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CARCASS CHARACTERISTICS OF BROILER CHICKENS FED DIETS CONTAINING BOABAB (*Adansonia digitata*) SEED MEAL AS REPLACEMENT FOR METHIONINE AND LYSINE

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ABSTRACT

The effects of feeding baobab seed meal (BSM) as a replacement for synthetic methionine and lysine (SML) on carcass characteristics of broiler finisher chickens was carried out in a 28-day feeding trail. A total of 180 four-weeks old broiler chicks (Cobb 500) were randomly allotted into 5 treatments of 36 birds comprising 3 replicates of 12 birds each in a complete randomized design (CRD). The diets were formulated to be isocaloric (3000 kcal/kg) and isonitrogenous (19 % crude protein) with BSM included at 0, 25, 50, 75 and 100 % replacing SML. Birds were reared in a deep litter system and fed experimental diets and watered at all time. Standard routine management practices were strictly observed. The result indicated significant (P<0.05) increase in the weights of breast bird (23.38, 15.94, 21.15, 25.22 and 21.20%) and liver weight (2.90, 5.52, 7.84, 6.22 and 4.51%) for birds fed on baobab seed meal. Birds fed diets containing 75 % BSM replacing methionine and lysine had higher breast weights (25.22%) than those fed control and other treatments diets. Similarly, birds fed 50 %BSM had higher liver weight (7.84%) than those fed on control and other treatment diets. Other parameters measured showed no significant (P>0.05) variation by the level of BSM inclusions in the diets. It is concluded that baobab seed meal should be included in the diets of broilers up to 75% replacement of synthetic methionine and lysine.

Keywords: Baobab, Broiler Finisher, Carcass characteristics, Synthetic Additives.

INTRODUCTION

The continuous folding up many commercial poultry farms in Nigeria have been attributed to high cost of poultry feeds (Ogundipe, 2002). Consequently, this has led to low protein intake below the recommended daily animal protein intake of 35g (Ari *et al.*, 2016). The reason for this backward trend in the production of poultry is the high cost of conventional feed ingredients and the high cost and non-availability of synthetic additives. Therefore, poultry value chain actors are challenged to search for alternative replacement of both conventional feed resources and the synthetic additives used in the feed industry. It should be noted that this replacement must lead to reduction in cost of feed ingredients as well as reduce stiff competition between livestock and man for these ingredients thereby making it economically viable for a profitable poultry business to strive and also to enhance their production efficiency (Ari *et al.*, 2016). Methionine and Lysine constitute the major additives in poultry diets that are exogenously supplied. These amino acids are required at higher levels to meet the increased tissue and egg demands of a bird predisposed to fast growth along with high production performance (Halder and Roy, 2007). Methionine is usually limiting in the diets of broilers and layers and therefore need to be supplemented (Fancher and Jensen, 1989). The supply of these essential additives is affected by many factors such as high cost and non-availability, storage and adulteration, etc. Therefore, reduction in the cost of synthetic feed additives and the increase of supply in the diets for poultry is a concern to researchers. Baobab tree (*Adansonia digitata*) is a drought and fire resistant tree that is found in most parts of Africa including the desert (FAO, 1988). This tree produces all year round in the savanna and derived savanna area of Nigeria. The

leaves are used for soup in the drier parts of Nigeria, and the seeds even though underutilized is rich in protein and contains substantial amount of energy (Mwale *et al*., 2008) while the fruit pulp is rich in vitamin C and contain appreciable amount of methionine and lysine (Sidibe *et al*., 1998). It can serve as suitable alternative to synthetic methionine and lysine in the diets of broilers in view of the values of these essential amino acids (Sidibe *et al*., 1996).

MATERIALS AND METHODS

Experimental site: The experiment was conducted at the Teaching and Research Farm of the Department of Animal Science, Faculty of Agriculture, Nasarawa State University Keffi, Shabu -Lafia Campus.Shabu-Lafia is located in the Southern Guinea Savannah Zone of Nigeria on Latitude $8^0$35' N and longitude $8^0$33'E. The average minimum temperature is 23^0C and maximum temperature is 36.9^{0}C; Mean monthly relative humidity is 74 %. The mean annual rainfall is 823mm and the mean monthly temperature is 35.06^{0}C (NIMET, 2019).

