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PERFORMANCE OF BROILER STARTER CHICKS FED GRADED LEVELS OF CASSAVA CHIPS MEAL AS REPLACEMENT FOR WHOLE MAIZE

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ABSTRACT

This study focuses on the performance of broiler starter chicks fed graded levels of cassava chips meal as replacement for whole maize. The need to explore the potentials of unconventional agricultural products as feedstuff for monogastric livestock is the motivation behind this study. A 28-day feeding trial was conducted using 180 unsexed day old marshal strain of broiler chicks fed 0, 12.5, 25, 37.5 and 50% levels of Cassava Chips Meal (CCM) in a completely randomized design where CCM replaced whole maize weight for weight. Each of the five dietary treatments was further replicated three times. Routine management practices, vaccination and medication typical of broilers were strictly adhered to. The initial weight, final weight, weight gain, feed intake, feed conversion ratio, feed cost/kilogram, feed cost/kilogram weight gain and mortality were measured. Results show that birds on control (0% CCM) and T2 (12.5% CCM) with weight gains 643 g and 625 g; average daily feed intake, 46.7 and 46.9 g average daily weight gain 23.0 and 21.3 g; feed conversion ratio, 2.03 and 2.20, respectively did not differ significantly (p>0.05) but were superior to those of levels 25, 35.5 and 50%. With the exception of the average daily feed intake and feed cost/kg gain, performance declined as the inclusion level of CCM increased. Mortality did not follow any particular trend showing that CCM did not impact negatively on the health of chicks.

Key words: Health of chicks, diet of broiler chicks, whole maize cassava chips meal (CCM)
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INTRODUCTION

The competition between man and monogastric livestock for available grains and other feedstuff has led to an escalating cost of conventional feedstuff which has in turn resulted in high cost of production rated at 70- 80% (Agbakoba *et al.*, 1995; Madubuike and Ekenyem, 2001; Olomu, 1984; Esonu, 2002). This problem requires urgent attention and subsequent solution. There is thus an obvious need to explore the potentials of unorthodox (unconventional) agricultural products as feedstuff for monogastric livestock. The net effect of increased unit cost of the conventional feed resources is usually the increased cost of proprietary feed, which by extension gives rise to increased cost of production of meat and other animal products.

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Cassava is abundantly available and relatively cheaper than maize; Nigeria-is the largest world producer of cassava (FAO, 2002). Cassava also has a relatively high energy level (3.34 kcal/g) when compared to maize (3.43kc1/g) (Obioha, 1992).

However, levels of both methionine and cystine are extremely low in cassava and appear to be first limiting factors to its nutritional potential (Close, 1963, Obih *et al* 2010).

Also the presence of Hydrocyanic Acid (HCN) as an anti-nutritional factor (Obih *et al* 2010) in cassava presents some problem in its utilization as livestock feed ingredient.

Oke (1969) also detected the presence of prussic acid in cassava. The HCN is however denatured and destabilized if oven dried, sun dried or fermented, when the enzyme linamarinase which is required for the hydrolysis of glucoside to form HCN is destroyed.

Partial replacement of maize with cassava meal is expected to reduce the cost of maize for human use, lead to overall reduction in the price of formulated rations for monogastric livestock and thereby reduce the cost of broiler production and make the end product cheap and affordable.

MATERIALS AND METHODS

Sitting of the Experiment: The experiment was conducted at the Poultry Production Unit of the Imo State University Teaching and Research farm Owerri, Nigeria. Owerri is situated on longitudes $7^{0}0^{1}$ 06^{11} E and 7°03^{1} 00^{11} E and latitudes $5^{0}24^{1}$ 24^{11} N and 5°30 00^{11} N. Owerri is the humid tropical region of West Africa.

