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Performance of Broiler Starter Fed Diets Containing Sweet Potato as a Substitute to Maize

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ABSTRACT

This study was conducted in the Poultry Research Unit, Federal University of Agriculture Zuru, Kebbi State, Nigeria. To determine the performance of broiler fed diets contain graded level of sweet potato (Ipomoea batata) meal (SPM) at 0%, (T1), 10% (T2), 20% (T3), and 30% (T4) were compounded respectively. In a four weeks experiment, one hundred and twelve (160) Ross 308 day old chicks were used in the experiment in a completely randomized design. The birds were grouped into four dietary treatments and replicated four times each treatment had 40 chicks and each replicate contain 10 chicks. From the parameter measured. Feed intake, body weight gain and feed conversion ratio. The results of final body weight, body weight gain and feed conversion ratio were significantly difference (P<0.05) for all the treatments. While results of initial weight and mortality showed there was significantly difference (P>0.05). Based on the results obtained in this study, it could be concluded that feeding broiler with sweet potato meal at 30% level of inclusion can substitute maize in the diets of broiler without adverse effects on their growth performance.

Keywords: Sweet potato, broiler performance, starter phase.

INTRODUCTION: Despite this economic importance broiler production is seriously affected by high cost of feeding which is the greatest challenge to Nigerian poultry farmers. Feed cost represent over 66% of the total cost, poultry feeding constitute about 70 – 80% of the recurrent cost of production, hence there is a need to utilize the alternative feed ingredients that are available in order to reduce feed cost and cost of poultry products as well as reducing the challenges of food insecurity and hunger worldwide, particularly in the developing countries like Nigeria which continued to received alternative from exports and governments (FAO, 2016).

Sweet potato is one of the tuber crop commonly grown in West Africa and besides it simple starches, it equally has a rich complex carbohydrates, dietary fibre and beta-carotene with moderate contents of other micronutrients, including vitamin B5 and B6 and as well as manganese (Babatunde and Oluyemi, 2000). Recent research shows that sweet potato ranked the highest among several other foods in terms of nutritional value. In addition their leaves are edible and can be prepared like spinach or turnip greens (Kwari, 2004). Maize and sweet potato have comparable metabolizable values of 14.5 and 14.8 respectively. The digestibility of sweet potato carbohydrates fraction was reported to be above 90% with level of starch increases with period of storage and instead of reducing sugars (Nwoke and Ugwu, 2011).
Though recent research indicated that, sweet potato has the ability to exhibit trypsin inhibitors activity which ranges from 20 – 90% inhibition. According to Food and Agricultural Organization of the Unite Nations the trypsin inhibitor levels present in sweet potato tubers are usually low and should not be cause for concern under practical situations (FAO, 2016).

However, a recent study carried out in Nigeria, recommended 27-50% levels of sweet potato in the starter and finisher diet respectively (Wholf, 2009). Another study reported that having replaced 50 -75% of maize in broiler feed with dried sweet potato flour without adverse effects on their growth (Kwari, 2004).

Materials and Methods: The Study Area: This research work was conducted in the Department of Animal Science, Federal University of Agriculture Zuru, the area is geographically located in the guinea savanna on the latitude 11^0 405N and longitude $5^0$2.39E of the equator (Baba *et al.*, 2013).

Experimental Birds: The birds used for this experiment were source from Zarm Farm in Oyo State in Nigeria. The strains used are *Ross 308* and was purchased at day old. One hundred and sixty (160) broiler chicks were used for this research.

Experimental Diets: The diets were compounded to include sweet potato at 0% (T1), 10% (T2), 20% (T3) and 30% (T4) (Table 1). Other ingredients in the diets was include maize, soya bean meal, groundnut cake, wheat offal, salt, bone meal, Limestone, lysine and premix. The sweet potato was obtained from Zuru central market. The sweet potato was sun dried for 7 days to remove the moisture content to the lowest level and grounded into smaller particles before mixing with other feedstuffs or ingredients.

Experimental Design: A completely randomized design (CRD) were used for the experiment and four (4) diets was formulated with different inclusion level of sweet potato, at 0%, 10%, 20% and 30% designated and tag T1, T2, T3 and T4 respectively. The birds were randomly divided into four treatment groups with 40 chicks in each group. Each treatment was replicated 4 times with 10 chicks per replicate. Each group was fed one of the experimental diets for 4 weeks. Feed and water were offered *ad-libitum*.

Data Collection: During the four (4) weeks of experimental period. Quantities of feed given and that of leftover was measure daily to compute feed intake while body weight changes of the birds was recorded weekly. Feed conversion ratio was determined by the fraction of feed intake and body weight gain.

Data Analysis: Data collected were subjected to analysis of variance (ANOVA). The mean was separated using Duncan multiple range test.

RESULTS AND DISCUSSIONS: At the end of the experiment, The initial body weight of the birds were 49, 49.00, 49.00 and 49.00 gram per bird (g/b) for T1, T2, T3 and T4 respectively ($P>0.05$) Final body weight differs significantly ($P<0.05$) between the treatment even though the value record for T4 (347.25) gram per bird (g/b) was higher than the values recorded T3 (332.25 g/b), T2 (322.25 g/b) and T1 (300.75 g/b). However feed intake of birds show that T4 (420.50) is significantly higher ($P<0.05$) than T3 (407.17), T2 (446.76) and T1 (489.30). Body weight of the birds were 298.25, 283.25, 273.25, and 251.7 (g/b) for T4, T3, T2 and T1 respectively ($P<0.05$). Feed conversation ration (FCR) was no significantly difference ($P>0.05$) between all the treatments were T1 (1.94), T2 (1.63), T3 (1.43) and T4 (1.40). The mortality flow the similar pattern ($P>0.05$) result showed there is no significant difference.

