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EFFECT OF SUBSTITUTING MAIZE WITH CASSAVA PEEL ON THE PERFORMANCE OF BROILER CHICKEN

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ABSTRACT

The study was conducted to examine the effect of substituting maize for cassava peal on the overall performances of Broiler chickens. A control diet was formulated with 100% maize as an energy source and 0% of the test ingredient (cassava peal meal). Another four diets were formulated by substituting maize with cassava peal meal at different dietary inclusion level. Treatments 2,3,4and 5 contained 25% cassava peel meal and 75% maize; 50% cassava peel meal and 50% maize; 75% cassava peel meal and 25% maize; and 100%cassava peel meal and 0% maize, respectively. Two hundred (200) unsexed day-old broiler chicks were used for the experiment. The birds were allotted into five (5) dietary treatments with four (4) replicates each in a completely randomized design (CRD). Feed and water were offered *adlibitum* and the experiment lasted for eight weeks. It was observed that significant ($p<0.05$) differences were recorded in the final body weight, weight gain, feed intake, and feed conversion ratio. The values for cost of feed, cost of feed consume per bird and feed cost per weight gained differs significantly ($p<0.05$) across the dietary treatment level. Cost of feed decreased with an increased level of cassava peel. Highest cost (₦136.40)of feed produced was obtained in Treatment 1 while the least cost (₦133.23)of feed produced was obtained in Treatment 5. The study showed that broilers could be raised on cassava peel meal at inclusion level of 25%-75% without having any statistical adverse effect on the growth performance. Substituting maize for cassava peel meal at 50%-75% inclusion proved to be more economical in terms of economics of production.

Keywords: *Broiler Chickens, Cassava Peel, Cost Benefit, Growth Performance*

INTRODUCTION

Broiler birds are those kept and reared for meat production from day-old to about eight weeks of age for good quality tender meat as source of

protein in human diet. However, the profit levels in poultry enterprises have been constrained by a number of factors critical among which is feed quality and cost. Feed is the major component of input cost accounting for up to 70% and 86-87%(Hassan *et al.,* 2006) of the total variable cost of production. The high feed cost has largely been attributed to competition between man and animals for limited grains. Therefore, there is need to exploit the use of potential feedstuff and agro industrial by-products such as cassava peel that are abundant in Nigeria for inclusion in the diets of poultry.

Cassava is a major staple food in the developing world, providing a basic diet for over half a billion people (Fauquet and Fargette, 1990). The peel accounts for 10- 13 percent of the tuber by weight. Cassava peel is a major by-product of cassava tuber roots processing industry. It is the outer cover of the tuber root which is usually removed manually with sharp knife (Hahn, 1988). These peels are regarded as waste and are usually discarded and allowed to rot. The future utilization of cassava peel depends largely on the development of improved processing technologies and improved products that can meet the changing needs of poultry farmers and on its suitability as alternative feedstuffin animal feeds.

MATERIALS AND METHODS

Location of experimental site: The research was conducted at the Teaching and Research Farm Ibrahim Badamasi Babangida University, Lapai, Niger state, Nigeria. Lapai lies between latitude 9°31 and 9°45, each of the equator (Usman,2013). According to the author, the area falls within the Southern Guinea Savannah Vegetation Zone of Nigeria with mean rainfall range between 1100-1600mm and mean temperature range of 21 and 36.5°C.

Sources of test ingredients, experimental animals and their management: Cassava peel was obtained from Gwada market in Shiroro Local Government Area of Niger State. Maize, wheat offal, groundnut cake, fishmeal, bone meal, salt, vitamin premix, methionine and lysine were purchased from Shop 29, Gidan Matasa Minna, Niger State. The cassava peel was sun-dried for 10 days and spread in an open room with good air circulation for 20 days before milling to produce cassava peel meal. The sundried cassava peel was ground using a hammer mill. Two hundred (200) day-old broiler chicks were purchased from Amo hatchery and used

for the experiment. The birds were allotted into five (5) dietary treatments with four (4) replicates each in a completely randomized design (CRD). The birds were weighed on arrival to get initial body weight and subsequently on weekly basis to get the body weight gain. On arrival, anti-stress drug (Vitalyte®) was added to their drinking water to reduce stress. The left over feed was weighed and subtracted from the offered feed to determine the feed intake on weekly basis. Adequate warmth was provided for the chicks during brooding. Routine vaccination schedule were properly observed and the health of birds was well taken care.

