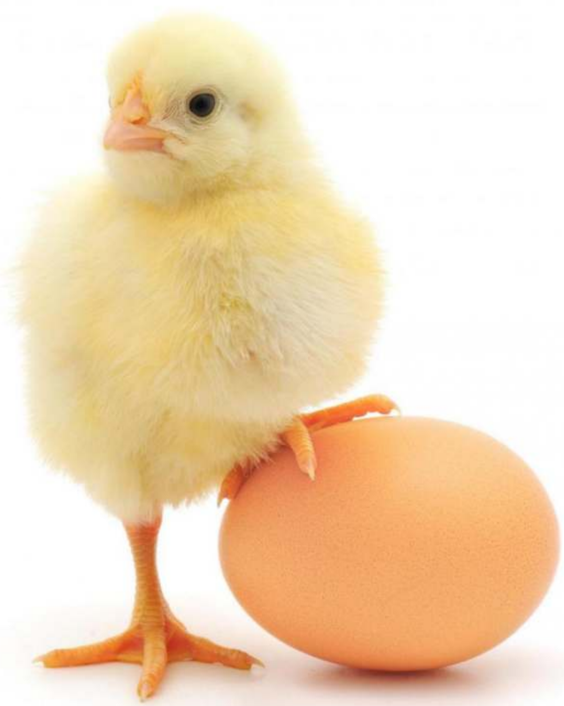

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ANSInet
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorijps@gmail.com

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The Effect of Quantitative Replacement of Soybean Meal with Cooked and Toasted Lima Bean Meal on Growth Performance and Carcass Quality Values of Broiler Finisher Birds

A.H. Akinmutimi, A.O. Aligwara and S.F. Abasiekong
College of Animal Science and Animal Production, Michael Okpara University of Agriculture, Umudike, P.M.B. 7267, Umuahia, Abia State, Nigeria

Abstract: The effect of cooked and toasted lima bean meal in boiler finisher diets was assessed using seventy five (75) Anak broiler birds. The beans were cooked for ninety (90) minutes, oven dried at 60°C and toasted to brownness. It was quantitatively used to replace soybean at 5%, 10%, 15%, and 20% levels of inclusion. The birds aged twenty eight (28) days were divided into five (5) treatments and each treatment replicated three (3) times. The birds were assigned to the diets in a completely randomized design experiment. The result of growth performance showed that the mean feed intake values showed no significant (P>0.05) difference for all the diets while there were significant (P<0.05) differences for values of weight gain and feed conversion ratio. The values are 42.8, 46.6, 41.2, 35.4, 23.3 and 3.45, 2.70, 2.84, 3.27, 4.93 for weight gain and feed conversion ratio respectively. The cut- parts showed that the birds on the test diets have values comparable to those on the control diet Based on the above results, normal market live weight and cost per kilogram weight gain, 5% cooked and toasted lima bean meal can quantitatively replaced soybean meal without adverse effect on the growth performance and carcass quality values and hence recommended.

Key words: Cooked and toasted lima bean, soybean, growth performance, carcass quality

Introduction

Protein deficiencies result in various clinical and sub-clinical condition such as reduced growth rates, poor physical and possibly mental development in children and adolescence. Impaired health reduced resistance to diseases, and lowered working efficiency in adult (Ojewola, 1988). Hence the expression of concern at the rather low level of animal protein intake b has been estimated to be 8gm per caput per day, day about 27gm less than the minimum requirement recommended by the Nation research council of the united state of America (Obioha, 1992). This has generally been attributed to the short fall in the animal production which encourage scarcity and high prices of animal products. One way of addressing this problem is by focusing on the production of animals which have high rate of reproduction and growth. The short generation interval of broiler chicken makes them a choice animal for rapid and sustainable production of animal protein for human consumption (Akpodiete *et al*, 1997). However, the cost of producing broilers is expensive due largely to cost of feed which accounts for between 70-80% of total cost of production (Ogunfowora, 1984). This has been attributed to the competition between human beings, industry and monogastric animals for the conventionally used feedstuffs, particularly protein sources (Soyabean and Groundnut). The high cost of these protein sources is also a deterrent to their usage. The situation however has stimulated the quest for alternative protein sources which are cheap, available, of low human preference, with little or no processing (Akinmutimi, 2001). Lima bean Phaseolus lunatus has such potentials (NAS, 1979). Furthermore; it yields about 3000-5000kg of seed per hectare, with crude protein content of about 22%. It thrives well in low land tropical rainfalls especially on poor soils where most crops don't thrive (NAS, 1979). Like other grain legumes, it contains anti-nutritional factors which causes negative effects such as less efficient feed conversion, poor growth, intermittent scouring, wasting and sometimes death of animals when consumed raw (Ologhobo *et al.*, 1992).

Tannins, phytins, protease inhibitors, cyanogenic glycosides have been reported as various anti-nutritional substances present in lima bean (Aletor, 1998; Ologhobo *et al.*, 1992). Phytin for example interferes with the utilization of mineral elements. It forms compounds with anions and proteins. These compounds are not readily broken down and hence reduce the absorption of minerals (Oberlease, 1973).

