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Growth Response, Carcass Analysis and Hematological Characteristics of Finisher Broilers Fed Diets Containing Ensiled Cassava Peel Meal

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Abstract

A 28-days feeding trial was conducted to determine the growth response, carcass analysis, and hematological characteristics of finisher broilers fed diet containing ensiled cassava peel meal. A total of sixty (60) day-old broiler chicks raised on a deep-litter system to finisher phase were used for the experiment. They were divided into two treatment groups of thirty (30) birds each, and each group were randomly assigned to one of the experimental diets, each group were later sub-divided into three replicates of 10 birds each. Two treatment diets were formulated such that 50% of the maize in diet 1 (control) was replaced in diet 2 (ECPM). The birds were fed for four weeks after which, their growth response was determined using the following parameters; feed intake, weight gain, feed conversion ratio, initial body weight, final body weight. Also 12 birds were randomly selected from the treatments (2 birds per replicate), and then slaughtered and prepared for carcass analysis. Blood samples were also collected from two (2) birds per replicate at the end of the feeding trial for assessment. Result shows that there was no significant different ($p>0.05$) between the control group and the ensiled cassava peel meal group in their growth response, carcass analysis, and hematological characteristics.

Keywords: Carcass Analysis, Finisher Broilers and Ensiled Cassava Peel Meal

Introduction

The feed industry in Nigeria is currently faced with a lot of challenges mainly as a result of high cost of feed ingredients because of the intense competition between human and animal over the available conventional feed ingredients. The search for materials that can substitute the conventional sources of energy and protein is therefore needed to relieve of the competition. Energy sources are the most important and expensive feedstuffs, maize which accounts for the largest proportion of about 50-55% of the poultry diet (Afolayan *et al.*, 2002). 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; Hamza *et al.*, 2003). Prices of these conventional feedstuffs have soared so high in recent times that it is no longer economical to use them in poultry feeds (Obikaonu *et al.*, 2006).

Substantial efforts have been made to replace cereals with cassava peel in poultry feeding. Cassava peel is one of the agro-industrial by-products that is readily available in countries where cassava is cultivated and processed into food for man. The peel accounts for between 10-13% of tuber by weight. It contains about 5% crude protein and reasonable amount of minerals (Tewe and Kasali, 1982). However, the use of cassava peel as feed for non-ruminant animals is limited by its high fiber content and hydrocyanic acid which is deleterious to the growth and development of the birds (Tewe, 2004). Many processing methods have been used to enhance the feeding value of cassava, which include sun-drying (Akinfala *et al.*, 2007), parboiling (Salami, 1999), Soaking in water and retting (Salami and Odunsi, 2003). All these have however achieved different level of success.

The objective of this study is to determine the growth response, carcass analysis, and hematological characteristics of finisher broilers fed diets containing ensiled cassava peel meal using the following parameters; Feed intake, Weight gain, Feed conversion ratio, Cost of production, Blood constituents.

Materials and Methods

The experiment was carried out at the Poultry unit of Teaching and Research farm of the School of Agriculture and Agricultural Technology, Federal University of Technology Owerri, Nigeria. The experiment was conducted between the months of June to August, 2017. Fresh cassava peels were collected in batches from local cassava processing farms at Eziobodo community in Owerri West Local Government Area of Imo state. Each batch of fresh cassava peel collected was ensiled for three (3) days, and then sun-dried for about 4-6 days to a constant weight. The sun-dried peels were taken to the feed mill where they were grinded into meal using a hammer mill to produce cassava peel meal.

Table 1: Ingredients composition of the experimental finisher diet

Ingredients	Diet 1 (Control)	Diet 2 (ECPM)*
Maize	60.00	30.00
Soya bean	18.00	18.00
ECPM*	0.00	30.00
Palm kernel cake	4.00	4.00
Wheat offal	10.00	10.00
Fish meal	3.00	3.00
Blood meal	3.00	3.00
Oyster shell	1.00	1.00
Lysine	0.25	0.25
Methionine	0.25	0.25
Vitamin/premix	0.25	0.25
Salt	0.25	0.25
Total	100.00	100.00
Calculated composition (%) for Diet 1 and 2		
Crude protein	19.78	19.63
Crude fibre	4.31	6.35
Ether extract	4.07	4.06
Ash	3.33	5.10
ME (kcal/kg)	2900.00	2481.41

Each kg of feed contains: Vit. A, 2,000,000iu; Vit. E, 80g; Vit.K, 0.4g; Vit. B1, 0.3g; Vit. B2, 1.0g; Vit. B6, 0.6g; Vit. C, 2.40g; Vit. B12, 40g; Mn, 160g; Fe, 8.0g; Zn, 7.2g; Cu, 0.3g; Iodine, 0.25g; Co, 36.0mg; Se, 16.0mg.

*ECPM= Ensiled Cassava Peel Meal

A total of 60 broiler birds were used for the experiment. The birds were divided into 2 groups of 30 birds each. Each group were assigned to one experimental diet. The groups were further sub-divided into 3 replicates of 10 birds each. The birds were housed in a deep litter dwarf wall poultry house in pens measuring 2m×2m each. Wood shavings were used as the litter materials. At the end of the experiment, 12 birds were selected in all the treatment (2 birds per replicate) and blood samples were collected for analysis. The birds were weighed at the beginning of the experiment and weekly thereafter.

At the end of the feeding trial, blood samples of 2ml each were collected from the brachial veins of the birds into sets of sterilized bottle containing EDTA anti-coagulant for the determination of hematological parameters (Hemoglobin, Packed cell volume, Red blood cell, Mean cell volume, Mean cell haemoglobin, Mean cell hemoglobin concentration, Platelet, White blood cell, Lymphocytes, heterophil. After the collection, the blood samples were immediately taken to the laboratory for appropriate analysis needed. The materials used for the blood collection were: ethylene, diamine, tetra acetic acid, bottles, springe and needle, cotton wool, methylated spirit.

