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Cassava Peels Meal as Substitute for Whole Maize on the Performance of Broiler Finisher Chicks

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Abstract

A 28-day feeding trial was conducted using 180 unsexed Fidan strain of day-old broiler chicks fed 0, 18, 36 and 54% levels of cassava peels meal (CPM) in a completely randomized design experiment, where CPM replaced maize weight for weight. Each of the four dietary treatments was further replicated four times. Routine vaccination and medication instruction typical of broilers management were strictly followed. Feed and water were supplied ad libitum. The initial live weight, final weight, weight gain, feed intake, feed conversion ratio, feed cost/kilogram and feed cost/kilograme weight gain were measured. Results showed that birds on the control diet (0% CPM) and 18% CPM were statistically similar ($p > 0.05$) in their final live weights, weight gain, average daily feed intake, feed conversion ratio and feed cost/kg gain (2.33 and 2.09kg, 1.69 and 1.45kg, 0.16 and 0.16kg/bird, 2.67 and 3.08 and 205.32 and 196.17 naira respectively). Both recorded values superior to those on levels 36 and 54% CPM. Both feed conversion ratio and feed cost/kg declined as the level of CPM increased from 0 to 54%, while feed cost/kg gain is not the cheapest to produce, feed wise.

Keywords: *Chicks, Finisher broilers, Cassava peels meal, Maize, feed*

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Background to the Study

The monogastric livestock industry in Nigeria and other developing countries of the world has witnessed a rapid decline due to high cost of inputs, especially the feed ingredients (Ogundipe 2017; Ndifon, 2018; Obioha, 2002). This high cost of feed ingredients is principally due to the competition between man and monogastric livestock for available grains and other feed stuff, which in turn has resulted in feed accounting for 70 – 80% of the total cost of production (Agbakoba et al, 2015; Madubuike and Ekenyem, 2011). This has prompted the search for cheaper and alternative feedstuffs for poultry (Oladunjoye et al, 2015, Onuh, 2015).

There is evidence from the works of researchers that the use of agro-industrial by-products can reduce the cost of producing poultry (Onuh, 2016). In Nigeria, one of such by products is cassava (manihot utilisima) tuber peel. Cassava consumption leaves behind substantial qualities of its peels, which if not properly managed, often it constitutes environmental nuisance since it is not edible to man. it constitutes the major by-product of cassava tubers used in preparing human food and industrial starch (Tewe and Egbunike, 2018). In most parts of Nigeria where cassava is grown and the tubers processed; the peel is largely underutilized as livestock feed (Ifut, 2018).

It is estimated that approximately 4 million tons of cassava peeling useful as livestock feed are manually produced as a by-product in Nigeria alone during the processing of cassava tubers. This is because it accounts for between 10 and 13% of the tuber weight (Tewe et al, 2016) 0r 20.1% of the tuber (Hahn and Chukwuma, 2017). Cassava peels have higher protein, fat and ash than the edible portion, highly nutritious than the pulp, very palatable and well relished by domestic livestock (Obioha, 2017; Oyenugo, 2016). It however contains toxic concentrations of cynogenic glycosides, which may be harmful to animals when consumed raw (Ogundipe, 2018). The aim of this study was therefore to evaluate the performance of broiler chicks fed graded levels of cassava peel meal as replacement for maize meal.

Materials and Methods

The study was carried out at the poultry production and research unit of the Alvan Ikoku Federal University of Education Owerri, Imo State Nigeria. Owerri is situated on longitude 7^{0} 01^{1} 07^{12E} and 7^{0} 04^{1} 00^{E} and Latitude 5^{0}, 28^{1}, 24^{11} N and 5^{0} 30^{1}, 00^{11} N

Collection and Preparation of Experimental Diets

Cassava peels were collected from rural garri processing families within the Owerri North Local Government Area, Imo State. The peels were sun dried on a clean dry floor until the moisture content was less than 10%. This helped to reduce the cyanide content, enzymatic and microbial activities that aid spoilage and nutrient leaching. The dried peels were then crushed in a hammer mill to produce the cassava peel meal (cpm).