Experimental Diets: Five experimental diets were formulated. The diets contained graded levels of processed cassava peel meal (CPM) that replaced maize at 0, 25, 50, 75 and 100% respectively. Diets 2-5 contained graded levels of processed cassava peel meal, while Diet 1 contained no cassava peel and it served as the control. The diets were formulated to give 23% and 20% crude protein needed for the starter (Table 1.0) as well as the finisher phases (Table 2.0), respectively. Feed and fresh water were provided *adlibitum* throughout the feeding trial.

Table 1.0: Gross Composition of Experimental Broiler Starter Diet

Ingredients (%)	T1	T2	T3	T4	T5
Maize	48.00	36.00	24.00	12.00	0.00
Cassava peel meal	0.00	12.00	24.00	36.00	48.00
Groundnut cake	31.70	31.70	31.70	31.70	31.70
Wheat offal	13.00	12.00	11.00	9.00	8.00
Fish meal	3.00	4.00	5.00	6.00	7.00
Bone meal	2.50	2.50	2.50	2.50	2.50
Lime stone	1.00	1.00	1.00	1.00	1.00
Methionine	0.20	0.20	0.20	0.20	0.20
Lysine	0.10	0.10	0.10	0.10	0.10
Vitamin premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00
Palm oil	-	1.8	3.5	5.5	7.5
Calculated values					
Crude protein(%)	23.23	23.01	23.24	22.85	22.64
Metabolizable energy(kcal/kg)	2814.01	2804.97	2813.32	2801.32	2808.22

Table 2.0: Gross Composition of Experimental Finisher Diets

Ingredients (%)	T1	T2	T3	T4	T5
Maize	54.00	40.50	27.00	13.50	0.00
Cassava peel meal	0.00	13.50	27.00	40.50	54.00
Groundnut cake	24.07	24.70	25.10	26.10	26.10
Wheat offal	15.00	14.00	12.60	10.60	9.00
Fish meal	2.00	3.00	4.00	5.00	6.60
Bone meal	2.50	2.50	2.50	2.50	2.50
Lime stone	1.00	1.00	1.00	1.00	1.00
Methionine	0.20	0.20	0.20	0.20	0.20
Lysine	0.10	0.10	0.10	0.10	0.10
Vitamin premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00
Palm oil	-	1.80	3.80	5.90	8.00
Calculated values					
Crude protein(%)	20.15	20.20	20.27	19.80	19.78
Metabolizable energy(kcal/kg)	2836.88	2810.94	2800.15	2802.16	2802.19

Keys

T1: zero percent (0%) inclusion of cassava peal meal
T2: Twenty-five percent (25%) inclusion of cassava peal meal
T3: Fifty percent (50%) inclusion of cassava peal meal
T4: Seventy-five percent (75%) inclusion of cassava peal meal
T5: One hundred percent (100%) inclusion of cassava peal meal

Data Analysis

Data generated from the study were subjected to analysis of variance (ANOVA) according to the procedure 0f Steel and Torrie(1980). The variations in means were separated using the Duncan Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

Table 3showed the growth performance of broiler chickens fed test different dietary level of cassava peel meal as substitute for maize. There were significant ($p< 0.05$) differences in the final body weight, weight gain, feed intake, and feed conversion ratio. The result of the study showed that birds fed 0% cassava peel had the highest weight gain of 1497.48g, which is statistically similar to those fed 25%(1008.23g), 50%(1099.18g) and 75%(1200.70g) cassava peel respectively while birds on 100% cassava peel had the least weight gain of 454.20g. This result is in agreement with the report of Oyebimpe et al (2006), who reported that 200g/kg sun dried cassava peel could replace maize in broiler diets with no adverse