Aletor and Fasuyi (1997) reported among other things that: tannin causes poor palatability and hence poor feed intake of diets containing high tannin content. On the account of the deleterious effect of feeding raw lima bean to livestock, there has arisen the need for processing before usage. Various processing methods such as soaking, cooking, germination, potash-cooked have been used and the performances reported (Ologhobo and Fetuga, 1983, Ologhobo *et al.*, 1992 and Akinmutimi, 2001).

Table 1: Composition of Experimental Diets

Ingredients	Diet I (0%)	Diet II (5%)	Diet III (10%)	Diet IV (15%)	Diet V (20%)
Maize	54.00	54.00	54.00	54.00	54.00
Soyabean meal	22.30	17.30	12.30	7.20	2.30
Lima bean meal	-	5.00	10.00	15.00	20.00
Palm kernel cake	14.00	14.00	14.00	14.00	14.00
Fish meal	3.00	3.00	3.00	3.00	3.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Blood meal	1.00	1.00	1.00	1.00	1.00
Oyster shell	2.00	2.00	2.00	2.00	2.00
Vit. Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10	0.10
Methionine	0.10	0.10	0.10	0.10	0.10
CP %	20.12	18.82	17.82	16.82	15.82
M.E. (Kcal/g)	2.8754	2.8622	2.8490	2.8358	2.8228

*Vitamin A 4,800,00 iu, vitamin C 100.00g, vitamin D3 800,000 iu Biotin 0.06g, vitamin E 12.00g, Chlornechloride 80.00g, vitamin K 0.80g, Manganese 10.00g, Pantothenate 4.00g, copper 10.00g, vitamin B6 1.20g, iodine 0.30g, vitamin B12 8.00mg, cobalt 0.30, folic acid 0.80g, selenium 0.04g.

Table 2: Proximate Composition of Experimental Diets

	0%	5%	10%	15%	20%
Dry matter %	90.38	91.68	90.49	90.23	89.46
Crude protein %	20.67	20.76	19.20	19.15	19.23
Crude fibre %	7.18	6.96	7.79	7.12	6.62
Ether extract %	4.67	5.60	4.23	4.39	4.12
Ash	11.81	11.16	10.82	10.32	9.12
GE Kcal/g	3.51	3.42	3.61	3.42	3.28

Cooking and toasting are convenient and practicable heat treatments for rural dwellers, livestock farmers and feed millers. Hence it attracts attention in this study.

Of importance to farmers and animals scientist are the following information: growth performance, particularly how a test feed stuff affects the feed intake, weight gain and final live weight. Also the proportion of the live weight that is edible as opposed to visceral or waste (Carcass quality). The objective of this study is to asses quantitative replacement of Soya bean meal with cooked and toasted lima bean meal on growth performance and carcass quality values of broiler finisher birds.

Materials and Methods

The study was conducted at the poultry unit of the livestock farm of Michael Okpara University of agriculture; Umudike. The lima bean (Phaseolus lunatus) used for the experiments was purchased from Idanre, Ondo State of Nigeria. The lima bean was cooked for ninety (90) minutes, oven- dried at 60°C and then toasted to brownness before being milled and then incorporated into diets. Five diets were formulated as follows: diet 1 was Soybean meal and served as control, diets 2 to 5 contains quantitative replacement of Soya beans meal with cooked and toasted lima bean meal at 5, 10,15 and 20% respectively (Table 1). Proximate composition of the diets was carried out as described by AOAC (1990).

Seventy-five 28 day-old Anak broiler birds were randomly assigned to the five experimental diets making it 15 birds per treatment group in a Completely Randomized Design (CRD). Each treatment group was further sub-divided into three replicates of 5 birds per replicate. Feed and water were given *ad-libutum*. Data were collected on feed intake and weight gain. Carcass quality was carried out as described by Ojewola and Longe (2000). The experiment lasted for 28 days. Data was subjected to analysis of variance (ANOVA) as described by Steel and Torrie (1980), While mean separation was by the multiple range test (Duncan, 1955).

Results and Discussion

Table 2 shows the proximate composition of experimental diets. The crude protein content range from 20.67 to 19.15. This range falls within the normal range of finisher birds (Akinmutimi, 2004)

Table 3 shows the effect of cooked and toasted lima bean meal on growth performance of broiler finisher birds. There were no significant ($P>0.05$) difference for the values of feed intake while there were significant ($P<0.05$) difference for the values of weight gain and feed conversion ratio. For feed intake, although there were no significant ($P>0.05$) difference for the diets but there were observable numerical difference.. The feed intake decreased as dietary level of inclusion of the test feed stuff increased. This could be due to increase in the level of residual anti-nutritional factors as dietary levels of test feed stuff increased. This is in agreement with the report of Akinmutimi (2001) who reported decrease in feed intake when potash-cooked lima bean was fed to broiler chicken due to residual anti-nutritional factors. The decreased in feed intake has been associated with poor palatability of diets containing high tannin. (Aletor and Fasuyi, 1997).

