REPLACEMENT VALUE OF CASHEW NUT WASTE AT GRADED LEVELS FOR MAIZE IN GROWTH PERFORMANCE AND CARCASS CHARACTERISTICS OF BROILER CHICKENS

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ABSTRACT
The effects of replacing maize with cashew nut waste (CNW) at graded levels, on the growth and carcass characteristics of broiler chickens were investigated. CNW was incorporated into the broiler starter and then finisher diets that were used, at 0, 25, 50, 75 and 100% of dietary maize on weight basis. One hundred and five (105) chicks were used for the experiment. They were randomly allocated into five (5) dietary treatments with three (3) replicates of 21 chicks each for a 42-day feeding trial. Results indicated that broilers chicks fed CNW at 25% had similar weight with that of control. The body weight gain and feed intake were significantly different (P < 0.05), 0 and 25% CNW had the highest feed intake, while 100% CNW had the lowest, significantly (P < 0.05). The weight of shank, back and breast were significantly different (P < 0.05), while those of thigh, neck, and wing were not. The results showed that CNW could be incorporated up to 25% in broiler chicken diets without adverse effect on growth performance and carcass characteristics.
Keywords: Cashew nut waste, growth performance, replacement, carcass characteristics.

INTRODUCTION

One of the major constraints of sustainable commercial poultry production, has been the high cost of conventional feed stuffs (Apata and Ojo, 2000), especially maize and soya beans, this coupled with increasing times of scarcity of these due to an added challenge posed by competition for them by man has necessitated attempts by animal nutritionists to seek for locally available alternatives that are cheaper and able to replace them (Tona, 2018). These are referred to as unconventional feedstuffs, they include agro-industrial by-products such as cassava peels, rice bran and cashew nut testa (Donkoh *et al*., 2012, Ghomsi *et al*., 2017, Fanz *et al*., 2018, Pangeran *et al*., 2021).

The usefulness of cashew nut waste has been demonstrated both as a replacement for maize and for soyabean meal at different levels (Odunsi, 2002; Sogunle *et al*., 2006; Fernandes *et al.*, 2016; Yusuf and Aliy-Paiko, 2020). The objective of this study is therefore to evaluate the maximum level of inclusion that can be tolerated by broiler chickens up to 100% level, more so as cashew nut waste is known to contain anti-nutritional factors such as tannins, saponins, etc. which have been found to significantly affect growth, feed intake and reproduction in animals (George, 2002).

MATERIALS AND METHODS

The experiment was carried out at the Poultry Section (Broiler Unit) of the Teaching and Research Farm, Kwara State University, Malete, Kwara State in the Guinea Savannah ecological zone of Nigeria, with an average day time temperature of 23 - 36°C relative humidity of 60 – 80% on latitude 8.6082°N and longitude 4.4723°E.

Source of Cashew Nut Waste

The cashew nut waste was collected from the cashew nut processing factory behind Onimago Motors, Ilorin, Kwara State, Nigeria. The waste consisted mainly of testa and broken nuts waste was obtained after the peeling stage, separation of the nuts from the other parts using 1mm, 1.5mm and 2mm sieves and handpicking for accuracy.

Chick Diet, Management and Experimental Design

One hundred and five (105) unisex day old Abor acre broiler chicks were purchased from Zartech Farm, Ibadan, Oyo State. They were grouped into five (5) with each having three (3) replicates with seven chicks; in a completely ransomised experimental design (CRD). Five (5) diets were formulated, starter (Table 1) and finisher (Table 2), the cashew nut waste inclusion levels were 0, 25, 50, 75and 100. The chicks were fed for 42 days.

Data Collection

(a) Feed Intake (kg/bird/day)

Feed was weighed daily and the leftovers were weighed. Feed consumed was calculated by subtracting the amount leftover from that given. The weekly average consumed was calculated for each treatment by dividing the total amount of feed consumed by the number of birds in each treatment.

