

COCOYAM (*COLOCASIA ESCULENTA*) PEEL MEAL SUPPLEMENTED WITH PALM OIL ON THE GROWTH PERFORMANCE OF BROILERS.

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ABSTRACT

One hundred and twenty (120) Abor acre broiler birds of one (1) week of age were used to evaluate the effect of cocoyam (*colocasia esculenta*) peel meal supplemented with palm oil on the growth performance of broilers. They were weighed and randomly assigned to four (4) dietary treatment formulated to contain the test ingredient cocoyam peel meal at levels of 0%, 5%, 10% and 15% with thirty (30) birds allotted to each of the treatment diet and the treatments were replicated three times. The crude protein (2.18%), crude fibre (7.78%), ether extra (0.37%), ash (3.27%) and NFE (86.40%), the anti-nutritional factors (ANF) are oxalate (0.078%), tannin (0.069%) and HCN (mg/kg) 26.28. The average final live weight and the average daily weight gain decreases across the treatment groups with increase in cocoyam peel meal inclusion. The control had the highest value than the rest of dietary treatment groups. Decreasing feed production cost (₦/kg) (51.33, 48.97, 46.81 and 42.49 naira) was observed as inclusion level of cocoyam peel meal increased from 0 to 15%. Similarly, average cost of daily feed intake by each test group followed the same decreasing trend (₦8.65, ₦7.74, ₦7.32 and ₦5.67) for 0, 5, 10 and 15% inclusion levels respectively. The liver values for diet IV had the highest value that was significantly ($P < 0.05$) different from the control diet. Diets III and IV were statistically similar to diet 1. There were significant differences ($P < 0.05$) for thigh cut, while the other parameters were not affected by the dietary treatments. There were no significant differences ($P < 0.05$) in alkaline phosphate, Hb and PCV, while total protein, albumin, RBC and WBC were significantly different ($P < 0.05$) from each other.

Keyword: Cocoyam peel meal, palm oil, broilers, growth, chemical and blood analysis

Introduction

Due to dramatic rises in maize and soya bean prices worldwide, great effort is been geared toward use of alternative, less traditional, raw ingredients when formulating diets (Okereke *et al.*, 2012). Furthermore, increasing cost of conventional feed stuffs has contributed immensely to the low level of animal protein intake in the diets of people of Nigeria. Cocoyam has nutritional advantages over other root and tubers crops (Lyonga and Nzietchueng, 1986). It has more crude protein than other root and tubers, and its starch is highly digestible because of the small size of the starch granules, its contents of calcium, phosphorus, vitamins A and B are reasonable (Aduku, 1993). Cocoyam corms and its by-products have not received enough attention in terms of utilization in the feeding of poultry/livestock and so, there is no adequate information on the substitution of maize grains with cocoyam peels in poultry rations. The Objectives are as follows to evaluate the proximate composition, anti-nutritional factors, haematological, blood chemistry, Carcass /organ, best dietary level of inclusion and feed cost analysis using taro cocoyam peel meal as test ingredients.

Materials & Methods

The cocoyam peels were collected from the post harvest Unit of the National Root Crops Research Institute, Umudike, Abia State. It was sun dried on a clean concrete floor for five to six days. The resulting peels were milled and bagged for the proximate composition and feeding trial.

Experimental Diets

The studies were conducted at the Poultry farm of Collage of Animal Science and Animal Health, Michael Okpara University of Agriculture, Umudike. One hundred and twenty (120) Abor acre broiler birds of one (1) weeks of age were weighed and randomly assigned to four (4) dietary treatment formulated to contain the test ingredient cocoyam peel meal at levels of 0%, 5%, 10% and 15% with thirty (30) birds allotted to each of the treatment diet and the treatments were replicated three times. The birds were placed on a commercial broiler starter mash for one week before the experiment, on a

deep litter system to stabilise the birds. Feed and water were provided *ad libitum* for the eight (8) weeks duration of the experiment. Body weight was taken at the beginning of the experiment and subsequently on weekly basis. Feed intake was taken daily by subtracting the weight of left over feed from the weight of feed given. Weight gain was calculated from body weights, while feed conversion ratio was calculated from feed intake and weight gain.

