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Outcome of Different Levels of Toasted Baobab Seed Meal on Growth Performance of Broilers Chickens

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Abstract
The present study was carried out with one hundred and eighty day (180) old broiler chicks to examine the outcome of using different levels of toasted baobab seed meal (TBSM) in the diet of broilers on their growth performance. The study had six dietary treatments as: Treatment 1 (T_1) had no baobab seed meal, Treatment 2 (T_2) contained 2.5% toasted baobab seed meal, Treatment 3 (T_3) contained 2.5% raw baobab seed meal, Treatment 4 (T_4) contained 5.0% toasted baobab seed meal, Treatment 5 (T_5) contained 7.5% toasted baobab seed meal and Treatment 6 (T_6) contained 10.0% toasted baobab seed meal. Each treatment had thirty (30) broiler chicks divided into three equal replicates in a completely randomized design. The study lasted for forty-nine days in a deep litter system and growth performance data were analyzed for both phases of production using SPSS version 19 of 2010. Dietary treatments produced significant ($p<0.05$) effect on all the parameters evaluated except protein intake and mortality percentage at starter phase and significant differences only existed for daily feed intake, final live weight and protein intake at the finisher phase of production. Diets containing TBSM up to 10% levels of inclusion brought efficient growth performance in broiler chickens with an average weight range of 2933.33-3146.67g/bird. The inclusion levels of toasted baobab seed meal up to 10% caused improvement in the body weight of broiler chickens.

Keywords: Baobab, toasted, broilers, growth, performance

Introduction

Martens *et al.* (2013) reported that the current state of poultry production in the developing regions is incapable of meeting the current protein needs of the masses to talk of meeting future demand. The major problem facing poultry industry in the developing countries Nigeria inclusive is high cost of conventional feedstuffs like soya bean and groundnut cake due to undue competition for conventional feedstuffs among human, livestock and industrial users making poultry business unproductive.Baobab seed contributed to the livelihood of many African'scan be classified as both protein, oil-rich and known to have a crude protein content of about 20-36% and energy content of 3000 – 4500Kcal/kg (Osman , 2004 and Nkafamiya *et al.,* 2007). Hence, nutritional studies on low-cost and locally available indigenous leguminous plants in tropical countries like Nigeria using toasting as a processing method could help in reducing anti-nutrients, cost and maximize profit on poultry farming as this will cause improvement in the poultry sector, there by create more job opportunities and increase protein intake of an average Nigerians.

The main objective of this study was, to determine the inclusion level of toasted baobab seed meal (*Adansonia digitata)* in broiler chicken diets at both starter and finisher phases of production.

Materials and Methods

The research was conducted at Poultry Unit of Plateau State College of Agriculture, Garkawa, Nigeria from December, 2014 to January, 2015. Garkawa town is located on latitude 8^0 58' E and longitude 9^0 45' N, with an elevation of 240m above sea level determined using Global positioning system (GPS) (Guluwa, 2014).Baobab seed *Adansonia digitata* were bought from Dawaki market of Kanke Local Government Area of Plateau State, Nigeria. The seeds were soaked in water for 24 hours, sun-dried for 72 hours, toasted, milled and sieved to obtain toasted Baobab seed meal (TBSM) to replace soya bean full fat (SBFF) on protein equivalent basis. The study had six dietary treatments as presented in Table 1.A total of one hundred and eighty (180) day-old broiler chicks were purchased from Zartech farm Jos and raised in a deep litter system pen measured 1.30 × 1.87 m ina completely randomized design. Vaccination, feeding and other management protocol were given at when due for 28 and 21 days respectively for starter and finisher phases. Parameters evaluated for the study were weekly live

weight and feed intake and weight gain, feed conversion (FCR), protein intake and protein efficiency ratio (PER) were determined through calculation and mortality were recorded as noticed.

Data collected was subjected to one-way analysis of variance (ANOVA) using the Statistical Package for Social Sciences (SPSS version 19 of 2010), (SPSS, 2010). Where significant differences were prominent, the means were separated using the Duncan's Multiple Range Test of SPSS (2010).

Table 1: Ingredients and composition of broiler starter and finisher diets containing toasted baobab seed meal.