Data were collected on feed intake, cost of production, feed conversion ratio, body weight gain and blood constituents. They were analyzed using one-way analysis of variance (ANOVA), and analysis of variance indicated significant treatment effects, and means were separated using t-test as described by Steel and Torrie, (1980).

At the end of the experiment, 12 birds were randomly selected (6 birds per treatment) and were denied feeds for 12 hours (in order to empty their gizzard and also for them to reach slaughter point at good condition), then slaughtered and prepared for carcass analysis. The carcass parameters to be weighed include: carcass weight, dressed weight, head, neck, abdominal fat, breast, shank, thigh, drum stick, gizzard, liver, crop, esophagus, pancreas, gall bladder, oviduct, ceca, small intestine, large intestine, proventriculus, spleen, ovary, kidney, lungs. All these parameters were weighed with a micro scale in order to get their accurate weight.

Results and Discussion

Table 2 shows the data on the growth performance of finisher broilers fed diets containing ensiled cassava peel meal, while data on the carcass analysis of finisher broilers fed diets containing ensiled cassava peel meal is presented in table 3. The results of hematological characteristics of finisher broilers fed diets containing ensiled cassava peel meal are also shown in table 4. The result of this experiment shows that ensiled cassava peel meal could be used to replace maize in finisher broiler diets and will not adversely affect the growth

and feed intake of the birds contrary to earlier reports on broilers fed sundried cassava peel meal diets (Aduku 2005). The result also indicates that the feed conversion ratio (FCR) in diet 1 (control) appears to be the best, which simply demonstrates that maize meal is better utilized by the broiler chicken than ensiled cassava peel meal in growth, which corroborate the findings of Obikaonu, and Udedibie (2006) that the feed conversion ratio of sundried cassava meal is poor when compared with maize. The result also indicates that replacing maize with 50% ensiled cassava peel meal in the finisher broiler diet will not show any significant effect ($p>0.05$) in the blood constituents and carcass parameters. In this study, no mortality was recorded throughout the period of the experiment, this is in agreement with Akinfala *et al.* (2002) which reported that cassava products do not cause any fatal death to broilers at both starter and finisher phase.

Table 2: Performance characteristics of finisher broilers fed Ensiled Cassava Peel Meal

Parameters	Control	*ECPM	Pvalue
Av. initial body weight (g)	550	520	0.02
Av. final body weight (g)	2263.33	1610.29	0.04
Av. body weight gained (g)	1713.33	1282.29	0.07
Growth rate (g)	62.0	64.0	0.01
Av. daily feed intake (g)	3927.78	3909.44	0.96
Feed conversion ratio	2.31	3.05	0.00
Mortality	-	-	-
Cost of feed (N/kg)	160.00	120.00	0.12

*ECPM = Ensiled Cassava Peel Meal

Table 3: Carcass and organ characteristics of finisher broilers fed ensiled cassava peel meal

Parameters (%)	Control	ECPM	P value
Carcass weight (g)	2461.00	1610.37	0.00
Dressed weight	76.21	72.45	0.48
Head	2.39	2.74	0.30
Neck	3.02	4.03	0.10
Abdominal fat	1.59	1.03	0.12
Breast	23.00	21.89	0.70
Wings	7.86	8.53	0.38
Thigh	11.73	12.43	0.58
Drumstick	7.95	8.64	0.10
Gizzard	1.78	3.02	0.40
Liver	2.18	2.65	0.00
Crop	0.69	0.86	0.01
Oesophagus	0.11	0.15	0.15
Pancreas	0.21	0.33	0.06
Gall	0.03	0.04	0.18
Oviduct	0.11	0.09	0.08
Ceca	0.36	0.31	0.73
Small intestine	2.30	3.24	0.04
Large intestine	3.24	4.52	0.00
Proventriculus	0.48	0.57	0.14
Spleen	0.10	0.10	0.72
Ovary	0.08	0.08	0.82
Kidney	0.17	0.14	0.55
Lungs	0.63	0.62	0.09

Table 4: hematological characteristics of finisher broilers fed diets containing ensiled cassava peel meal.

Parameters	Control	ECPM	Pvalue
White blood cell	109.12	113.25	0.28
Lymphocytes	90.83	88.00	0.10
Heterophil	8.67	11.67	0.07
Red blood cell	2.31	2.35	0.90
Haemoglobin	16.05	15.93	0.82
Packed cell volume	28.07	26.63	0.29
Mean cell haemoglobin concentration	57.30	59.88	0.09
Mean cell haemoglobin	69.83	68.77	0.61
Mean cell volume	119.75	120.05	0.92
Platelets	51.50	51.00	0.92

Conclusion and Recommendation

From the result of this experiment, it appears that ensiling before sun-drying is a good processing method. It also shows that up to 50-60% of cassava peel meals can be incorporated in a single diet of broilers in the finisher phase without a marked detrimental effect on the growth and performance. Hence, cassava peel meal in partial replacement of maize may go a long way in reducing the cost of energy source and on the long run the sustainability of poultry production. Ensiling before sun-drying of cassava peel meal also shows that the integrity of the blood constituents and carcass parameters were not tampered.

It is recommended that increased use of cassava product should be made in compounding animal feeds to ameliorate the incident of pressure in maize. Further research is necessary to determine how to increase the nutritive value of cassava peel meal for monogastric animals in view of its cheapness and abundance.

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