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EVALUATION OF GROWTH PERFORMANCE AND CARCASS TRAITS OF BROILERS FED DRIED SWEET POTATOES PEEL AS A REPLACEMENT FOR MAIZE

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Abstract

A six-week study was carried out in Poultry Unit of Agricultural Research Farm, University of Delta, Agbor, to evaluate the replacement of dried sweet potatoes peel meal with maize on the growth performance and carcass quality of broiler birds. Dried sweet potatoes peel meal replaced maize at 0 (control), 10, 20, 30 and 40% levels.150 seven days old unisex broiler birds were used for the experiment, randomly allocated to the five dietary treatments with 30 birds each, replicated three times with 10 birds each in a completely randomized design (CRD). Feed and water were provided as *ad-libitum*. Growth performance of broiler chicks on average weekly weight gain was significantly ($p<0.05$) higher on diet 0% (179g) and 10 (175g) compared to other diets at 20 (143g), 30 (133g) and 40% (123g) respectively. Feed intake declined as the levels of diet increased from 0% (448g) to 40% (375.25g) respectively. Feed conversion ratio was better in diet 0% (2.50). Mortality percentage was lower in 10% (1.54) diet. Carcass characteristics and cut-parts were significantly better in 0% and 10% diets compared to 20, 30 and 40%. Therefore, 10% diet is recommended since it enhances better growth performance and carcass quality of broiler birds fed dried sweet potatoes peel meal compared to others diets.

Key words: Broilers, carcass, sweet potatoes, performance.

1.0 INTRODUCTION

In Nigeria, very low proportion of poultry farmers have access to cereals grains to be used as animal feeding, due to incessant increase in their price of recent time. The high cost of the cereals is also not sustainable and affordable for growing poultry industries that are depending totally on the conventional grains. High composition of humans, animals and biofuel industry depend on this feed resource that is aggravated by high cost and shortages of cereal grains (Moseri, *et al.*, 2020). The shortages of conventional ingredients such as maize is further escalated by natural disasters such as flood that has cause a lot of hazard and damages cost over seven hundred billion naira (FMARD, 2022) in all agricultural products within Nigeria. The existing composition is compromising

the availability, accessibility and affordability of poultry production and ancillary parts which has limited the expansion of the industry to consumer rate with the demands. The high cost and minimal use of cereal grains have reached a point where it is inheritable advocate for alternative food. Crop by-product are abundant in Nigeria but are not effectively utilized by livestock producers as a potential feeding stuff (Ayuk *et al.*, 2011). Onyekwere *et al*. (2008) recommended 20% sweet potato as dietary energy source in broiler chicken starter. Ayuk and Essien (2009) fed diets containing 0 to 50% sweet potato root meal to broiler chickens and observed increased body weight gain up to 40% inclusion. The residue such as dried sweet potatoes peel and by-products is being advocated as alternative feed for monogastric. It is therefore pertinent to identify those unharnessed by-products as an alternative energy source that have a potential to ameliorate the feed shortage which is posing a major challenge to the poultry industry and encourage the development of farmers in Nigeria. Thus, the study evaluated replacement of dried sweet potatoes peel meal with maize on the growth performance and carcass quality of broiler birds.

2.0 MATERIALS AND METHODS

2.1 Experimental location

The research was carried out at the Poultry Unit of the Teaching and Research Farm, Agricultural Education Department, University of Delta, Agbor. The farm is located in Ika South Local Government Area of Delta State, Nigeria.

2.2 Sources of materials

Sweet potatoes peels were sourced from small scale potato processors within Agbor. Sweet potatoes peels were washed and sun dried for seven days to reduce the moisture content. The peels were hammer milled to form sweet potato peel meal. Other ingredients were purchased from the feed dealers in Agbor.

2.3 Design, housing and management of experimental animals

A total of 150 seven day-old unsex Sabtech birds were used for the experiment and randomly allocated to five diets (0, 10, 20, 30 and 40% Dried sweet potatoes peel meals) replacement for maize in a completely randomized design (CRD). Each dietary treatment had 30 birds and replicated three times with 10 birds each. The birds were managed in deep litter housing system. Feed and water were provided *ad-libitum.* Drugs, vaccines and other routine management

Table 1: Composition of experimental diets

Ingredients	0	10%	20%	30%	40%
Maize	60.25	54.23	48.20	42.18	36.15
DSPPM	-	6.02	12.05	18.07	24.10
Soya beans	23.00	23.00	23.00	23.00	23.00
Fish meal	5.00	5.00	5.00	5.00	5.00
Blood meal	3.00	3.00	3.00	3.00	3.00
Wheat offal	5.00	5.00	5.00	5.00	5.00
Premix	0.50	0.50	0.50	0.50	0.50
Oyster shell	1.00	1.00	1.00	1.00	1.00
Bone meal	2.00	2.00	2.00	2.00	2.00
Salt	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00
Calculated Values					
Metabolizable energy (Kcal)	3150.35	3150.44	3130.25	3119.36	3111.51
Crude protein	21.87	21.86	21.86	21.85	21.85
Calcium	1.17	1.19	1.17	1.17	1.17
Phosphorus	0.86	0.85	0.84	0.83	0.82
Lysine	1.84	1.15	1.14	1.12	1.11
Methionine	0.47	0.64	0.62	0.60	0.59

practices were observed. The experiment lasted for 6 weeks.