Table 1: Gross and chemical composition of the experimental diets at starter phase

Ingredient	T1(0% SPM)	T2 (10% SPM)	T3 (20% SPM)	T4(30% SPM)
Maize	50	40	30	20
Sweet potato	0	10.00	20.00	30.00
SBM	21.90	21.20	22.00	22.00
GNC	11.00	12.00	12.00	12.40
Wheat offal	11.00	11.00	10.00	9.50
Salt	0.30	0.30	0.30	0.30
Bone meal	3.40	3.10	3.30	3.40
Premix	0.25	0.25	0.25	0.25
Limestone	1.50	1.50	1.50	1.50
Methionine	0.30	0.30	0.30	0.30
Lysine	0.30	0.30	0.30	0.30
Total	100	100	100	100
Calculated chemical composition of diets				
ME(kcal/kg)	2900	2900	2900	2900
CP (%)	21	21	21	21
CF (%)	5.10	5.10	5.10	5.10
Calcium (%)	1.50	1.50	1.50	1.50
Phosphorus (Av.)	0.70	0.70	0.70	0.70

(Field Work, 2021). SBM (soya beans meal), GNC (groundnut cake), CP (crude protein), CF (crude fibre)

Table 2: Growth performance of broiler fed diets containing sweet potato at starter phase

Parameters.	T1	T2	T3	T4	SEM
Initial body weight (g/b)	49.00	49.00	49.00	49.00	0.4532
Final body weight (g/b)	300.75^{b}	322.25^{a}	332.25^{a}	347.25^{a}	17.8574
Body weight (g/b)	251.75^{b}	273.25^{a}	283.25^{a}	298.25^{a}	11.0863
Body weight (g/b/d)	8.99	9.75	10.11	10.65	1.46701
Feed intake (g/b)	489.30^{a}	446.76^{a}	407.15^{a}	420.50^{b}	15.2401
Mortality (%).	0.00	0.00	0.00	0.00	0.00
Feed conversation ratio	1.94^{a}	1.63^{b}	1.43^{b}	1.40^{b}	0.3033

^{abc} Means in the same row followed by different superscripts are significantly different at (P<0.05)

In the starter phase, the mean final body weights of birds fed dietary treatments showed there is significant (P<0.05) difference in final body weight, body weight gain and feed intake and feed conversion ratio among the treatments means. This is in agreement with several studies of (Adeyeye *et al* 2019; Obakanurhe and Okpara 2016; Unigwe *et al* (2014) on sweet potato leaf meal (15SP inclusion) which showed significant (P<0.05) difference between the treatment means of birds on final weight, weight gain, feed intake and feed conversion ration respectively. The declining values recorded in weight gain as inclusion levels increased beyond 10% SP is in line with this present study (Wude and Berhan, 2009). There was a marginal increase in body weight that ranged from 1.18kg – 1.25kg. However, treatments 0% SP and 30% SP recorded the highest and least values of 347.25g/b and 300.75g/b respectively. The values recorded in weight gain are in agreement with separate trial on broiler starter chickens fed with varying levels of sweet potato (Ipomoea batata) root meal (SPRM) (Jiwuba *et al.*, 2016). During the starter phase, feed intake results recorded ranged from 407.15g – 489.30g. It was observed that treatment (T3) 20%SPM and (T1)

0% SPM recorded the highest and lowest mean values among the treatment means. This aligned with the reports of several researchers which stated that younger birds tend not to digest fiber beyond 10% inclusion levels, since their digestive tract is still tender for the metabolic and enzymatic processes in their digestive system (Jiwuba *et al* 2016; Obakanurhe and Okpara, 2016; Adeyeye *et al* 2019). The best feed conversion ratio value observed in Treatment (T4) 30% SP (1.40) across the dietary treatment with treatments 1.94 (0% SPM) .1.63 (10% SPM. and 1.43 (20% SPM respectively is in line with the ranged reported by (Jiwuba *et al* 2016) that used sweet potato root meal with lower energy compared to maize. At higher inclusion level of the SP in the diets, a corresponding decline in energy levels of the diets was observed. In the starter phase, the higher FCR at 30SP was an indication that the diet had higher fibre content that stimulated its feed intake to meet up with its normal energy and protein requirements which will therefore correspond to excretion of metabolic wastes.

SUMMARY, RECOMMENDATION: A study was conducted in the Poultry Research Unit, Federal University of Agriculture Zuru, Kebbi State, Nigeria. To determine the performance of broiler fed diets contain graded level of sweet potato (Ipomoea batata) meal (SPM) at 0%, (T1), 10% (T2), 20% (T3), and 30% (T4) were compounded respectively. In a four weeks experiment, one hundred and twelve (160) Ross 308 day old chicks were used in the experiment in a completely randomized design. The birds were grouped into four dietary treatments and replicated four times each treatment had 40 chicks and each replicate contain 10 chicks. From the parameter measured. Feed intake, body weight gain and feed conversion ratio. The results of final body weight, body weight gain and feed conversion ratio were significantly difference ($P<0.05$) for all the treatments. While results of initial weight and mortality showed there was significantly difference ($P>0.05$). Based on the results obtained in this study, it could be concluded that feeding broiler with sweet potato meal at 30% level of inclusion can substitute maize in the diets of broiler without adverse effects on their growth performance. However it is recommended that, further investigation should be carried but determine, Inclusion level of sweet potato meal should be conduct in the study area in order to ascertain optimum inclusion level in a poultry diets.

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