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THE EFFECT OF POTASH-COOKED LIMA BEAN (*Phaseolus lunatus*) ON BROILER STARTER DIETS

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ABSTRACT

The efficiency of potash (Akanwu) in improving the nutritive value of lima beans (*Phaseolus lunatus*) was investigated using seventy-five Anak broiler birds at the starter phase. The birds were placed on five treatment diets of three replicates containing five birds each in a completely randomized design. The experiment was carried out for 28 days.

There were significant differences ($P<0.05$) among treatment means for growth parameters (feed intake (52.74, 47.26, 41.55, 47.06, 45.73, weight gain (16.54, 15.52, 13.16, 13.98, 12.04; and feed conversion ratio 3.20, 3.06, 3.15, 3.37 and 3.8). Values of organs showed significant differences ($P<0.05$) with respect to gizzards and liver. On the other hand, no significant differences ($P<0.05$) were obtained among values of kidney, spleen and intestine.

For the cutparts, no significant differences ($P<0.05$) were obtained for drumstick and breastcut, while there were for thigh, backcut and wing.

In occlusion, quantitative replacement of soyabeans with lima beans cooked with potash should not exceed 5% in broiler starter diet

INTRODUCTION

The position of Nigeria as one of the least consumers of animal protein in Africa (Egbunike, 1997). In spite of her enormous natural and human resources is something that calls for a great concern. The present acute shortage animal protein in the country is as a result of high cost of inputs, most especially feeds, which accounts for about 70% of total cost of production (Nworgu *et at,* 1999). This is due to the competition that exist between man and animal for available conventional feed-stuffs like maize, soyabean, groundnut etc. (Akinmutimi and Abasiekong, 1999).

This escalating cost of conventional ingredients has been the prime stimulant for the continuing search for alternative feedstuff that can meet the nutritional requirements of livestock and reduce cost of feed and animal production (Onifade et al, 1998) as reported by Adeyemi et al, (2000). Such a feedstuff should be one that has very low human food preference in order to eliminate competition. Lima beans (*Phaseolus lunatus*) has such potentials (Rachie, 1974 in NAS 1979). It is a tropical legume with potentials to serve as alternative plant protein concentrate for animal feeding because of its desirable agronomic and nutritional characteristics (Oyawoye and Ogunkunle, 1998). It is a widely available leguminous crop that thrives well in low land tropical rain forest especially on poor soils where most crops so not thrive. Lime bean has a yield of 3000 – 5000kg of seed ha with a crude protein content of about 22% (NAS, 1979 However, like a number of other tropical legumes, it contains toxic substances, which affect its utilization by monogastic animals. D'Mello et al, 1990). The poor nutritional value of the raw beans has been attributed to the presence of many anti-nutritional substances, which have been isolated from the beans. These include haemagglutinating lectins (Aletor, 1984). Protease inhibitors (Ologhobo and Fetuga, 1983), cyanogenic glycosides (Ologhobo et al, 1992) and Tannins (Vohra et al, 1966). Arijeniwa et al, 1999) reported that studies which involved feeding of raw lima beans as protein sources to animals revealed undesirable physiologi-

cal and biochemical alterations. Consequently lima beans meant for feeding to monogastric animals should be processed in bid to remove the anti-nutritional factors which interfere with protein utilization. Lima beans has been subjected to various processing methods and performance reported (Ojo, 1988; Akinmutimi and Abasiekong, 1999). Potash (*Akanwu*) made up predominantly of sodium with small amounts of other metals (Esonu et al, 2000) is a cheap substance, which is widely used in cooking in the southern part of Nigeria. Processing may involve additional costs, which may further increase prices of final product (Arijeniwa *et al*, 1999). It was this desire to reduce production cost that stimulated the present study which was designed to evaluate the efficacy of potash (Akanwu) in improving the nutritive value of lima beans in diets of broiler starter birds using growth performance and carcass qualities parameters as indicators.

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 obtained from Idanre, Ondo State. Seventy five day-old Anak broiler birds were used for the experiment. They were brooded with kerosene stoves under a metal Hoover. Electric bulbs, and lanterns were provided in each pen to serve as sources of heat and light to enable the birds eat all night. The birds were also provided with drinkers and feeders in the pens. Feed and water were supplied ad libitum. The necessary vaccines and medications were administered. The birds were randomly allotted to five dietary treatments with each treatment having three replicates of 5 birds. The beans were cooked in a 3% solution of potash for 90 minutes. They were then oven-dried at 60°C, milled and incorporated in the diets. There was five diets designated T1, T2, T3, T4 and T5. Diet T1 was soyabean based and served as the control. Diets T2, T3, T4 and T5 contained quantitative replacement of soyabean by lima beans at 5%, 10%, 15% and 20% levels respectively (Table 1).

Table 1: Composition of Experimental Diets

Ingredients	1 Control	II (5%)	III (10%)	IV (15%)	V (20%)
Maize	49.8	49.80	49.80	49.80	49.80
Soyabean	27.50	22.50	17.50	12.50	7.50
Limabean	-	5.00	10.00	15.00	20.00
Pal Kernel Cake	9.00	9.00	9.00	9.00	9.00
Fishmeal	3.00	3.00	3.00	3.00	3.00
Bonemeal	3.00	3.00	3.00	3.00	3.00
Bloodmeal	5.00	5.00	5.00	5.00	5.00
Cyster 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
Methionine	0.10	0.10	0.10	0.10	0.10
Lysine	0.10	0.10	0.10	0.10	0.10
Crude Protein	23.65	19.45	19.45	17.35	15.25
Met. Energy Keal/g	3010	2699.7	2699.7	2544.7	2389.7

Vitamins and Premix: 1kg of vitamins and Premix contains the following:

