EFFECT OF THE REPLACEMENT OF MAIZE WITH WHEAT OFFAL IN BROILER FINISHER DIETS ON GROWTH PERFORMANCE AND FEED COST

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ABSTRACT

An experiment was carried out to assess the effect of replacing maize with wheat offal in broiler finisher diets on bird performance and feed cost. Six rations were formulated using 0, 5, 10, 15, 20, and 25 percent wheat offal to replace maize in the rations. The formulated rations were fed to one hundred and fifty six commercial broiler finisher birds in a completely randomized experimental design. All the rations were made isocaloric and isonitrogenous with the inclusion of varying levels of palm oil.

The results indicated that there were no significant differences ($P > 0.05$) in body weight, body weight gain, feed intake and efficiency of feed utilization and carcass characteristics amongst the treatment means. However, wheat offal replaced maize for up to 25 percent without any adverse effect on performance. More so, at 25 percent inclusion to replace maize, cost of feed per kilogram was reduced by about 15.91 percent. Such feed cost reduction could engender overall production cost reduction in broiler production especially at the finisher stage.

Key words: Broiler, Cost, Diet, Finisher, Performance, Wheat offal

INTRODUCTION

The trend in wheat production and processing of wheat into flour for human food has made wheat offal (a by-product of the milling process) abundantly available in Nigeria in recent times. This product has no value as human food, since it is largely fibre. However, the value of wheat offal in the feeding of livestock had long been recognized by earlier scientists in the USA such as Morrison (9) and Ewing (8), who had published the nutritive values of wheat offal, based on results obtained from analysis of wheat offal in the temperate region.

More recently, Aduku (1) in Nigeria published that wheat offal contains 1256 and 2320 Kcal of metabolisable energy per kg for poultry and swine respectively, 15.6 percent crude protein and mineral elements such as calcium and phosphorus. These reports have portrayed wheat offal somewhat, as a product with a fair potential for use in the diet, even if it is to replace a portion of maize, which is used conventionally in the diet of chicken. This observation would make economic sense, since maize, the conventional energy source, has become scarce and expensive due to high demand caused by competition for its use as human food and industrial raw material.

Broiler chickens have the potential for rapid growth. This growth process requires energy for its support and such energy comes from dietary carbohydrate. Generally, in a maize based diet, it is the maize that supplies such energy. However, where another energy source has been compounded into the diet to replace part of the maize and growth performance is not affected, it would be reasonable to assume that the composite effect of such energy combination is adequate for the animal. Here in lies the advantage, in terms of the cost, of replacing some part of the maize, if such combination meets the animal's energy requirement for growth and other functions.

There has not been sufficient information on the use of wheat offal as whole or partial replacement for maize especially in broiler finisher diets. Except for the work reported by Dada (6) of an inclusion level of 75 percent wheat offal and sorghum dust in broiler diets without adverse effect on the birds' performance.

The purpose of the present study therefore was to assess the replacement value of wheat offal for maize in broiler finisher diets.

MATERIALS AND METHODS

Birds and Location

The study was carried out at the Teaching and Research Farm of the University of Uyo, Akwa Ibom State in the South-South geopolitical zone of Nigeria. One hundred and fifty-six Anak broiler chickens were raised conventionally on a starter diet, from day old to four weeks of age before the commencement of the experiment.

Experimental Design and Dietary Treatments

The broiler birds were assigned to six dietary treatment groups following a completely randomized design (CRD). Each treatment group had two replicates of thirteen birds per treatment. The weights of the birds in the replicate groups were adjusted to give near uniform initial weights for all the groups. The experiment was essentially in the finishing stage. Water and weighed quantities of diets were given ad libitum to the birds. The birds were reared in deep litter with the floor space so partitioned to provide accommodation for the thirteen broiler birds per replicate.

The formulated diets were made isocaloric and isonitrogeneous with the inclusion of varying levels of palm oil and their composition is presented in Table1. In the control diet (T_1), maize served as the main energy source and therefore had no wheat offal inclusion. The five test diets designated as T_2, T_3, T_4, T_5 and T_6 were formulated to contain 5, 10, 15, 20 and 25 percent wheat offal to replace maize by these relative values.

Data Collection

The data collected during the experiment included, initial body weights weekly body weights and weekly feed consumed. Weekly body weights were used to calculate weight gain, while weekly feed intake and weight gain were used to determine efficiency of feed utilization for the treatment groups.

At the end of the 8th week, four birds (two males and two females) per treatment were randomly removed and starved over night. They were then weighed and slaughtered by cervical dislocation as described by Oluyemi and Roberts (10). The slaughtered birds were plucked manually after scalding in hot water and plucked weights were then taken before evisceration as described by (10). After dressing, the following weights were taken; eviscerated weight, thigh/ drumstick, breast, wing and neck weights.

Chemical Analysis

The proximate composition of the six experimental diets, were determined using the AOAC (4) method. This is presented in Table 2.

The determined crude fibre and crude protein contents of the wheat offal used in this experiment were 9.8 and 17 percent respectively.