2.4 Experimental diets

One phase experimental diet was formulated to meet the nutrient requirements of broiler according to recommended standard by NRC (1994) as presented in Table 1

2.5 Data collection

Birds were weighed at the beginning of the experiment and subsequent weights on weekly basis to determine the weight gained. Feed supplied and left over were also weighed daily which were used to determine the weekly feed intake, average weekly weight gain and feed conversion ratio. At six weeks three birds each were randomly selected per replicate and were weighed prior to slaughtering. Each of the birds was slaughtered by throat cut, bled and defeathered manually after scalding in warm water, abdomen was cut open and the lung, heart, liver, gizzard and kidney were removed. Birds were eviscerated for carcass evaluation. The dressed weight was determined and expressed as a percentage of the live weight. Total bone was obtained after removal of total edible meat from eviscerated weight and weight of bone. Cut up parts and internal organs were also weighed and

expressed as percentages of the live weight and percentage of mortality were all recorded.

$$\text{Mortality (\%)} \frac{\text{Dead birds/replicate}}{\text{No. birds stocked/ replicate}} \times 100$$

2.6 Statistical analysis

Data collected were analyzed with SAS (2003) package, and differences amongst treatment means were parted using Duncan's multiple range test (1955) as defined by Obi (2002).

3.0 RESULTS AND DISCUSSION

The results of the performance characteristic of birds fed dried sweet potatoes peel as a replacement for maize was presented in Table 2. Final weight ranged from 780g (40%) to 1116g (0%) inclusion levels. Average weekly weight gain ranges from 123g (40%) to 193g (0%). Feed intake was highest in 0% (448g) and least in 40% (375.25g), while feed conversion ratio was better in 0% (2.50) compared to other diets 10, 20, 30 and 40% with respective values of 2.54, 2.76, 2.93, and 3.05. Mortality percentage was highest in 40% (6.16) as against least in 0% (2.3). this result disagreed with Ayuk and Essien (2009) and Tamir and Tsega (2009) who observed no significant differences in the daily feed intake, weight gain, feed conversion ratio, and mortality rates of broiler chickens fed diets containing sweet potato as replacement for maize. Further in contrary with Ayuk and Essien (2009) that recommended 40% inclusion of sweet potatoes meal in broiler chickens as replacement for maize. However, the study is in tandem with the findings of Taiwo *et al*. (2005) and Akinmutimi and Anakebe (2008) who observed significant ($p<0.05$) differences in average weight gain, average feed intake and feed conversion ratio of Weaner rabbits fed sweet potato and yam peel meal. Carcass characteristics and cut-up parts of broiler birds fed dried sweet potatoes peel presented in Table 3, carcass traits such as breast, back and neck significantly ($P<0.05$) varied while eviscerated weight, abdominal fat, total bone, total edible meat, thigh, drum stick and wings show some level of similarity across the diets. Dressed percentage ranged from 589.00g (40%) to 970.00g (0%). Eviscerated weight increased from 429.00g (40%) to 779.00g (0%) while abdominal fat decreased from 20.22g (0%) to 8.46g (40%). Total bone was higher in10% (156.97g) and lower in 40%(103.32g).Total edible meat decreased from 0% (547.23g) to 40% (307.08g). Thigh ranged from 0% (63.33g) to 40% (33.62g). Drumstick followed the same trend from 0% (54.59g) to 40% (31.72g) while breast ranges from 40% (95.19g) to 0% (31.72g). Breast ranged from 0 % (186.49g) to 40% (95.19g).

Table 2: Performance characteristics of broilers fed dried sweet potato peels

Parameters	0	10%	20%	30%	40%	SEM (±)
Initial weight/ bird (g)	42	42	42	42	42	
Final weight of birds (g)	1116.00^{a}	1054.00^{b}	906.00^{c}	836.00^{d}	780.00^{e}	6.75
Av. weekly weight gain(g)	179.00^{a}	175.00^{a}	143.00^{b}	133.00^{c}	123.00^{d}	5.19
Av. weekly feed intake (g)	448.00^{a}	445.00^{a}	394.00^{b}	388.00^{b}	375.25^{c}	1.14
Feed conversion ratio	2.50^{a}	2.54^{a}	2.76^{b}	2.92^{b}	3.05^{c}	0.29
Mortality (%)	2.30	1.54	3.08	4.62	6.16	-

^{a,b,c,d,e} Means within the same row with different superscripts are significantly ($P< 0.05$) different, SEM: Standard error of mean.