(b) Weight Gain

The birds were weighed in each treatment at the beginning of the trial and the weight recorded as initial weight. They were weighed subsequently weekly and the weight gain were obtained by subtracting the value of the body weight of one week from that of the previous one.

(c) Feed Conversion Ratio

This was calculated by dividing feed intake by the weight gain.

Carcass Evaluation

Two birds were taken by random sampling from each treatment at the end of the 42 days trial and slaughtered by cervical dislocation, and the carcass weight was recorded after defeathering.

The organs for evaluation (liver, heart, and gizzard) were obtained after dressing the carcass weighed, and the weights were recorded.

Chemical Analysis

The proximate analysis of the cashew nut waste was determined using the AOAC (2000) method of analysis.

Statistical Analysis

Data collected were subjected to a One Way ANOVA. Means were separated using Duncan's Multiple Range test (1955) at ($P < 0.05$) level of significance.

RESULTS AND DISCUSSION

The result of the proximate analysis of the cashew nut waste Table 3 indicated that it contains 18.65% Ash, 28.22% ether extract and 39.81% NFE.

Proximate composition of test ingredient (cashew nut waste) contains dry matter 92.75%, crude protein 18.65%, crude fibre 2.79%, ether extract 28.22%, ash 3.06%, moisture content 7.25%, and nitrogen free extracting 39.81%.

The percentage crude fibre of cashew nut waste is higher compared to that of maize at 2.79, the metabolizable energy of maize is lower than that of cashew nut waste of 3434 – 3729 (kcal/kg). The crude protein of cashew nut waste is also higher that that of dietary maize, 18.65 to 8.9% the fat content of CNW is higher than that of maize 28.22 to 4%.

Table 1: Effect of CNW on growth performance of Broiler chickens

	Levels of CNW in diet %				
Parameters	0	25	50	75	100
Initial body weight	32	37	35	36	34
Final body weight	1800	1880	1500	1400	767
0 – 21 days weight gain (g/d)	31.14^{a}	31.18^{a}	23.72^{b}	22.91^{b}	22.49^{b}
Feed intake (g/d)	41.06^{a}	40.83^{a}	30.56^{b}	30.21^{c}	24.56^{d}
Feed converion22 to 42 days	1.3	1.3	1.28	1.32	1.31
Weight gain (g/d)	47.08	44.51^{a}	37.11^{c}	24.14^{c}	111.29^{d}
Feed intake (g/d)	137.06^{b}	146.49^{b}	133.54^{c}	112.32^{d}	86.65^{c}
Feed conversion 0 to 42 days	2.91	3.29^{d}	3.59^{c}	4.65^{b}	7.65^{b}
Weight gain (g/d)	39.11^{a}	37.85^{a}	30.19^{b}	23.52^{c}	16.89^{d}
Feed intake (g/d)	89.06^{d}	93.66^{a}	82.05^{c}	71.26^{d}	58.10^{c}
Feed conversion	2.27^{a}	2.47^{d}	2.71^{c}	3.02^{b}	3.43^{d}

Values in the row with the same letters do not differ significantly at ($P < 0.05$)

The average feed intake, body weight gain and feed to gain ratio by broiler chicks are presented on Table 5. The performances of the broiler chicks did not differ among the treatment groups during the

starter period but did significantly at the finisher phase over the 42 days trial period, the weight gain per bird for birds on 25% CNW were superior ($P < 0.05$) to that of the other treatments.

Carcass Characteristics

The live and carcass weights of broiler chickens fed on 0% and 25% CNW were higher and significantly different ($P < 0.05$) from those on the other treatments. The weights of head and internal organs (gizzard and heart) of the experimental birds were not significantly different ($P < 0.05$) except for that of liver which showed significant difference for birds fed 0%, 75% and 100% CNW.