Preparation of Experimental Diets: Cassava tubers were procured from a local market, peeled (removal of the outer cover) and sliced into chips (smaller sizes) to enhance sun drying to a moisture content of less than 8%. The sun drying also facilitated a reduction in cyanide content as well as enzymatic and microbial activities which lead to spoilage and nutrient leaching. The dried chips were later subjected to hammer milling with a sieve of 4.0mm diameter. The milled cassava chips were also subjected to proximate analysis at the biochemistry laboratory of the Animal Science and Fisheries of the Imo State University, Owerri, Nigeria, (AOAC 1995). The proximate composition of cassava chips meal (Table 1) was the basis for the experimental feed formulation. Other feed ingredients were procured from reputable dealers. The cassava chips replaced maize meal weight for weight at levels 0, 12.5, 25, 37.5 and 50% to form experimental diets T_1, T_2, T_3, T_4 and T_5 respectively.

Procurement and Brooding of Chicks: A total of 180 unsexed day old marshal breed of broiler chicks were procured from a local distributor and brooded for one week (stabilization period) before allotting them randomly to the five treatment diets.

The dietary treatments were replicated 3 times in a completely randomized design. Feed and water were supplied *ad libitum.* Appropriate routine medication, vaccination, scrupulous sanitation and other standard chick brooding conditions were adopted in a deep litter brooding house.

Experimental Design and Data Collection: The experimental design was Completely Randomized Design (CRD). Each of the five treatments had thirty six (36) birds and each replicate had twelve (12) birds. Parameters measured were, weight gain, feed intake, feed conversion ratio, feed cost/kg and feed cost per kilogram weight gain and mortality.

The birds were weighed using a top loading (5 kg capacity) Goat brand weighing scale. Weighing of birds took place in the morning hours (7.00am to 8.00am) on a particular day of each week. Initial body weights of the birds were taken at the start of the experiment and this was used to calculate the weight gain as final weight minus the initial weight. Daily feed intake was also measured by subtracting the weight of left over feed from the weight of feed supplied.

Feed conversion ratio was calculated as follows:

$$\frac{\text{Avg. Feed intake}}{\text{Avg. Weight gain}}$$

Feed cost per kilogram was calculated by adding prevailing prices of the different ingredients per kilogram (at the time of the experiment), multiplied by their inclusion levels and divided by one hundred. The cost per kilogram gain was calculated as feed conversion ratio multiplied by feed cost/kg feed.

All the data were subjected to One Way analysis of variance ANOVA (Steel and Torrie, 1980) while differences in the treatment means were separated using the Duncan's multiple range test as outlined by Onuh and Igwemma (1998).

RESULTS

Results of the performance of broiler chicks fed varying dietary levels of cassava chips meal for 28 days is shown in Table 3. With the exception of the initial live weight, all other parameters differed significantly ($P < 0.05$) between treatment means.

The control (0% CCM) diet and 12.5% CCM did not differ significantly ($P > 0.05$) for final weight, weight gain, average daily weight gain, average daily feed intake and feed conversion ratio. With the exception of average daily feed intake and feed cost/kg gain, all other parameters seemed to decrease in value as the inclusion level of CCM increased.

DISCUSSION

The initial live weights of the birds did not differ significantly ($p > 0.05$) between treatment means. Significant differences ($p < 0.05$) were however observed in their final live weights of 710, 693, 661, 560 and 504; weight gain of 643, 625, 593, 493 and 436 g; average daily weight gain of 23.0, 21.30, 19.10, 17.6 and 15.60 g; average daily feed intake of 46.70, 46.90

47.80 48.10 and 48.50 g; feed conversion ratio of 2.03, 2.20 2.50 2.73 and 3.10; feed cost/kg of 71.20, 62.50, 56.60, 48.20 and 39.40 naira and feed cost/kg gain of 144.50, 137.50, 141.50, 131.60 and 122.10 naira for 0, 12.50, 25, 37.50 and 50% levels of CCM respectively, though the control (0% CCM and 12.50 CCM did not differ significantly (p>0.05) for final weight, weight gain, average daily weight gain, average daily feed intake and feed conversion ratio.

With the exception of the control (0% CCM) and 12.5% CCM, there was decline in performance as the inclusion of level of CCM increased from 0% in the control to 50% in diet five. This trend could be attributed to the decline in crude protein % (23.24 in the control to 19.38 in 50% CCM diet) as well as the fall in energy level from 2859.32 in the control to 2732.32 ME (kcal/kg) in 50% CCM diet below the NRC (1994) recommended levels. The result of the average daily feed intake, 46.7, 46 9, 47.8, 48.10 and 48.5 g for 0%, 12.5, 25, 37.5 and 50 CCM diets respectively showed that the chicks consumed more feed to make up for the shortfall in both crude protein and ME energy levels as the inclusion level of CCM increased.

