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Research Article

Evaluation of Cowpea Waste Meal as Protein Source in Broiler Chick Ration

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Abstract

A five-week feeding trial was conducted to evaluate the performance of one hundred and fifty (150) broiler chicks fed different levels of cowpea waste meal as replacement for groundnut cake was carried out. Five diets were formulated with maize as the major source of energy. Diet A served as the control with no inclusion of cowpea waste meal. Diets B, C, D and E contained cowpea waste at 10, 20, 30 and 40% levels of replacement of groundnut cake. There were no significant differences ($P > 0.05$) in the parameters observed which include feed intake, feed efficiency, weight of the birds and weight gain. It was observed that it is cheaper to compound diets that contain cowpea waste and groundnut cake. The results indicated that cowpea waste can be included to replace up to 40% of groundnut cake in the diet of broiler chicks without any adverse effect on performance.

Keywords: Cowpea Waste; Meal; Protein

Introduction

The population of poultry in Nigeria is about 130 – 150 million birds and appears more advanced than other livestock with about 12, 34, 32, 4.40 and 1 million cattle, goats, sheep, pigs and donkeys, respectively [1]. However, in spite of the enormous natural and human resources at its disposal, Nigeria still remains amongst the least consumers of animal protein in Africa [1].

Proteins are derived from two major sources, animals and plants. Cereal proteins are deficient in lysine and methionine, but glutamic acid is the most abundant amino acid followed by leucine [2]. Plant protein sources used in livestock production are mainly from legumes [3] and are not as expensive as that of animal origin, but their use is limited due to their poor quality and the presence of anti-nutritional factors such as tannin, saponnin, mycotoxins and aflatoxins [14]. Animal proteins are particularly important due to their higher biological value as compared to proteins from vegetable sources.

The sub-optional intake of animal protein in developing countries has long been recognized while in some developed countries more than 60 g of animal protein is consumed per caput per day [4]. The F. A. O. [5] has recommended a minimum of 40 g of animal protein and 30g of plant protein in diet of an average adult. To combat the prevalent animal protein shortage and occurrence of protein-calorie malnutrition such as kwashiorkor, it is necessary to increase the production of more protein from cattle, sheep, goat, pigs and poultry through improved nutritional managerial techniques.

The supply of protein concentrate for non-ruminant nutrition in Nigeria over the years has been grossly inadequate. This is mainly due to high cost of such feed items like fishmeal and to the scarcity of the conventional ingredients such as groundnut cake and soybean [7]. In an attempt to keep the livestock industry in operation. Producers have often had to use other less known protein sources, which have, at times led to disastrous results. In South East Asia, non-conventional feed resources have been used as feed for animal production [3]. The situation in Nigeria and other developing countries is similar to what obtains in South East Asia. Therefore the need to direct attention to the possible use of safe alternative protein sources in non-ruminant feed cannot be over-emphasized. One of such alternative protein sources, which need to be investigated, is cowpea waste meal (CWM), a by-product obtained after the collection of the clean seeds. The CWM is made up of the testa,

broken pieces of cowpea seeds, shafts and the weevilled or insect - damaged seeds.

Figure 1: Experimental broiler chicks.

Figure 2: Cowpea waste meal.

This study was therefore initiated to evaluate the nutritional potential of CWM for possible incorporation into broiler starter feed.

Materials and Methods

A total of one hundred and fifty (150) day-old broiler were used for the experiment. These birds were randomly distributed into five dietary treatments consisting of 30 birds per treatment. The dietary treatments were made up of the control diet A, which contained groundnut cake (GNC) as the source of plant protein and diets B, C, D and E in which 10, 20, 30 and 40% of the groundnut cake was replaced by CWM respectively. The diets were made isonitrogenous by slight adjustment in the levels of CWM and maize. Ingredient composition of the test diets is shown in Table 1.

	Rations				
Ingredients (?)	**A**	**B**	**C**	**D**	**E**
Maize	59.0	56.0	53.0	50.0	47.0
Groundnut cake	24.0	21.6	19.2	16.8	14.4
Cowpea waste meal	-	5.4	10.8	16.2	21.6
Fish meal	3.0	3.0	3.0	3.0	3.0
Dry brewers grain	10.0	10.0	10.0	10.0	10.0
Bone meal	2.0	2.0	2.0	2.0	2.0
Oyster shell	1.0	1.0	1.0	1.0	1.0
Vit-Min. mix*	0.5	0.5	0.5	0.5	0.5
Salt	0.5	0.5	0.5	0.5	0.5
Total (?)	100.00	100.00	100.00	100.00	100.00
Calculated CP	22.41	22.15	21.88	21.62	21.38
M.E. (Kcal/kg)	3289	3038	2980	2934	2879

Table 1: Composition of experimental rations.