Ingredients	Broiler starter diets						Broiler finisher diets					
	T_1	T_2	T_3	T_4	T_5	T_6	T_1	T_2	T_3	T_4	T_5	T_6
Maize	47.49	46.58	46.58	45.68	44.76	43.91	51.50	50.56	50.56	49.67	48.73	47.82
SBFF	14.09	12.50	12.50	10.90	9.32	7.67	25.00	23.61	23.61	22.00	20.44	18.85
TBSM	0.00	2.50	2.50	5.00	7.50	10.00	0.00	2.50	2.50	5.00	7.50	10.00
FM	1.60	1.60	1.60	1.60	1.60	1.60	0.50	0.50	0.50	0.50	0.50	0.50
GNC	26.00	26.00	26.00	26.00	26.00	26.00	10.00	10.00	10.00	10.00	10.00	10.00
R/O	1.52	1.52	1.52	1.52	1.52	1.52	3.00	3.00	3.00	3.00	3.00	3.00
W/O	4.00	4.00	4.00	4.00	4.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00
Palm oil	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.50	0.50	0.50	0.50	0.50
Bm	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20	2.20
Salt	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Lysine	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Meth	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
L/S	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100	100	100	100	100	100	100	100
Calculated nutrients												
CP	23.00	23.00	23.00	23.00	23.00	23.00	20.00	20.00	20.00	20.00	20.00	20.00
M.E Kcal/kg	2950.87	2941.87	2941.87	2932.88	2923.86	2914.28	3003.18	2999.75	2999.75	2990.78	2981.73	2972.73
CF	3.09	3.11	3.11	3.14	3.17	3.20	3.28	3.32	3.32	3.34	3.37	3.39
EE	6.59	6.90	6.90	7.21	7.51	7.82	8.28	8.62	8.62	8.93	9.23	9.53
Ca	1.28	1.28	1.28	1.28	1.27	1.27	1.33	1.33	1.33	1.33	1.32	1.32
P	0.67	0.67	0.67	0.65	0.65	9.64	0.72	0.71	0.71	0.70	0.69	0.68

T_1 = Control diet without baobab seed meal, T_2 = Diet containing 2.5% toasted baobab seed meal, T_3 = Diet containing 2.5% raw baobab seed meal, T_4 = Diet containing 5.0% toasted baobab seed meal, T_5 = Diet containing 7.5% toasted baobab seed meal, T_6 = Diet containing 10.0% toasted baobab seed meal, TBSM = toasted baobab seed meal, RBSM = raw baobab seed meal, SBFF = Soya bean full fat, FM = fish meal GNC = Ground nut cake, R/O = rice offal, W/O =wheat offal, BM = bone meal, meth = methionine, L/S = limestone, CP = crude protein, M.E = Metabolisable energy, CF = crude fibre, EE = ether extract, Ca = calcium, P = phosphorus

Results and Discussion

Result presented on Table 2 discloses the effect of TBSM on broiler chick at twenty eight (28) day-old. Feed intake in this study was not affected as the replacement value of TBSM increased from 2.5 – 10.0%. The similarity in feed intake for all the dietary groups quantified the palatability of the diets by the birds.

Table 2: Effect of broiler chicks fed toasted baobab seed meal

Performance indices	Dietary treatments						SEM
	T_1	T_2	T_3	T_4	T_5	T_6	
Initial weight g/bird	115.00^{ab}	109.67^{ab}	108.33^{ab}	108.00^{ab}	105.00^{b}	116.33^{a}	1.45^{*}
Daily feed intake	74.16	80.76	84.71	78.71	78.71	73.73	1.52^{NS}
Final live weight (g/bird)	1561.67^{ab}	1633.33^{a}	1648.33^{a}	1313.33^{b}	1460.00^{ab}	1340.00^{b}	37.74^{**}
Daily body weight gain (g/bird)	52.62^{ab}	54.42^{a}	55.00^{a}	43.05^{c}	48.39^{abc}	43.70^{bc}	1.37^{**}
Feed conversion ratio	1.42^{a}	1.49^{a}	1.54^{ab}	2.21^{b}	1.62^{ab}	1.69^{ab}	0.08^{*}
Protein intake	17.21	18.57	19.48	18.10	18.10	16.96	0.36^{NS}

Protein efficiency ratio	3.10[a]	2.94[ab]	2.85[ab]	2.38[b]	2.67[ab]	2.64[ab]	0.08[*]
Mortality (%)	1.00	0.00	1.00	0.00	0.00	0.00	0.23[NS]

[*a, b, c] Means on the same row with different superscripts are significantly different (p<0.05) (p<0.01). NS = Not significant (p>0.05), SEM = Standard error of mean, T_1 = Control diet without baobab seed meal, T_2 = Diet containing 2.5% toasted baobab seed meal, T_3 = Diet containing 2.5% raw baobab seed meal, T_4 = Diet containing 5.0% toasted baobab seed meal, T_5 = Diet containing 7.5% toasted baobab seed meal, T_6 = Diet containing 10.0% toasted baobab seed meal, TBSM = toasted baobab seed meal, RBSM = raw baobab seed meal.

This could be defensible by the fact that toasting as a processing method reduces the level of anti-nutrient, that argue why feed intake for broilers chicks fed TBSM was statistically similar with those on the control diet. Nonetheless, daily feed intake for starter phase ranged from 73.73 – 84.71 g/bird. Feed intake is seen as a major factor that induced body weight gain and feed conversion in animals that are used for producing meat.