TABLE 1: Composition of the Experimental Diets

Ingredients	DIETS			
	I	II	III	IV
Maize	47.70	42.50	37.40	32.00
Cocoyam peel	0.00	5.00	10.00	15.00
Soybean	29.40	29.60	29.70	30.10
Palm Oil	2.00	2.00	2.00	2.00
Wheat offal	17.00	17.00	17.00	17.00
Bone meal	2.50	2.50	2.50	2.50
Oyster shell	0.50	0.50	0.50	0.50
Salt	0.25	0.25	0.25	0.25
*Vitamin premix	0.25	0.25	0.25	0.25
Lysine	0.20	0.20	0.20	0.20
Methionine	0.20	0.20	0.20	0.20
Total	100	100	100	100
Cp %	22	22	22	22
CF %	3.52	3.69	3.86	4.02
ME/ kcal/kg	2894.49	2863.60	2827.72	2897.83

*Vitamin-mineral premix supplied (per kg of diet): Vitamin A, 1500 Iu, vitamin D3 1600Iu, riboflavin 9.0g, Biotin 0.25mg, pantothenic acid 6.0mg, vitamin B12 8.0mg, Vitamin B2 2.5mg, vitamin B12 8.0mg, Nicotinic acid 8.0mg Iron 5.0mg, manganese 10mg, zinc 4.5mg. Cobalt 0.02mg, selenium 0.01mg.

Cut Parts and Organ Weights

At the end of the experiment, 2 birds per replicate were randomly selected, starved for 24 hours, weighed and slaughtered by severing the jugular vein. They were bled thoroughly, scalded in hot water and defeathered. The defeathered birds were weighed. The head, neck, shank and viscera were separated from the carcass and the dressed weight taken. Each dressed carcass was cut into parts as reported by Ojewola and Longe (1999) for the purpose of carcass evaluation. All parts were weighed and expressed as percentage dressed weight. Organs like liver, heart, gizzard, and kidney were also weighed and expressed as percentage of dressed weight.

Determination of Blood Constituents

At 8th week of the experiment, blood samples were collected through the wing veins. The samples were collected into sets of labelled sterile bottles. One set of the bottles containing anti-coagulant were used to determine the values of haematological indices like size of red blood cell (RBC) white blood cells (WBC), haemoglobin (Hb) and packed cell volume (PCV). While the other set of bottles without anti coagulant were used to determine the biochemical indices such as total protein, albumin, serum alkaline phosphatase, serum creatinine.

Sample Analysis

Proximate analysis of the test ingredient (cocoyam peel meal) and anti-nutritional content were carried out using standard method (AOAC, 1990). The crude protein content was calculated by multiplying the nitrogen content by 6.25.

Statistical Analysis

All results were subjected to one-way analysis of variance (ANOVA) for completely randomized design (CRD) experiments according to Steel and Torrie (1980), while significant treatment means were separated using LSD.

Results and Discussion

The compositions of the diets are presented in Table 1. The diets were isonitrogenous and the energy content differed. As cocoyam peel meal increased in the diet, caloric values of the diets decreased across the treatments. The crude fiber content increased with increase in the inclusion levels of cocoyam peel meal in the diet. The chemical composition of cocoyam peel meal is presented in Table 2. The crude protein (2.18%), crude fibre (7.78%), Ether extra (0.37%), ash (3.27%) and NFE (86.40%), the anti-nutritional factors (ANF) are as shown below. The results as below are comparable to those of (Oyenuga, 1978; Aduku, 1993; Okereke *et al.*, 2012). Furthermore, tannin at level of 0.5% causes a depression of growth rate and at a level of 5.0% results to mortality in poultry (Clarke and Clarke, 1978).

Table 2: Proximate composition of test ingredient

Composition (g/100gdm)	Cocoyam peel meal
Crude protein	2.18%
Crude fibre	7.78%
Lipids/fat	0.37%
Ash	3.27%
NFE	86.40%
Oxalate	0.078%
Tannin	0.069%
HCN (mg/Kg)	26.28

Table 3 reveals that the average final live weight and the average daily weight gain decreases across the treatment groups with increase in cocoyam peel meal inclusion. The control had the highest value than the rest of dietary treatment groups.