Vitamin-mineral mix supplied per kg ration: Mg 25mg; Mn 25g; Mn 120mg, Fe 48mg, 1_2 1,100mg IU, Vit, $D_3$1,000 IU, Vit E 10mg; Vit B_1 1.6mg; Vit B_2 3.2mg; Vit B_6 2.4mg; Vit B_{12} 8mg; Folic acid 0.6mg; Panthothemic acid 14.4mg; Choline chloridemg.

All the birds were weighed on the day of collection and subsequent weights were recorded at weekly intervals. Water and feed were given ad-libitum. Light was also supplied consistently and mortality records were kept. The chicks were raised under the brooder box with an artificial heat source up to the end of the experiment. This experiment lasted 5 weeks. Weekly records of average feed consumption, body weight gain and feed efficiency were obtained for each treatment

The proximate consumption of the diets was determined by using the official A.O. A. C. [2] methods.

Results and Discussion

The chemical compositions of the experimental rations are shown in Table 2. The ash, crude fibre and the ether extract contents of the rations increased slightly while the crude protein and nitrogen free extract decreased as the level of CWM increased. The crude protein content of the rations vary from 22.10 to 22.59%. The observed levels are within the range recommended by various workers [10,13,16].

	Rations				
Parameters	**A**	**B**	**C**	**D**	**E**
Dry matter (?)	91.0	92.0	89.8	80.5	80.5
Other components (DM basis)					
Crude Protein (%)	22.59	22.50	22.45	22.30	22.10
Crude fibre (%)	8.30	8.50	8.55	9.30	10.50
Ether extract (%)	1.00	1.20	1.40	1.50	1.53
Ash (%)	17.80	18.20	18.30	18.50	18.90
(?) NFE (%)	41.31	41.60	39.10	28.90	37.95

Table 2: Proximate composition of experimental rations.

The performance characteristics data of the birds on the different rations are presented in Table 3. The average daily feed intake tended to be higher with rations in which 30% of the GNC was replaced with CWM and lower with ration E with 40% of GNC replaced. As for the daily live weight gain, the order was diets D>C>E>B>A while the final live weight of the birds followed the same pattern as the average live weight of the birds followed the same pattern as the average live weight gains.

	Rations				
Parameters	**A**	**B**	**C**	**D**	**E**
Average initial live weight(g)	39	40	40	38	40
Average final live weight(g)	530	605	610	615	610
Average feed intake (g/day)	32.96	32.60	32.97	34.79	32.58
Average weight gain(g/day)	14.00	16.14	16.35	16.49	16.28
Feed efficiency	2.35	2.02	2.56	2.11	2.00
Feed cost (N/Kg)	7.66	7.31	6.96	6.61	6.26
Total feed bird (kg)	1.157	1.144	1.560	1.217	1.140
Cost if total feed per bird (N)	8.86	8.36	8.05	8.04	7.14
Weight gain/bird (kg)	0.491	0.565	0.450	0.577	0.570

Table 3: Effect of replacement of groundnut cake with cowpea waste meal on performance of starters.

It was observed that the decrease of growth performance of broilers on diet E was as a result of the decrease of feed digestibility of the diet. This observation agrees with the earlier findings [1] who reported that a reduction of feed digestibility contributed to the decrease in the amount of nutrients available for growth.

Better performance of diets C and D could be as a result of adequacy of nutrients and balance of amino acids [13]. According to [13], if a lower level of protein than the normal is fed to broilers, amino acid catabolic enzymes decrease primarily in the liver and kidney resulting in a lower catabolism of the amino acids from the dietary protein.

Conclusion

No mortality was recorded at all levels of replacement of GNC with CWM. The results of this study revealed that feeding broiler starter with CWM is practicable. It may be postulated therefore, that CWM may replace up to 40% of GNC in the diets of broiler chicks with no deleterious effects.

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