THE EFFECT OF REPLACING SOYBEAN MEAL WITH PIGEON PEA (Cajanus Cajan) SEED MEAL IN BROILER STARTER DIETS

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Abstract

Processed pigeon pea seed was ground with hammer mill to form pigeon pea seed meal (PPSM). Four experimental diets were compounded with inclusion of PPSM at 0%, 33%, 67%, and 100% as replacement for soybean meal (SBM) (w/w) at the starter phase. Twelve birds were randomly assigned to each of the four diets. They were further divided into two replicates of six birds. At the end of the four-week feeding trial, performance, cost per kilogram of feed and the cost feed per kilogram of weight gain of birds were determined. The daily feed intake and weight gain of birds fed control diet (0%PPSM) and diet with 33% PPSM replacement were significantly ($P<0.05$) higher than those of the other diets.

Economically, raising birds on the diet with 33% PPSM replacement was cheaper. Therefore, the use of PPSM will reduce feed cost since it is relatively cheaper than SBM.

Keywords: Pigeon pea seed meal, Soybean meal, Performance, Economy, Broiler, Starter.

Introduction

Poultry production is gaining high level of recognition and attention in Nigeria. This is so because poultry meat is generally accepted by all people. Poultry production outfit is easy to establish because it does not need much initial capital. This situation is fast changing because of the present economic hardship especially on feeds industry. This has resulted to production of feeds that are either excessively costly or nutritionally inadequate.

Nutrition is an important factor in any poultry enterprise since it accounts for 60- 70% of the total cost (Tewe, 1984). Poultry farmers are operating under a very narrow profit margin and many are out of business as a result of this. As a way forward, Bamgbose and Tewe (1995) suggested the exploration of alternative plant protein sources that are not in direct competition with human diet.

Pigeon pea is one of the uncommon legumes that are rich and available sources of protein in human and animal nutrition. The seed is also rich in carotene, adequate in lysine, but deficient in methionine, cystine and tryptophan (Olomu, 1995). About 85% of the world supply of pigeon pea is from India (Umaid and Ramamurthi, 1981), while Nigeria produces about 146,494 tonnes annually (Caswell, 1977). Pigeon pea feeding value in broilers and layers has been reported (Grimaud, 1988; and Ologhobo, 1992). It has been used to replace groundnut cake at up to 50% level in broiler finisher ration (Amaefule and Obioha, 1997) and 40% level in growing rabbit (Alokan, and Bamgbose, 1997).

The aim of this study is to evaluate the effect of replacing varying levels of SBM with PPSM on the performance of broiler chickens.

Materials And Methods Processing

Pigeon pea seeds were obtained in a local market in Bauchi State. 15g portions of the sample were dry toasted for I hr in an electric oven at 60°C, ground into flour in a Christy-Norris hammer mill and stored in dry container in a dessicator from which samples were taken for chemical analysis by the methods of A.O.A.C, (1986). The mineral nutrients in the ash were determined using the PYE- UNICAN-SP-q Atomic Absorption Spectrophotometer (AAS).

Feeding Trial

Four experimental diets were compounded with PPSM replacing SBM at 0%, 33%, 67% and 100% levels (w/w) at the starter phase. Forty eight day old chicks were raised on a commercial starter

diet for one week after which twelve birds were randomly assigned to each experimental diet. The birds in each diet were further divided into two replicates of six birds per replicate.

Feeds and water were provided *adlibitum.* At the end of the four weeks feeding trials performance, cost per kilogram of feed and cost of feed per kilogram weight gain were calculated. Data generated were subjected to analysis of variance (Steaf and Torrie, 1960) and means separated using the Least Significant Difference (LSD).
The composition of the experimental diets are shown in Table 1.

Table 1: Composition of Experimental Starter Diets.

Level of replacement of SBM by PPSM Ingredients	0%	33%	67%	100%
Maize	54.35	54.35	54.35	54.35
Soybean meal	25.00	16.75	8.25	
Pigeon pea seed meal		8.25	16.75	25.00
Fish meal	5.00	5.00	5.00	5.00
Wheat offal	12.00	10.00	8.00	6.00
Blood meal		2.00	4.00	6.00
Limestone	1.00	1.00	1.00	1.00
Vit/min premix*	0.40	0.40	0.40	0.40
Salt	0 25	0 25	0 25	0 25
	100.00	100.00	100.00	100.00
Calculated Analysis				
Metabolisable energy Kcal/g	2.78	2.78	2.78	2.78
Crude protein (%)	21.86	21.41	20.90	20.77
Ether extract (%)	3.46	3.75	3.32	3.17
Crude fibre (%)	4.37	4.26	4.71	4.10
Calcium (%)	1.37	1.33	1.33	1.37
Phosphorous (%)	0.89	0.84	0.76	0.76