reduction in their growth performance. There was significant ($p<0.05$) difference in feed intake. However, feed intake decreased as the level of cassava peal inclusion in the diets increased. This could be as a result of the dustiness of the cassava peel meal. Broilers birds are known to eat more when the diets are palatable and coarse than when finely ground and unpalatable (Leeson and Summers, 2001). This result is in line with the findings of Apata and Babalola (2012) who reported that dried cassava meal is floury in nature and this can reduce feed intake thereby reducing weight gain. Dustiness of cassava meal can cause irritation of the respiratory tract unless feed is pelletized. Feed conversion ratios of the various dietary treatments are as follows, 1.94, 2.48, 2.22, 1.98, and 3.42 in treatment 1-5 respectively. Birds fed T1 had the best feed conversion ratio, followed by those on T4, while the poorest was recorded in T5,which significantly differs ($p<0.05$) from other treatments. This could be due to high level of crude fibre content of the diet which might have reduced the digestibility of nutrients. Oyebimpe*et al.,* (2006) reported that high fibre diets usually tend to inhibit protein utilization at high inclusion levels, leading to low feed conversion ratio and body weight gain. The results for the cost benefit of chickens fed cassava peal as substitute for maize shown in Table 4.0 is discuss below. The values for cost of feed, cost of feed consume per bird and feed cost per weight gained differs significantly ($p<0.05$) across the dietary treatment level. Cost of feed decreased with an increased level of cassava peal, highest cost of feed produced (₦ 136.40) was obtained in Treatment one while the least cost of feed produced was obtained in treatment five(₦ 113.23). This could be attributed to the fact that cassava peal is consider as non conventional feed stuff which most people regarded as waste. This makes it to be cheaper than other conventional energy feed stuffs. Cost of feed consume per bird is more expensive (₦ 443.30) in treatment two (T2), while least expensive (₦176.56) in treatment five (T5). Best feed cost /kg weight gained (224.18 ₦/kg) was recorded in treatment four (T4), while the poorest (444.30 ₦/kg) was obtained in treatment two (T2).This shows that more meat can also be obtain from birds fed 75% level of non conventional energy feed stuff at a cheaper rate of (224.18₦/kg) which is more economical for a farmer to employ in order to minimize production cost and enhance his profit. This result corresponded with the findings of Abubakar and Ohiaege (2011),who reported that inclusion of cassava peels up to 75% showed no adverse effect on the performance of broiler chickens and could lead to reduction in cost.

Table 3.0: Growth Performance of broiler chickens fed different dietary level of cassava peel meal as substitute for maize.

Parameter	T1	T2	T3	T4	T5	SEM	p value
Initial weight (g)	28.53	30.03	30.05	30.05	30.05	1.15	0.59
Final weight (kg)	1526.00^{a}	1038.25^{ab}	1129.25^{a}	1230.75^{a}	484.25^{b}	272.19	0.02
Body weight gain (g)	1497.47^{a}	1008.22^{ab}	1099.20^{b}	1200.70^{a}	454.20^{c}	271.82	0.02
Daily body weight gain (g)	26.74^{a}	18.00^{ab}	19.63^{b}	21.44^{a}	8.11^{c}	33.98	0.02
Feed intake (kg)	2898.50^{a}	2504.75^{b}	2436.25^{b}	2380.25^{b}	1552.50^{c}	180.43	0.00
Daily feed intake (g)	51.76^{a}	44.73^{b}	43.50^{b}	42.50^{b}	31.05^{c}	22.55	0.00
Feed conversion ratio	1.94^{a}	2.49^{a}	2.22^{a}	1.98^{a}	3.83^{b}	0.37	0.01
Mortality (%)	0.00	2.50	2.50	5.00	7.50		

Means with no superscripts on the same row does not differ significantly ($p>0.05$), a, b: means with different superscripts on the same row differ significantly ($p<0.05$). SEM = Standard Error of Means, LSD, T_1=treatment one (maize 100:0cassava peel meal), T_2=treatment two, (maize 75:25cassava peel meal) T3=treatment three, (maize 50:50cassava peel meal) T4=treatment four, (maize 25:75cassava peel meal) $T_{5=}$ Treatment five, (maize 0:100cassava peel meal)

Table 4.0: Cost benefit of chickens fed with different dietary level of cassava peel meal.

Parameter	T1	T2	T3	T4	T5	SEM	p value
Cost of feed (₦/kg)	136.40^{a}	117.69^{b}	115.78^{c}	113.23^{d}	113.89^{e}	0.21	0.00
Cost of feed consumed/bird	407.76^{a}	443.30^{b}	281.28^{c}	269.45^{d}	176.56^{e}	0.06	0.00
Feed cost/weight gain (₦/kg)	271.84^{a}	444.30^{b}	258.53^{c}	224.18^{d}	392.77^{e}	0.48	0.00

a, b,c,d,e: Means with different superscripts on the same row differ significantly ($P<0.05$),S.E.M= Standard error of mean, LS= level of significance difference, T_1=treatment one (maize 100:0cassava peel meal), T_2=treatment two, (maize 75:25cassava peel meal) T3=treatment three, (maize 50:50cassava peel meal) T4=treatment four, (maize 25:75cassava peel meal) $T_{5=}$ Treatment five, (maize 0:100cassava peel meal)

CONCLUSION

The results obtained from this study indicates that broilers could be raised on cassava peel meal at inclusion level of 25%-75% without having any statistical adverse effect on the growth performance and proved to be

more economical in terms of economics of production, employing this level of inclusion will enable the farmer to maximize profit through reduction in cost of production

RECOMMENDATION

Based on the conclusion drawn from this study, it is recommended that cassava peel should replace maize up to 75% so as to minimize cost

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