The dietary treatments were highly significant (p<0.01) on final live and daily body weight gain of broiler starter. Broiler chicks fed dietary treatments T_1, T_2, T_3 and T_5 were highly significant (p<0.01) heavier in terms of final live and body weight gain over those fed diets T_4 and T_6, respectively. The influence of diets containing TBSM on feed conversion ratio, had a significant (p<0.05) effect. However, feed conversion ratio by the chicks fed diets T_2, T_3, T_5 and T_6 compared favourably with the control diet (T_1). The low feed conversion ratio was due to the fact that TBSM was sieved to remove the hard coats which contain high fibre that may lessen growth performance.No significant (p>0.05) effect was noticed for protein intake, this allude to the factthat broiler chicks place on TBSM was able to utilize the protein in the feed competently as the birds in the control groups. Since feed intake was statistically similar with the control diet, it also meansthat toasting as a processing method reduced anti-nutrient and increased sweet smelling aroma for diets that contained TBSM as these improve its utilization to increase protein intake of birds in the tropics.

Increased in the replacement of TBSM for dietary treatments T_2, T_3, T_5 and T_6 were significantly (p<0.05) similar, except T_4 that had the lowest protein efficiency ratio. This suggests that TBSM may be a very good source of protein in broiler chicken nutrition, since the final live and weight gain in this study was almost comparably with 1327.2 – 1589.0 g/bird of broiler finisher chicken fed diets containing sweet orange peel meal soaked in water for 0 – 72 hours (Guluwa, 2014). Mortality recorded was not significantly (p>0.05) across dietary treatments groups as replacement value of TBSM increased from 2.5 – 10.0% for both phases of production. These also recommend that the processing method was sufficiently good for this study.

Presented in Table 3 below is the performance of broiler finisher fed toasted baobab seed meal. The daily feed intake in this study varied from 158.30 – 175.56 g/bird and significantly (p<0.05) different as the replacement value of TBSM increased. The final live weight of 2933.33 – 3146.67 g/bird was significant (p<0.05) as substitution value of TBSM increased. This shows that TBSM up to 10% can be used as an alternative dietary protein feed resource. Daily body weight gain were not significantly (p>0.05) affected by TBSM. This proposes that baobab seed meal toasted and sieved could be used as a replacement for soya bean full fat in broiler chicken diets. Low value of feed conversion ratio in this study yielded high body weight of 2933.33 – 3146.67 g/bird within seven (7) weeks of age.

Table 3: Effect of broiler finisher chickens fed toasted baobab seed meal

	Dietary treatments						
Performance indices	T_1	T_2	T_3	T_4	T_5	T_6	SEM
Initial records (g/bird)	1680.00	1680.00	1673.33	1673.33	1686.67	1680.00	3.78[NS]
Daily feed intake (g/bird)	160.62[b]	158.30[b]	167.86[ab]	162.56[ab]	162.79[ab]	175.56[a]	2.06*
Final live weight (g/bird)	2943.33[ab]	2933.33[b]	2963.33[ab]	3040.00[ab]	3066.67[ab]	3146.67[a]	28.32[*]
Daily weight gain (g/bird)	1263.30	1253.33	1290.00	1366.67	1380.00	1466.67	28.45[NS]
Feed conversion ratio	0.13	0.13	0.13	0.12	0.12	0.12	0.00[NS]
Protein intake	32.12[ab]	31.66[b]	33.57[ab]	32.51[ab]	32.56[ab]	35.11[a]	0.41[*]
Protein efficiency ratio	39.25	39.81	38.67	44.98	42.62	41.79	0.88[NS]
Mortality (%)	1.00	0.00	1.00	0.00	0.00	0.00	0.23[NS]

*a,bMeans on the same row with different superscripts are significantly different (p<0.05) NS = Not significant (p>0.05), SEM = Standard error of mean, T_1 = Control diet without baobab seed meal, T_2 = Diet containing 2.5% toasted baobab seed meal, T_3 = Diet containing 2.5% raw baobab seed meal, T_4 = Diet containing 5.0% toasted baobab seed meal, T_5 = Diet containing 7.5% toasted baobab seed meal, T_6 = Diet containing 10.0% toasted

baobab seed meal, TBSM = toasted baobab seed meal, RBSM = raw baobab seed meal, % = Percentage, g = gram

The similarity in feed conversion ratio elucidated the usefulness of TBSM to improve feed value and show how well the birds utilized feed for weight gain. Feed was converted more efficiently by the bird fed up to 10% TBSM. It was also observed in this study that protein intake had the same direction of significant ($p<0.05$) different with daily feed intake. This described the relationship between feed intake and protein intake, because feed consumed was utilized in building body tissues which reflected in high body weight that is statistically similar with the control diet. Toasting employed as a processing method could improve the availability of nutrients in the seed. Non-significant ($p>0.05$) different for protein efficiency ratio (PER) shows the number of gram of body weight gain of broiler chicken per unit of TBSM consumed as protein was utilized for body weight at seven weeks which ranged from 2933.33 – 3146.67 g/bird.

Conclusion and Recommendation

This study established that toasted Baobab seed meal offer higher body weight at seven weeks of age. For that reason, diets containing TBSM up to 10% levels of inclusion could bring about competent growth in broilers chickens which advancesthe practicality of livestock production. Sieving baobab seed meal also promote feed conversion ratio which is translated into body weight gain because the seed coat discarded through sieving contain more of the ant-nutrient.

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