Growth Performance and Cost Implication of Broiler Chickens fed Fortified Composite Cassava Stump Meal-based Diets

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Abstract

This study investigated the effect of fortifying composite cassava stump meal with cassava leaf meal on growth performance and cost-implication of producing broiler-chickens. Composite cassava stumps were collected, crushed, pressed, subjected to heat treatment and then milled (CCSM). Cassava leaves were obtained, air-dried and milled (CLM). Thereafter, the CLM and CCSM were mixed together in ratio 1:9 to produce fortified composite cassava stump meal (FCCSM). The FCCSM was used as feed ingredient. 5 broiler-starter diets were formulated using FCCSM at the graded levels of 0, 5, 10, 15 and 20% and designated diets I, II, III, IV and V, respectively. The same procedure was followed for the finisher phase. 150 broiler chicks of Abor-Acre breed were assigned to 5 dietary treatments of 3replicates at 10 chicks per replicate in a Completely Randomized Design. The respective formulated diets and water were fed to the chicks *ad libitum* from 1 – 49 days. All data collected were subjected to Analysis of variance using SPSS version 17 package. Results shows that highest total weight gain (2477±159.10g/bird) and best FCR (2.12±0.01) were obtained with birds fed diet I, while the lowest total weight gain (2040.28±159.59g/bird) and poorest FCR (2.68±0.05) were observed with birds fed diet IV. Bird fed diet V yielded highest profit (₦807.35±12.88). Based on this study, it is recommended that 20% FCCSM can be included in broiler diet without adverse effect on growth performance and also give the highest returns on the production process.

Keywords: Performance, fortified, cassava stump, cassava leaf and cost

Introduction

Chicken constitutes one of the most common sources of animal protein in developed countries but this is not the case in developing countries mostly due to the cost which is beyond the reach of the common man and this could be as a result of high cost of feed ingredients especially grains which results in high cost of feed, which makes up to 60-70% of the total cost of production of monogastric animals under intensive system (Adegbenro *et al.*, 2012). The ever-rising cost of maize is brought about by its declining production conditions and stiff competition for its use by man and other livestock species (Agbede *et al.*, 2002). Therefore, there is a need to explore the use of alternative feed sources that have the capacity to yield the same output as conventional feedstuffs and at a cheaper cost. This will help to reduce the cost of feeds and also minimize the direct competition between man and livestock for the available conventional feedstuffs. One such economical substitute ingredient for maize is cassava meal (Anthony, 2009). Thus, this study was designed to evaluate the potential of fortified cassava stumps as energy source in broiler chicken diets.

Materials and Methods

The experiment was carried out at the Poultry Unit of Teaching and Research Farm (T&RF), Federal University of Technology, Akure Nigeria. Cassava stumps were collected, crushed and subjected to heat treatment by frying. The cassava leaves were obtained in large quantities and air-dried. The cassava stumps and cassava leaves were milled separately. The cassava leaf meal and cassava stump meal were mixed together in ratio 1: 9 (1kg cassava leaf meal meal+ 9kg cassava stump meal) to produce the fortified cassava

stump meal. Five experimental diets were produced in such a way that the fortified cassava stump meal was used as one of the feed ingredients at 0, 5, 10, 15 and 20% and each diet was designated Diets I, II, III, IV and V, respectively. The diets were thoroughly mixed. The same procedure was followed for the finisher phase. The gross composition of the starter and finisher diets are as presented in Tables 1 and 2, respectively.

Table 1: Gross Composition of broiler chicken Experimental Diet (g/100g) (Starter)

INGREDIENTS	DIET I	DIET II	DIET III	DIET IV	DIET V
Maize	54.00	49.00	44.00	39.00	34.00
Wheat offal	3.30	3.30	3.30	3.30	3.30
Soybean meal	21.00	21.00	21.00	21.00	21.00
Groundnut cake	12.00	12.00	12.00	12.00	12.00
Fish meal	5.00	5.00	5.00	5.00	5.00
FCCSM	0.00	5.00	10.00	15.00	20.00
Lysine	0.10	0.10	0.10	0.10	0.10
Methione	0.10	0.10	0.10	0.10	0.10
DCP	1.00	1.00	1.00	1.00	1.00
Limestone	1.50	1.50	1.50	1.50	1.50
Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Vegetable oil	1.50	1.50	1.50	1.50	1.50
TOTAL	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table 2: Gross Composition of broiler chicken Experimental Diet (g/100g) (Finisher)

INGREDIENTS	DIET I	DIET II	DIET III	DIET IV	DIET V
Maize	54.00	49.00	44.00	39.00	34.00
Wheat offal	5.80	5.80	5.80	5.80	5.80
Soybean meal	21.00	21.00	21.00	21.00	21.00
Groundnut cake	12.00	12.00	12.00	12.00	12.00
FCCSM	0.00	5.00	10.00	15.00	20.00
Lysine	0.10	0.10	0.10	0.10	0.10
Methione	0.10	0.10	0.10	0.10	0.10
DCP	1.50	1.50	1.50	1.50	1.50

Limestone	2.00	2.00	2.00	2.00	2.00
Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Vegetable oil	3.00	3.00	3.00	3.00	3.00
TOTAL	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

FCCSM = *Fortified composite cassava stump meal*, DCP = *Dicalcium phosphate*

One hundred and fifty Abor-Acre strain of broiler were assigned to five dietary treatments of three replicates and ten chicks per replicate in a Completely Randomized Design. Their respectively starter diets were fed *ad libitum* for 1 – 28 days. Thereafter, the finisher diets were fed *ad libitum* between 29 – 49 days during which weekly feed consumption and weight changes were measured and feed conversion ratio was calculated. The economics and cost of producing experimental diets were estimated in comparative fashion. The cost of feed consumed per bird and total cost of production were calculated. The average price gained per bird was calculated by subtracting average price realized per bird from total cost of production. All data collected were subjected to Analysis of Variance (ANOVA) using SPSS version 17 package. Where significant differences existed, Duncan Multiple Range Test (DMRT) of the same package was used to separate the means.