Decreasing feed production cost (₦/kg) (51.33, 48.97, 46.81 and 42.49 naira) was observed as inclusion level of cocoyam peel meal increased from 0 to 15%. Similarly, average cost of daily feed intake by each test group followed the same decreasing trend (₦8.65, ₦7.74, ₦7.32 and ₦5.67) for 0, 5, 10 and 15% inclusion levels respectively as shown in Table 3. We had two mortalities one bird from 5% and another one from 10% cocoyam peel meal inclusion levels. The mortalities recorded were not associated with the treatment diets.

Table 3: Growth performance of broiler fed varying levels of cocoyam peel meal

Parameters	Dietary treatment levels			
	I (0%)	II (5%)	III (10%)	IV (15%)
Avg. Initial Live weight (g)	100	100	101	100
Avg. Final Live Weight (g)	2718	2098	1877	1799
Avg. Daily weight gain/ bird (g)	50.99	38.00	32.15	29.70
Avg. Daily Feed Intake/bird (g)	158.00	153.55	154.35	138.32
Feed conversion Ratio	4.35	10.98	9.20	6.56
Mortality	0	1	1	0

Cost of Production				
Avg. Cost of Feed ₦/kg	51.33	48.97	46.81	42.49
Avg. Cost of daily feed intake/b(₦)	8.65	7.74	7.32	5.67

Table 4 shows that the values of liver for diet 4 had the highest value that was significantly ($P<0.05$) different from the control diet. Diets III and IV were statistically similar to diet 1. The highest value obtained for diet IV could be attributed to the effect of anti-nutritional factors since the liver is the body clearing house. There were significant differences ($P<0.05$) for thigh cut, while the other parameters were not affected by the dietary treatments.

TABLE 4:
Carcass /Organ Weights of Broilers Fed Different Levels of Cocoyam Peels Meal Diets

Parameter	I (0%)	II (5%)	III (10%)	IV (15%)	SEM
Breast cut	26.77	27.10	27.65	27.93	0.82
Drum stick	16.73	16.59	16.71	16.17	0.29
Thigh cut	17.83 ^a	16.22 ^b	15.89 ^b	15.79 ^b	0.14
Intestine	10.91	12.61	13.04	13.48	1.35
Liver	3.07 ^b	3.25 ^{ab}	3.30 ^{ab}	3.57 ^a	0.16
Heart	0.76	0.74	0.78	0.81	0.08
Gizzard	3.46	3.55	3.79	4.11	0.32

Mean within the same row bearing different superscripts (a-c) are significantly ($P<0.05$) different.
SEM: Standard Error of Mean.

Table 5 shows no significant differences ($P<0.05$) in alkaline phosphate, Hb and PCV, while total protein, albumin, RBC and WBC were significantly different ($P<0.05$) from each other. The differences followed similar pattern in total protein, albumin and RBC. WBC followed the reversed other. The increase in value with increase in quantity of the test ingredient may be due to increase in the level of the ANF in the test ingredient.

TABLE 5: Biochemical and Haematological Indices of Broiler Chicken Fed Cocoyam Peels Meal Diets

Parameter	I (%)	II (5%)	III 10%)	IV 5%)	SEM
Total protein (g/l)	5.37 ^a	4.10 ^a	4.00 ^a	3.6 ^{ab}	0.81
Albumin (g/l)	1.76 ^a	1.20 ^{ab}	1.10 ^b	0.80 ^b	0.18
Alkaline phosphate (u/l)	116.50	125.50	113.50	109.00	8.08
RBC($\times 10^6$ /cm ³)	1.64 ^a	1.62 ^a	1.39 ^{ab}	1.09 ^b	0.10
WBC($\times 10^3$ /cm ³)	8.00 ^b	13.15 ^{ab}	15.00 ^{ab}	26.86 ^a	4.25
Hb(g/100ml)	9.00	9.05	8.15	7.45	0.58
PCV (%)	25.00	26.00	24.20	24.00	1.46

Mean within the same row bearing different superscripts (a-c) are significantly ($P<0.05$) different.

Conclusion and Recommendations

From the parameters evaluated that is (best dietary level of inclusion, carcass/organ weights, haematological, blood chemistry and feed cost analysis) using 10% taro cocoyam peel meal as test ingredients will not constitute any negative effect in broilers production.

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