Back reduces from 197.51g (0%) to 100.87g (40%) while neck ranged from 47.02g (10%) to 20.72g (40%). Wing decreased from 49.27g in10% to 28.20g (40%). Visceral organ weight such as heart, kidney, gizzard, lung and liver significantly ($P<0.05$) differed between 0% and 40% across with inclusion levels of dried sweet potatoes peel. Heart value recorded was highest in 10% (5.82g) and lowest in 40% (3.67g). Kidney ranged from 0% (7.46g) to 10% (6.20g) while gizzard increased from 40% (2.90g) to 10% (5.40g). Liver values of 18.58g, 16.28g, 15.75g, 16.91g and 13.46g were obtained for0, 10, 20, 30 and 40% respectively. 0% and 40% significant ($P<0.05$) varied in all the carcass traits measured which is regular with results attained in the growth indices; indicating that nutrients supplied by the dietary treatments were acceptable that translated into carcass traits in the broiler chickens. This result did not agree with Akinmutimi and Anakebe (2008) in full but in parts in terms of breast back and neck only while visceral organ weight shared similarity, whom observed significant ($p<0.05$) difference in carcass weight and visceral organ of Weaner rabbit. However, is in contrary with Beckford and Bartlett (2015) who observed no significance differences in the pre-slaughter weight, carcass weight, dressing percentage and retail cut-up parts of broiler chickens fed varying levels of sweet potato meal as replacement for maize.

4.0 Conclusion

From the results of the study, it can be concluded that dried sweet potatoes peel meal impact positively on the growth performance and carcass quality of broiler birds. Therefore, 10% diet is recommended since it enhances a better growth performance and carcass quality of broiler birds fed dried sweet potatoes peel meal compared to other diets.

Table 3: Carcass characteristic and cut-up parts of broiler birds fed dried sweet potato peels

Parameters	0%	10%	20%	30%	40%	SEM (±)
Live weight (g)	1116.00	1097.00	960.00	845.00	781.00	-
Dressed weight (g)	970.00^{a}	950.00^{a}	904.00^{b}	589.00^{c}	519.00^{d}	30.06
Eviscerated weight (g)	779.00^{a}	749.00^{a}	579.00^{b}	549.00^{c}	429.00^{d}	25.90
Abdominal fat (g)	20.27^{a}	19.94^{a}	12.87^{b}	11.67^{b}	8.46^{c}	1.08
Total bone (g)	146.32^{b}	156.97^{a}	126.60^{c}	110.27^{d}	103.32^{e}	1.14
Total edible meat (g)	547.23^{a}	512.32^{b}	393.93^{c}	377.95^{c}	307.05^{d}	20.40
Thigh (g)	63.30^{a}	55.04^{b}	45.52^{c}	45.97^{c}	33.62^{d}	4.70
Drumstick (g)	54.59^{a}	55.19^{a}	43.66^{b}	42.12^{b}	31.72^{c}	2.28
Breast (g)	186.49^{a}	172.19^{b}	146.22^{c}	126.27^{d}	95.19^{e}	2.01
Back (g)	197.51^{a}	171.95^{b}	131.82^{c}	116.54^{d}	100.87^{e}	8.23
Neck (g)	37.35^{b}	47.02^{a}	31.95^{c}	27.82^{d}	20.72^{e}	2.05
Wings (g)	48.04^{a}	49.27^{a}	38.62^{b}	38.11^{b}	28.20^{c}	1.51
Visceral organs weight						
Heart	5.29^{a}	5.82^{ab}	4.47^{ab}	4.32^{ab}	3.67^{bc}	0.45
Kidney	7.46^{a}	6.20^{ab}	6.90^{a}	7.09^{a}	6.26^{ab}	0.48
Gizzard	37.04^{a}	33.10^{a}	26.67^{b}	26.66^{b}	20.19^{ba}	1.97
Lung	5.40^{a}	4.44^{a}	3.57^{bc}	2.93^{cd}	2.90^{cd}	0.38
Liver	18.58^{a}	16.28^{b}	15.75^{c}	16.91^{b}	13.46^{d}	2.30

^{a,b,c,d,e} means within the same row with different superscripts are significantly ($P< 0.05$) different**,** SEM: Standard error of mean.

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