Results and Discussion

From Table 3, Birds fed diet I were not significantly different (P<0.05) from those fed diets II, III and V with respect to the final body weight (FBW) and total weight gain (TWG). Numerically, highest FBW (2517.00g/bird) and highest TWG (2477.18g/bird) were recorded with birds fed diet I while lowest FBW (2080.00g/bird) and lowest TWG (2040.28g/bird) were observed with birds fed diet IV. Also, feed conversion ratio (2.12) of birds fed diet I was significantly (P<0.05) lower than those fed diets III, IV and V but similar to birds fed diet II (2.16). Variation in growth performance characteristics obtained were in accord with Adeyoyin *et al.*(2010) who reported significant differences in final weight, weight gain and feed conversion ratio when unpeel cassava grit was fed to layers. Higher feed conversion ratio recorded for birds fed diet IV could be responsible for increasing feed intake in order to meet up with nutritional requirement especially energy of the birds that significantly exhibit higher live bodyweight as the dietary energy increased (Greenwood *et al.,* 2004). There were significant (P<0.05) differences observed in cost of feed per bird, cost of production per bird and profit made from sales of birds as presented in Table 4. Costs of feed (₦ 925.32±23.63) and production (₦ 1175.32±23.63) were highest in diet I. Cost of production and cost of feed decrease progressively as the inclusion of fortified composite cassava stump increases. Diet V which contained highest level of fortified composite cassava stump yielded better (₦ 807.35±12.88) profit. Cost of day-old chicks, cost of drug and vaccinations per bird, and sales price per bird was the same for all the treatments. The variation in the cost of feed and production indicated that diet V had the least cost of feed consumed and cost of production. This is in agreement with the report of Omoikhoje *et al.* (2008) that least-cost of feed consumed recorded in birds fed 100% cassava grit meal (CGM) could be as a result of cheap cost of cassava grit used in the diet. In the same vein, the total cost of production was least in birds fed diet V and this could be due to the cheap nature of the basal diet that reduced the cost of formulating the diet per kilogram.

Conclusion and Recommendations

In this study, it was demonstrated that having up to 20% level of FCCSM did not adversely affect growth and feed efficiency in broiler chickens. It indeed brought about an increased profit margin in the production process. From the outcome of this study, it is therefore recommended that; farmers and feed millers could use FCCSM up to 20% as replacement for maize in broiler chicken diets.

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Table 3: Growth Performance of broiler chickens fed fortified composite cassava stump meal-based diets

Parameter	Diet I	Diet II	Diet III	Diet IV	Diet V
Initial weight (g)	39.82±0.79	39.71±0.59	39.67±0.49	39.72±0.49	39.72±0.30
Final weight (g)	2517.00±159.29^{a}	2346.67±180.95^{a}	2340.00±104.08^{a}	2080.00±160.00^{b}	2286.67±20.28^{ab}
Weight gain (g)	2477.18±159.10^{a}	2306.95±181.52^{a}	2300.33±104.31^{a}	2040.28±159.59^{b}	2246.95±20.05^{ab}
Feed intake(g)	5263.50±58.95^{b}	4987.91±23.03^{c}	5160.26±103.75^{bc}	5465.55±29.47^{a}	4657.61±51.31^{d}
Feed conversion ratio	2.12±0.01^{a}	2.16±0.03^{a}	2.24±0.03^{b}	2.68±0.05^{c}	2.21±0.01^{b}

Means without identical superscripts in the same horizontal row are significantly different ($p<0.05$)

Table 4: Cost analysis of broiler chickens fed fortified composite cassava stump meal-based diets

Parameters	Diet I	Diet II	Diet III	Diet IV	Diet V
Cost of day-old chick	180	180	180	180	180
Cost of feed consumed (₦/Bird)	925.32±23.63^{a}	853.18±19.07^{a}	858.16±85.59^{a}	865.16±9.12^{a}	742.65±22.30^{b}
Cost of drug + vaccine (₦/Bird)	250.00±0.00	250.00±0.00	250.00±0.00	250.00±0.00	250.00±0.00
Total cost of production (₦/Bird)	1175.32±23.63^{a}	1103.18±11.01^{a}	1108.15±49.41^{a}	1115.16±5.27^{a}	992.65±12.88^{b}
Sales price of bird (₦/Bird)	1800±0.00	1800±0.00	1800±0.00	1800±0.00	1800±0.00
Net profit/bird produced (₦)	624.68±23.63^{b}	696.82±11.01^{b}	691.85±49.41^{b}	684.84±5.27^{b}	807.35±12.88^{a}

Means without identical superscripts in the same horizontal row are significantly different ($p<0.05$)