A sample of the milled cassava peels was taken to the Animal Science and Technology Laboratory of the Federal University of Technology Owerri, for proximate analysis according to AOAC (1995).

The proximate values are shown in Table 1. Other feed ingredients were procured from reputable local dealers, crushed where necessary and used to formulate cpm trial diets shown in table 2. Specifically, treatment diets were formulated to contain on dry weight bases O (control) 18, 36, and 54% CPM and labeled T_1, T_2, T_3 and T_4 respectively).

Table 1: Proximate composition of cassava peels

Nutrients	Proximate composition (%)
Carbohydrates	53.59
Crude protein	4.38
Crude fat	6.83
Crude fibre	25.30
Moisture	7.90
Ash	2.00

Table 2: Composition of Experimental Diets

	Diets (Cassava peels %)			
Ingredients	**T_1 (0%)**	**T_2 (18%)**	**T_3 (36%)**	**T_4 (54%)**
Maize	54	36	18	0
Cassava peel	0	18	36	54
Soya meal	10	10	10	10
Groundnut cake	12	12	12	12
Fish meal	5.0	5.0	5.0	5.0
Palm kernel cake	6.3	6.3	6.3	6.3
Dry brewers spent grain	7.0	7.0	7.0	7.0
Oyster shell	5.0	5.0	5.0	5.0
Common salt	0.30	0.30	0.30	0.30
Premix (vit/min)	0.25	0.25	0.25	0.25
L – lysine	0.09	0.09	0.09	0.09
DL – Methionine	0.06	0.06	0.06	0.06
Total	**100**	**100**	**100**	**100**

Calculated Nutrient Composition

Crude protein %	20.64	19.62	18.20	17.61
ME (Kcal/kg)	2859.08	2684.47	2509.15	2333.83
Crude fibre %	4.53	8.73	12.92	17.12
Ether extract %	4.25	4.76	5.27	5.78

Procurement and rearing of experimental Birds

Two hundred (200) day-old Fidan strain of broiler chicks were procured from a local distributor, brooded for 28days on deep littre in a standard tropical poultry brooding building, and were fed standard commercial starter ration. At the end of the brooding period, 160 birds were selected from the lot using sound physical disposition as yardstick. Sixteen pens (each to accommodate 10 birds) were partitioned out within the building and the 160 birds randomly divided into 4 treatment groups (T_1, T_2, T_3, T_4). Each group was assigned to one of the diets containing 0, 18, 36 and 54% cassava peel meal. Each of these treatments was further replicated 4 times in a completely randomized design. Thus, each of the four replicates had 10 birds. Standard management practices of sanitation, appropriate medication and vaccination were carried out as recommended in the Teaching and Research Farm. Feed and water were supplied ad libitum. The birds were fed for 28days.

Data Collection and Analysis

Parameters measured were initial weight, final weight, weight gain, feed intake, feed conversion ratio, feed cost/kg of feed, feed cost/kg gain and mortality. The birds in each replicate were weighed individually using a top loading 5kg salter weighing scale. Weighing was done weekly in the morning hours (7 to 8am) before the days feeding. Initial body weights of birds were taken at the start of the experiment and this was used to calculate the weight gain as the final weight minus the initial weight. Daily feed intake was also measured by subtracting the weight of leftover feed from the weight supplied. Feed conversion ratio (FRC) was calculated using the formula outlined by Madubuike and Ekenyem (2001).

Feed cost per kilogram was calculated by summing 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 weight gain was calculated as FCR x cost/kg of feed.

Data Analysis: All the data were subjected to one-way analysis of variance (steel and Torice 1989) while difference in the treatment means were separated using the Ducan's multiple Range Test as outlined by (Onuh and Igwemma, 1998).