Vitamins A	4,800,000 I. U.	Vitamin C	100.00 g
Vitamin D3	800,000 IU.	Biotin	0.06 g
Vitamin E	12.00 g	Chlorine Chloride	80.00 g
Vitamin K	0.80 g	Manganese	10.00 g
Vitamin B1	0.40 g	Iron	50.00 g
Vitamin B2	1.60 g	Zinc	60.00 g
Calcium D-Pantohenate	4.00 g	Copper	10.00 g
Vitamin B6	1.20 g	Iodine	0.30 g
Vitamin B12	8.00 mg	Cobalt	0.30 g
Folic Acid	0.80 g	Selenium	0.04 g

The experiment lasted for 28 days and data for weight gain and feed intake were collected weekly. Carcass quality was carried out using the method of Ojewola and Longe (2000). Data collected were subjected to analysis of variance (ANOVA) according to Steel and Torrie (1980). Difference between treatment means were determined by the new multiple range test (Duncan 1955).

Samples of feeds were analyzed for proximate composition (Table 2) according to the methods of AOAC (1980).

RESULTS AND DISCUSSIONS

Results of the growth performance are shown in Table 3 There were significant differences ($P<0.05$) in values of treatment means for all the parameters (Feed intake, weight gain and feed conversion ration). For feed intake, the highest value was ob-

Table II: Proximate Composition of Experimental Diets

Parameters	Control	5%	10%	15%	20%
Crude protein	21.24	23.01	21.39	21.77	21.89
Ether Extract	4.06	3.98	3.99	4.24	4.06
Crude Fibre	6.50	6.21	6.97	6.87	7.05
Ash	10.08	9.69	11.19	10.05	11.31
Dry Matter	91.17	91.22	91.01	91.74	91.12
G. E. (Keal/g)	3.14	3.13	3.12	3.02	3.17

tained from birds fed the control diet, this was followed by values for those on diet 11 (5%). This showed that the feed intake decreased as the level of lima bean increased in the diet. This perhaps indicated that the processing method was not able to remove completely the effect of anti-nutritional factors such as tannin, phytin etc in the beans (Aletor, 1984). This agrees with the report or Ologhobo *et al,* (1992), Vohra *et al*, (1966) and Friedman and Gumbmann, (1986) that the presence of tannin in lima bean affects intake of lima bean based diet.

Values of weight gain show that there were significant differences (P.<.05) between the control and birds of the experimental diets, with the exceptions of those on diet 11 (5%). Their values also follow the same pattern as those of the feed intake. The least weight gain was by birds fed the 20% inclusion level of lima beans. This suggests that the higher the levels of lima bean in the diet, the poorer the performance, and this may be due to increased toxicity of the test

feed. This agrees with the report of Vohra *et al*, 1966 who also reported poor performance when feeds with high tannin content was administered to birds.

For feed conversion ration there were no significant difference ($P<0.05$) with the exception of diet V. For the carcass quality, (Table IV), the values obtained for the organs showed that there were no significant differences ($P<0.05$) in the values obtained for the kidney, spleen and intestine. But values of proventiculus, gizzard and liver differed significant ($P<0.05$) among the dietary treatment groups.

Values of cutparts are shown in Table IV. Thus treatment means showed no significant differences ($P<0.05$) for drumstick and breastcut. For thigh and backcut, there were no significant differences ($P<0.05$) between the control

Table III: Mean Values for Growth Performance of Broiler Starter birds fed Control diet and Four levels of Diet containing Lima beans Cooked with Potash

Parameters	Control	5%	10%	15%	20%	SEM
Daily Feed Intake (g)	52.74^{a}	47.26^{b}	41.55^{c}	47.06^{b}	45.73^{c}	1.10
Daily Weight Gain (g)	16.54^{a}	15.52^{a}	13.16^{b}	13.98^{b}	12.04^{c}	0.46
Feed Conversion Ration	3.20^{b}	3.06^{b}	3.15^{b}	3.37^{b}	3.8^{a}	0.17

a b c means in a row with different Superscripts differ significantly ($P<0.05$).

birds and those of other experimental diets with the exception of those on diet V (20%). For the cutparts, it could be said that up to 15 & level of inclusion is safe this on above result. Carcass quality was high at 15% level of dietary potash cooked lima beans while growth parameters were depressed at levels above 5%. In commercial broiler production profitability is lima bean meal in levels that do not exceed 5% in broiler poultry rations.

Table IV: Mean Weight of Organs and Cut Parts as percent-

	Control	5%	10%	15%	20%	SEM
Kidney	0.76	0.69	0.66	0.70	0.60	0.02
Splean	0.05	0.08	0.09	0.12	0.11	0.05
Proren-triculus	0.62^{b}	0.65^{a}	0.6^{b}	0.7^{a}	0.72a	0.02
Intestine	7.95	8.08	7.62	8.39	5:85	0.43
Gizzard	4.17^{b}	4.52^{b}	4.63^{a}	5.54^{a}	3.99^{c}	0.16
Liver	2.77^{a}	2.48^{a}	2.56^{a}	313b	2.67^{a}	0.07
Drum Stick	9.61	8.79	9.22	8.46	8.80	0.18
Thigh	9.04^{a}	8.45^{a}	8.72^{a}	8.55^{a}	6.75^{b}	0.24
Backcut	14.63^{a}	13.09^{a}	15.48^{a}	15.55^{a}	13.94^{b}	0.36
Breastcut	14.63	13.09	15.48	15.55	13.94	0.36
Wing	8.86^{a}	7.75^{ab}	7.31^{b}	7.96^{a}	7.82^{a}	0.17

a b c means in a row with different Superscripts differ signify cantly ($P<0.05$).

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