Processing of Baobab seeds to seed meal:Baobab seeds were collected within Kokona Local Government Area of Nasarawa State, Nigeria. The seeds were removed from the pods, sorted, dried and then hammer-milled to obtain baobab seed meal (BSM). The crushed sample was then analysed for its proximate and amino acid compositions.

Laboratory analyses:Proximate compositions and the amino acid profiles (Table 1) of the test ingredients were determined using the procedure outlined by AOAC (2010) as described by Alu *et al* (2018).

Table 1. Proximate composition and amino acid profile of baobab seed meal

Proximate composition		Amino acid profile	
Nutrients	**(%)**	**Essential amino acids**	**(%)**
Crude protein	20.23	Lysine	2.94
Crude fibre	7.54	Leucine	14.39
Ether extract	25.00	Valine	2.24
Ash	7.27	Isoleucine	17.47
Moisture	5.41	Threonine	7.91
Nitrogen free extract	34.55	Phenylalanine	6.83
Dry matter	94.59	Methionine	1.68
**Metabolizable energy (kcal/kg)	4002.54	Tryptophan	3.41

** Pauzenga (1985),

Diets formulation: Five experimental diets were formulated to be isocaloric (3000 kcal/kg) and isonitrogenous (19 % crude protein) for the broiler finisher with baobab seed meal included at 0, 25, 50, 75 and 100 % replacing synthetic methionine and lysine (See Table 2).

BSM= Baobab Seed Meal, M+C = moisture content, The vitamin- mineral premix supplied the following per 100kg of diet: vitamin A15,000 I.U, vitamin D3 300,000 I.U., Vitamin E 3,000 I.U., vitamin K 2.50mg, vitamin B_1 (thiamine) 200mg, Riboflavin (B_2) 600mg, pyridoxine (B_6), Niacin 40.0mg,vitamin B_{12} 2mg, Pantothenic acid 10.0mg, folic acid 100mg, Biotin 8mg, choline chloride 50mg, anti-oxidant 12.5mg, manganese 96mg, zinc 6mg, Iron 24mg, Copper 0.6mg, Iodine 0.14mg, Selenium 24mg, cobalt 214mg. Using Feedwin software version 1.01.

***Experimental birds, management and design*:** A total of 180 birds were used for the research. They were given the feed and water *ad – libitum.* They were assigned in a completely randomized design (CRD) to 5 experimental diets under the deep litter system for 4weeks. Each treatment was replicated 3 times comprising of 12 birds each.

Carcass evaluation: Two (2) birds were randomly selected from each replicate for carcass analysis at the end of the experiment. Feed and water was withdrawn for 6 - 8 hours preceding slaughtering of the birds. Each bird was tagged accordingly and weighed before and after slaughtering, followed by scalding,

evisceration and dissection were done and weighed accordingly as adopted by (Farshid and Moshen, 2017). The parameters include: fasted weight, dressed weight, head, neck, wings, back, breast, drumstick, thigh, shank, liver, heart, gizzards weights. These weights were expressed as the percentage of the fasted live weight of the birds. The dressing percentages were calculated as: Dressing % = Dressed weight (g) x 100

Live weight (g) 1

Statistical analysis

Data collected were subjected to one-way analysis of variance (ANOVA) using (SPSS, 2007) Model. Significantly different means were separated using Duncan's Multiple Range Test (DMRT) at 5%.

Table 2. Percent ingredient composition of experimental diets for broiler finisher chickens