Table 2: Effect of dietary levels of CNW on Carcass Characteristics of broiler chickens

	Levels of CNW in diet %				
Parameters	0	25	50	75	100
Live weight (kg)	1.96[a]	1.90[a]	1.43[b]	1.16[c]	0.71[d]
Carcass weight (kg)	1.88[a]	1.86[a]	1.41[b]	1.12[c]	0.66[d]
Thigh (%)[a]	23.69	22.95	21.43[b]	17.36[c]	17.57[c]
Breast (%)[a]	15.25[a]	14.94[b]	10.67[d]	12.36[c]	12.23[c]
Head (%)[b]	3.11	3.31	3.59	3.59	4.22
Liver (%)[b]	1.77[d]	2.1[cd]	2.34[c]	3.01[a]	2.94[b]
Gizzard (%)[b]	1.79	2.1	2.22	2.16	2.84
Heart (%)[b]	0.57	0.59	0.56	0.56	0.54

[a] Percentage computed as a ratio of carcass weight[b] Percentage computed as a ratio of live weight
Different superscripts on means within row indicate significant difference ($P < 0.05$).

DISCUSSION

Proximate Composition of Cashew Nut Waste

The moisture content of obtained for the cashew nut waste was similar to that reported by Ojewola *et al* (2004); ash was the same with that of cashew nut (Akande *et al*, 2015), the crude fibre and crude protein were however higher than that of cashew nut and lower than that of cashew nut shell, 0.16 – 3.2 and 33.4 – 49.1 respectively (Lima *et al*., 2004). The ether extractives content is appreciably high (28.22%) but lower than that reported by Karikari *et al*. (2022) at 39% for cashew kernel meal, the value is in agreement with findings of Odunsi (2022), Ojewola (2004) substantiated by Akande (2015) that cashew kernel meal can be a high energy feedstuff for poultry. The crude protein content of 18.65% is lower than 38.42% obtained by Ojewola (2004) for cashew kernel meal, and 25% by Aremu (2006) but is higher than that of maize, and close that of Famima (2004) confirming that it can be a moderate source of protein as reported by Fermandes *et al* (2016).

Growth Performance of Broiler Chickens

Feed intake was significantly different ($P < 0.05$) between the control and birds fed on 25% CNW and those on 50%, 25% and 100%. There was a decline with increasing level of CNW, in agreement with the findings of Akande *et al* (2015) that feed intake for all diets was significantly different and growth rate decreased with increasing levels of cashew nut waste. This is most probably due to a combination of the high caloric density due to the high fat content of the CNW since chickens are said to feed to satisfy their energy requirement (Leeson *et al.,* 1997) and the presence of antinutritional factors, such as tannin which is known to depress feed intake (Ortiz, 1994). Final body weight and weight gain were higher and significantly different ($P < 0.05$) for both the birds on control and 25% CNW than for other treatments both at the starter and finisher phases, this suggests that the birds were able to convert feed to muscle for all treatments but those on treatment beyond 25% CNW inclusion were limited by the presence of the antinutritional factors in CNW. This agrees with the reports of Ortiz (1994), that chicks fed on tannin-containing diets exhibited high mortality and significantly decreased body weights as well as lowered fed intakes and higher feed intake: weight gain ratios.

Effect of Cashew Nut Waste on Carcass Characteristics

The live and carcass weights were higher similar for both the broiler chicks on control and 25% CNW and significantly different from those on the other treatments. There was significant difference in the weight of the liver, weight of liver decreased with increased levels of inclusion of cashew nut waste; this is in congruence with the report of Ortiz (1994) who observed that histopathology of the liver of both chicks and rats showed hydropic degeneration of hepatocytes clearly more severe in the former

than in the latter when fed diets containing tannin, and the gizzard and heart were not affected. The results of this study confirmed this as there were no significant differences for the weights of the other organs (gizzard, heart, head).

CONCLUSION

The results of this study show that cashew nut waste can be used to replace maize in broiler chicken starter and finisher diets without adverse effects up to 25% inclusion level.

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