Results and Discussion

Results of the experiment (Table 3) showed that with the exception of the initial weight and average daily feed intake, all the parameters investigated differed significantly ($p < 0.05$) between treatment means. Birds on control (0%) and 18% cassava peel meal were however statistically similar ($p > 0.05$) in final live weight, weight gain, average daily weight gain, feed conversion ratio and feed cost/kg gain.

Table 3: Performance characteristics of Finisher Broiler fed varying levels of cassava peel meal as replacement for maize meal:

Percentage dietary levels cassava peel meal

Parameters	T_1 (0%)	T_2 (18%)	T_3 (36%)	T_4 (54%)	SEM
Initial live weight (kg)	0.64^a	0.64^a	0.065^a	0.64^a	0.03
Final live weight (kg)	2.33^a	2.09^a	1.52^b	1.39^c	0.08
Weight gain (kg)	1.69^a	1.45^a	0.87^b	1.75^c	0.08
Average daily weight gain (kg)	0.060^a	0.052^a	0.031^b	0.027^b	0.003
Average feed intake (kg)	0.16^a	0.16^a	0.17^a	0.17^a	0.002
Feed conversion ratio	2.67^c	3.08^c	5.48^b	6.30^a	0.34
Feed cost/kg feed (₦)	76.90^a	63.90^b	50.40^c	36.40^d	1.22
Feed cost/kg gain (₦)	205.32^b	196.17^b	276.19^b	229.32^{ab}	1.65

Means with different superscripts in the same row are significantly different ($p < 0.05$)

The initial live weight of the birds in the various treatments was similar ($p > 0.05$). significant differences ($p < 0.05$) were however observed in their final live weights (2.33, 2.09, 1.52, and 1.39kg; weight gain kg/bird) of 1 – 69, 1.45, 0.87 and 0.72; average daily weight gain (kg/bird/day) of 0.060, 0.052, 0.031 and 0.027; feed conversion ratio of 2.67, 3.08, 5.48 and 6.30; feed cost/kg (N) of 76.90, 63.90, 50.40 and 36.40 as well as field wet/kg gain of 205.32, 196.17. 276.19 and 229.32 for 0, 18, 36 and 54% level of the CPM respectively. Values returned for the control and 18% levels with the exception of feed cost/kg were similar. Feed cost/kg feed (N) declined progressively from 76.90 in 0% to 36.40 in 54% CPM. This is as a result of the wide differences in procurement costs (N62/kg for maize and N4.20 for CPM).

The final live weight, weight gain and feed conversion ratio, decreased in performance value as the level of CPM increased from 0% to 54%. The declining trend in performance values could be attributed to higher fibre levels beyond the recommended levels of NRC (1994). Earlier reports by Opara (2016), Ekenyem (2018) and Madubuike (2006) indicate that higher levels of fibre in the diets of monogastric animals depressed weights gain. In addition, the decreased in crude protein percentage as the level of CRM increased may have depressed weight gain. The 36% (T_3) and 54% (T_4) diets had crude protein levels (18.20% and 17.61% respectively) far below the 20% recommendation of NRC (1994). Feed intake did not show any significant difference between treatment means. This suggests that CPM did not influence palatability. The result on feed intake also fails to agree with the finding of Isikwenu et al (2010), who stated that feed intake increased with increase in fibre content.

Feed cost/kg and weight gain differed significantly ($p < 0.05$) between treatment means but did not follow any particular trend since it is a product of feed conversion ratio multiplied by feed cost/kg. The 18% CPM diet produced the cheapest chicken (N196.17.20) at the end of the experimental period performing better than the control (0% CPM). More importantly, the major problem encountered with the use of cassava products in the diets of monogastric animals is the deleterious effects on the animals' physiology resulting from the activities of cyanogenic glycoside content of the products (Udedibie 2007). It is therefore probable that the toxicological activities of cyanogenic glycosides in the CPM may have contributed to the declining performance of the experimental birds as the CPM inclusion in the diets increased (Udedibie, 2007).

Conclusion

Results of this experiment showed that CPM could be used to replace up to 18% of the maize in the diets of finisher broilers, with good results thereby reducing the cost of broiler production.

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