Statistical Analysis

Table 1: The Composition of the Diets Used in the Experiment

Ingredients	Percentage Composition of the Experimented Rations					
	0%	5%	10%	15%	20%	25%
Maize	65.2	61.14	57.18	52.32	47.56	42.8
Wheat offal	0	3.26	6.52	9.78	13.04	16.3
Soybean meal (SBM)	26.0	26.0	26.0	26.0	26.0	26.0
Fish meal (FM)	3.5	3.5	3.6	3.5	3.5	3.5
Palm oil	2.0	2.8	3.5	5.1	6.6	8.1
Premix	0.5	0.5	0.5	0.5	0.5	0.5
Bone meal (BM)	2.0	2.0	2.0	2.0	2.0	2.0
Salt	0.5	0.5	0.5	0.5	0.5	0.5
DL Methionine	0.1	0.1	0.1	0.1	0.1	0.1
Lysine	0.2	0.2	0.2	0.2	0.2	0.2
Total	100	100	100	100	100	100
Calculated analysis						
Metab. energy Kcal/kg	3071.16	3038.28	3000.83	3004.51	3003.62	3002.74
% Protein	20.00	20.02	20.16	20.25	20.30	20.40
% Fat	3.98	6.6	7.27	8.71	10.23	11.74
% Fibre	3.95	4.19	4.38	4.58	4.77	4.98
% Calcium	0.90	0.91	1.11	1.21	1.31	1.40
% Phosphorus	0.76	0.79	0.82	0.81	0.87	0.89

Table 2: Proximate Analysis of Experimental Diets

Dietary Replacement levels (%)	Percentage Crude protein	Percentage Crude fat	Percentage Crude fibre	Percentage Ash	Percentage Nitrogen Free Extract (NFE)
0	20.80	5.00	4.53	6.80	60.17
5	20.25	5.50	4.73	7.10	64.93
10	22.20	5.80	5.07	7.90	60.22
15	19.80	6.26	5.30	8.70	60.45
20	21.44	6.70	5.80	8.80	57.38
25	20.60	6.80	5.87	7.60	63.70

The data that were generated were all subjected to a one way Analysis of Variance (ANOVA). The paired treatment means were then separated using the Duncan's Multiple Range Test (11).

RESULTS AND DISCUSSION

Effect on Growth

The results indicated that, there were no significant differences (P>0.05) in body weight, weight gain, feed intake and efficiency of feed utilization (EFU) among the treatment means. Implying that, wheat offal could replace maize in broiler finisher ration up to 25 per cent without affecting growth parameters. The results agree with (2), (3), (7) and (5) in their separate studies using rice bran and corn bran respectively.

Carcass Characteristics

There were no significant (P>0.05) differences in dressed weights and live weight among the treatment groups. Implying that, replacement of maize with wheat offal at the different dietary levels employed in the study had no significant effect on dressed and live weights. Also the dressing percentage of treatment with 10 percent wheat offal replacement was 68.9 percent and consistent with the optimum range of 65–70 percent reported by (10).

COST EFFECT OF REPLACING MAIZE WITH WHEAT OFFAL ON COST OF BROILER FINISHER DIETS

The cost analysis indicates that feed cost per kilogramme of broiler birds decreased with increasing levels of wheat

Table 3: Growth Performance and Cost Effectiveness of Replacing Maize with Maize in Broiler Finisher Diets

Parameters	Replacement Levels of Maize with Wheat Offal					
	0%	5%	10%	15%	20%	25%
Ave. initial wt. (g)	661.5±9.94	657.70±13.81	657.70±9.81	646.15±6.6	646.15±6.20	661.50±7.66
Ave. final body wt. (g)	1750±22.54	1882.5±21.43	2011.5±32	1685±12.56	1769.5±16.2	1819.5±18.8
Ave. daily wt gain (g)	38.88±9.8	43.74±1.37	48.35±1.38	37.10±1.9	40.12±1.35	41.36±3.09
Ave. daily feed intake (g)	115.79±5.0	112.86±4.9	112.86±4.7	114.43±6.0	104.29±4.4	104.29±6.0
EFU (g)	2.98±0.40	2.58±0.4	2.33±0.3	3.0±0.5	2.60±0.3	2.52±0.40
Dressed wt. (g)	1140±60	1230±40	1440±100	1760±150	1440±150	1250±35
Thigh/drumstick (g)	250±30	260±20.02	310±20.04	260.0±40.10	260.00±30.01	260±13.01
Breast wt. (g)	290±60.02	330.00±40.01	380.60±50.0	290±60.01	380±60.03	310±10.00
Wing (g)	100±0.00	100±.00	140±10.00	110±10.0	140±10.00	100±0.00
Neck (g)	90±20.1	100.00±.00	90±10.01	110±10.0	100.10±0.00	100±0.00
Cost of feed/kg of diet (₦)	37.95	36.26	35.46	34.59	33.80	32.94
Cost of feed/final body wt/bird (₦/kg)	70.22	60.87	55.69	64.04	55.77	53.08
Cost of feed/wt. gain (₦/kg)	113.02	93.55	82.62	103.77	87.88	83.01
% cost reduction/final body wt/bird	-	13.36	20.74	8.85	20.62	24.45

Note: ($P > 0.05$) for all the parameters
Source: Computed from experimental data.

offal replacement. When maize was replaced with about 25 per cent wheat offal, feed cost decreased from ₦37,950/ton to ₦32,940/ton (a difference of about 13.2 percent) (See Table 3).

Given that feed cost contribute about 65 to 70 percent of the total cost of production, a 13 percent decrease in substantial enough to further enhance the profitability of broiler enterprises.

The analysis also indicated that, for every kilogramme gain in weight of birds about ₦82.62 is spent when 10 percent (best treatment in relative terms) wheat offal replaces maize as against ₦113.02 spent when there is zero maize replacement with wheat offal. This translates into about 36.80 percent cost reduction. A similar trend in cost reduction was reported by (3) when they replaced maize with sorghum dust in broiler finisher diets.

CONCLUSION

Although wheat offal is essentially fibre, it is endowed with some amount of metabolizable energy (1). This energy has made some contribution to the total energy pool in the diets. Replacing maize with about 25 percent wheat offal has no adverse effect on growth, feed intake and efficiency of feed utilization, but leads to a considerable reduction in feed cost. However, 10 percent replacement value of maize with wheat offal appears to be best for optimum growth performance.

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