Weight gain values ranged from 46.6g to 23.3g with diet II having the highest value and diet V having the least value. Values for diets I, II and III were not significantly different ($P>0.05$) from one another but for diets iv and v. The least value obtained for diet V (20%) inclusion levels of processed lima bean suggests that the higher the level of processed lima bean in the diet, the poorer the performance and this may be due to increase toxicity of

Table 3: Growth performance of broiler birds fed cooked and toasted lima bean meal

	Diet I	Diet II	Diet III	Diet IV	Diet V	SEM
Initial weight/bird (g)	0.64	0.61	0.63	0.63	0.60	0.007
Final weight/bird (g)	1.85[a]	190.00[a]	1.71[b]	1.61[c]	1.24[d]	0.117
Feed intake/bird/day (g)	148.00	125.90	117.30	115.90	114.90	6.200
Weight gain/bird/day (g)	42.80	46.60[a]	41.20[ab]	35.40[b]	23.30[c]	4.100
Feed conversion ratio	3.45[b]	2.70[c]	2.84[bc]	3.27[b]	4.93[a]	0.400
% Mortality	0.00	0.00	0.00	0.00	0.00	0.000
Cost/kg weight gain (N)	161.68	125.46	129.68	145.26	196.61	

Different Superscripts on Means within a row indicate significant differences (P<0.05)

Table 4: Mean weight of cut parts expressed as percentage of dressed weight

Parameters	Diet I	Diet II	Diet III	Diet IV	Diet V	SEM
Wing	111.50	118.50	114.00	115.00	112.50	1.21
Drum sticks	140.00	145.00	120.00	145.00	135.00	4.64
Thigh	175.00	170.00	155.00	165.00	150.00	4.64
Back cut	140.00	165.00	125.00	145.00	170.00	6.44
Breast cut	190.00	183.50	178.50	172.50	166.50	4.10
Dressing %	74.64[a]	74.68[a]	69.29[b]	74.74[a]	74.01[a]	1.05

Difference superscripts on means a row indicate significant differences (P<0.05)

Table 5: Organ weights expressed as percentage dressed weight of broiler birds fed cooked and toasted lima bean meal

Organs	0%	5%	10%	15%	20%	SEM
Proventriculus	7.50[a]	5.50[b]	3.50[c]	5.50[b]	7.00	0.7
Gizzard	53.00[a]	42.50[a]	32.50[c]	36.00[bc]	50.00[ab]	3.9
Spleen	4.50[b]	8.00[a]	8.00[a]	4.50	1.00[c]	1.3
Liver	23.00	21.50	23.50	23.00	24.00	0.5
Heart	6.50	6.00	4.50	6.50	7.00	0.4
Kidney	13.00[a]	6.50[b]	2.50[c]	6.00[b]	9.00[b]	1.7

Different superscripts on means within the same row indicate significant difference (<0.05)

the residual anti-nutritional factors such as tannin and Phytin which are inherent in the test feed and have been reported to have negative effects on broiler chicks growth (Vohra *et al*., 1966; Oberlease, 1973 and Akinmutimi, 2001). For feed conversion ratio, the least value was 2.7 (diet II) followed by diet III and the highest was diet V. This shows that birds fed diets II and III utilize the feed better than others. The high value for diet V was probably due to poor weight gain. The final live weights for diets I, II, III and IV fall within the normal range established for broiler finisher birds (Oluyemi and Roberts, 2000; Obioha, 1992). Considering the final live weights, the cost per kilogram weight gain and the feed conversion ratio, diet II (5%) performed better than both the control diet and other test diets and hence recommended.

Table 4 shows the mean weight of cut- parts expressed as percentage dressed weight. For all the parameters considered. There were no significant (p>0.05) difference for the values. The dressed percentage had high values for all treatment diets even at 20% level of inclusion. This suggests that the proportion of the edible parts is high as opposed to inedible offal (Feather, Shank) etc Oluyemi and Roberts (2000). These result shows that broiler finisher birds fed quantitative replacement of Soyabean meal with cooked and toasted lima bean meal at various levels had commendable cut-parts when compared with those placed on soyabean based control diet.

Table 5 shows the mean weight of organs expressed as percentage dressed weight . There were significant (P <0.05) for the values obtained for proventriculus, gizzard, spleen and kidney but for liver and kidney were not. The non significant difference for the values of liver and heart is in agreement with the report of Ologhobo *et al*. (1992) who reported no significant difference when broiler birds was fed soaked and boiled lima bean meal. Contrary to Ologhobo *et al*. (1992) was the significant different observed for the kidney values. This may be due to different processing techniques employed. Although the result shows significant difference for proventriculus, gizzard, spleen, and kidney, the values were however not consistent with dietary treatments. These results show that broiler finisher birds fed quantitative replacement of soyabean with cooked and toasted lima bean at various levels compared favourably with that of control diet (soya bean based diet).

Conclusion: Based on the above results normal market live-weight, cost per kilogram weight gain, dressing percentage, 5% dietary level of inclusion of the test feed stuff compared favourably with the control diet and hence chosen.

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