*Premix (Pfizer) supplied the following per kg diet. Vit. A 150014, Vit $D_3$160014, Ell.Omg, Riboflavin 9.0mg, Biotin 0.25mg, pantothenic acid ll.Omg, vit k 3.0mg, B_2 2.5mg, B_6 0.3mg, B_{12} 8.0mg, Nicotinic acid 8.0mg, Fe. 5.0mg, Mn lO.Omg, Zn 4.5mg, Co 0.02mg, Se O.Olmg.

Result and Discussion

The results of the proximate composition and feeding trial are shown in Tables 2 and 3.

Table 2: Proximate Composition of processed pigeon pea seed.

Component	Percentage
Dry matter	93.33
Crude protein	19.35
Ether extract	1.52
Nitrogen free extract	65.46
Crude fibre	4.25
Total ash	4.86
Phosphorous (ppm)	355.00
Iron (ppm)	67.00
Calcium (ppm)	614.00
Magnesium (ppm)	19.00

The result of the chemical analysis as shown in Table 1 compared favourably with Duke (1981) and Obioha (1992), with respect to crude fibre, total ash, ether extract and mineral content, but lower with respect to crude protein. However, the NFE in this study is higher than those of Shrisvatara and Bajpa (1989) and Obioha (1992). The difference could be attributed to the processing method and specie difference.

Table 3: Performance of Broilers Fed PPSM as a Replacement for SBM (0-4 weeks).

Parameters	***Replacement level of SBM by PPSM*** 0%	33%	67%	100%	LSD5%
Initial body weights (g)	34.17	36.33	37.34	34.17	NS
Final body weight (g)	708.50	680.00	483.00	450.00	165.53
Daily feed intake (g/d)	48.25	46.30	38.90	36.34	4.11
Daily weight gain (g/d)	24.00	23.00	15.92	14.85	4.56
Feed/gain ratio	2.00	2.00	2.46	2.46	NS
Cost of feed/kg (N)	33.81	33.00	32.77	32.26	NS
Cost feed/kg wt gain (N)	69.96	70.00	80.61	79.04	NS
Mortality	0	0	0	0	

From the performance table, the birds fed on the control diet and diet in which 33% of SBM was replaced with PPSM had higher body weight, daily feed intake and daily weight gain. This observation could be attributed to the high biological value (BV) and high nutrient density of the diets. The birds were able to obtain the required essential nutrients from the diets that favoured higher growth rate and weight gain.

However, as the PPSM and blood meal content of the ration increased, the BV of the diets tends to decrease while the bulkiness increased appreciably. Consequent upon this, there were significant decreases in feed intake and weight gain at PPSM level above 33%. This phenomenon could be attributed to poor palatability and low protein digestibility of the diets due to the presence of large amount of blood meal (Wahlstrom and Libal, 1977). Blood meal has low sulphur amino acid, Trytophan, Isoleucine and low protein digestibility, which contribute to poor utilization of blood meal protein by farm animals (Eggun, 1968). It may well be that the gastro-intestinal tracts of these birds could not have developed to the extent of handling bulky diets since they are young birds. Gut capacity, rates of passage of digesta through the gastro-intestinal tract influence voluntary feed intake (Blaxter and Wilson, 1962).

In general, the birds fed the diet with 33% SBM replaced with PPSM compared favourably with those fed with the control diet with respect to the daily feed intake, weight gain, feed/gain ratio and even in the final body weight. However, the daily feed intake of birds fed on the diet with 33% SBM replaced with PPSM was lower than those of the control diet, suggesting that, it has higher high nutrient density. It took 46.30g of this diet to produce 23.Og of meat at the cost of M33.00, while it took 48.25g of the control diet to produce 24.0g of meat at the cost of J433.81. This to a large extent demonstrated appreciable superiority of the diet in which 33% of SBM was replaced with PPSM, over the control diet. The mean value of daily feed intake, weight gain and feed/gain ratio compared favourably with Aduku, (1993). No mortality recorded in this study, showed that PPSM is not harmful to the birds.

Conclusion

Feeding birds with diet in which 33% SBM is replaced with PPSM will undoubtedly reduce cost of production and improve profit margin of livestock producers. It is therefore cheaper to raise birds on this diet at the starter phase.

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