Feed cost/kg decreased as the inclusion level of CCM increased from 0% in the control to 50% in diet five and differed significantly between treatment means. The cost per kg of feed obtained resulted from lower cost per kg of CCM (N32.00/kg) compared to N72.00/kg for maize as at the time of this study. Feed cost/kg gain which is a product of FCR x feed cost/kg did not follow any particular trend. 50% 0CM inclusion level produced the cheapest finisher chicken at N122/kg by the 28th day.

Conclusion: Results of the experiment indicate that CCM can replace whole maize up to 12.5% in broiler starter diets. Replacing whole maize with CCM reduced the cost of broiler chick production.

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APPENDIX

Table 1: Proximate composition of Cassava Chips Meal (CCM)

Nutrient	Composition (%)
Nitrogen free extract	86 15
Crude protein	2 28
Crude fibre	4.95
Ether extract	0 12
Ash	2.00
Moisture	4.50

Table 2: Composition of experimental diets

	Dietary levels (%)				
Ingredients	**T_1 (%)**	**T_2 (12.5%)**	**T_3 (25%)**	**T_4 (37.5%)**	**T_5 (50%)**
Maize	50.00	35.0	25.00	12.00	0.00
CCM	0.00	12.50	25.00	37.00	50.00
Soybean meal	15.00	15.00	15.00	15.00	15.00
Groundnut cake	14.30	14.30	14.30	14.30	14.30
Wheat offal	7.00	7.00	7.00	7.00	7.00
Palm kernel meal	4.00	4.00	4.00	4.00	4.00
Fish meal	5.00	5.00	5.00	5.00	5.00
Bone meal	4.00	400	4.00	4.00	4.00
Common salt	0.30	0.30	0.30	0.30	0.30
Feed premix	0.25	0.25	0.25	0.25	0.25
DL-methionine	0.06	0.06	0.06	0.06	0.06
L-Lysine	0.09	0.09	0.09	0.09	0.09
Total	100.00	100.00	100.00	100.00	100.00
Calculated nutrient composition (%)					
% Crude Protein (CP)	23.24	22.28	21.35	20.35	19.38
ME (kcal/kg)	2859.31	2783.57	2765.82	2749.07	2732.32
Ether extract	4.57	4.09	3.60	3.12	2.63
Crude fibre	3.98	4.17	4.36	4.54	4.75

Table 3: Performance of broiler chicks fed varying dieting levels of cassava chips meal for 28 days

	Percentage dietary levels of cassava chips meal					
Parameters	**0% (T_1)**	**12.5% (T_2)**	**25% (T_3)**	**37.5% (T_4)**	**50% (T_5)**	**SEM**
Initial live weight (g)	67.00	68.00	67.50	67.60	68.00	0.001
Final weight (g)	710.00^a	693.00^a	661.00^b	560.00^c	504.00^d	0.020
Weight gain (g)	643.00^a	625.00^a	593.00^b	493.00^c	436.00^d	0.080
Avg. daily weight gain (g)	23.00^a	21.30^a	19.10^c	17.60^d	15.60^c	0.700
Avg. daily feed intake (g/chick/day)	46.70^b	46.90^b	47.80^{ab}	48.10^a	48.50^a	0.090
Feed conversion ratio (FCR)						
Feed cost/kg (*)	2.03^c	2.20^c	2.50^c	2.73^b	3.10^a	0.008
Feed cost/kg gain (*)	71.20^a	62.50^b	56.60^c	48.20^d	39.40^e	0.150
Mortality	144.50^a	137.50^c	141.50^b	131.60^d	122.10^e	0.280
	3.00^a	0.00^d	1.00^c	3.00^a	2.00^b	0.002

Abcde: Means within the same row with different superscripts are significantly different ($P < 0.05$)