	Levels of replacement of Methionine and Lysine with baobab seed meal (%)				
Ingredients	**0**	**25**	**50**	**75**	**100**
Maize	61.00	61.00	60.94	60.83	60.00
Rice bran	10.00	10.00	9.97	9.85	9.65
GNC	19.00	19.00	18.98	18.00	17.89
Fish meal	1.00	1.00	1.00	1.00	1.00
Blood meal	4.10	4.10	4.12	4.12	4.13
Bone meal	3.00	3.00	3.00	3.10	3.10
Oil palm	1.00	1.00	1.00	1.00	1.00
Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
BSM*	0.00	0.10	0.20	0.30	0.40
Lysine	0.20	0.15	0.10	0.05	0.00
Methionine	0.20	0.15	0.10	0.05	0.00
TOTAL	100.00	100.00	100.00	100.00	100.00
Calculated analysis					
Crude protein	19.25	19.19	19.16	19.00	19.02
ME/Kcal/Kg	3102.45	3101.98	3101.20	3100.02	3100.00
Dry matter	90.32	90.31	90.31	90.36	90.78
Crude fibre	5.58	5.59	5.59	5.55	5.57
Ether extract	6.00	6.01	5.98	5.99	6.10
Lysine	1.02	1.01	1.00	1.00	1.00
Methionine	0.93	0.93	0.92	0.91	0.91
M+C	0.76	0.77	0.77	0.76	0.76
Calcium	1.23	1.25	1.29	1.34	1.35
Phosphorus	0.91	0.91	0.90	0.89	0.98

RESULTS AND DISCUSSION

The result indicated significant ($P<0.05$) increase in the weights of breast bird (23.38, 15.94, 21.15, 25.22 and 21.20%). Similarly, the liver weight (2.90, 5.52, 7.84, 6.22 and 4.51%) for birds fed on baobab seed meal. Birds fed diets containing 75 % BSM replacing methionine and lysine had higher breast weights (25.22%) than those fed control and other treatments diets. Similarly, birds fed 50 %BSM had higher liver weight (7.84) than those fed on control and other treatment diets. Other parameters measured showed no significant ($P>0.05$) variation by the level of BSM inclusions in the diets.

The significant increase in the weights of breast (25.22%) and that of liver weight (7.84%) were associated with the increase level of baobab methionine and lysine in the diets which indicate that organic source of methionine and lysine from baobab had beneficial effect on broilers performance compared to

synthetic methionine and lysine. This is in consonance with the findings of Farshid and Moshen (2017) who studied the effects of different levels of lysine and threonine on carcass characteristics, intestinal micro flora and growth performance of broiler chicks and reported that carcass characteristics and growth performance can be improved with increasing in lysine and threonine levels to 120 % above from NRC recommendations for commercial broilers. However, the results for this research is not in agreement with Cengiz *et al.* (2008) who studied the Influence of excessive lysine and/or methionine supplementation on growth performance and carcass traits in broiler chicks and reported that carcass, leg quarter, breast with bone yields and relative weights of heart, spleen, bursa of Fabricius were not affected from Lysine and/or Methionine supplementation.

Table 3. Effect of baobab methionine and lysine on carcass and organs characteristics of broiler finisher chickens

Parameters	Levels of replacement of Methionine and Lysine with baobab seed meal (%)					**SEM**	**LOS**
	0	**25**	**50**	**75**	**100**		
Fasted weight (g/bird)	1575.00	1375.00	1300.00	1200.00	1412.50	59.21	NS
Dressed weight (g/bird)	1100.00	962.50	925.00	1025.00	1122.50	48.11	NS
Dressing (%)	69.44	69.94	71.15	86.14	79.28	3.01	NS
Wings weight (%)	9.99	6.34	11.54	9.34	14.26	1.24	NS
Back weight (%)	13.88	13.41	13.46	18.82	14.12	0.89	NS
Breast weight (%)	23.38^{ab}	15.94^{b}	21.15^{ab}	25.22^{a}	21.20^{ab}	1.28	*
Drumstick (%)	12.50	8.52	9.62	12.67	10.62	0.74	NS
Thigh weight (%)	9.26	11.04	9.61	12.54	11.53	0.68	NS
Liver weight (%)	2.90^{b}	5.52^{ab}	7.84^{a}	6.22^{ab}	4.51^{ab}	0.63	*
Gizzard weight (%)	6.36	5.52	8.11	8.49	6.01	0.55	NS
Heart weight (%)	1.22	1.84	2.70	3.76	2.25	0.37	NS

BSM = Baobab Seed Meal; ^{abc} Means on the same row haven different superscript differ significantly ($P<0.05$);
NS = Not Significant ($P>0.05$), SEM= Standard Error of Mean; LOS = Levels of Significance.

CONCLUSION AND RECOMMENDATION

Based on the outcome of this research, baobab seed meal improved the weights of breast and liver of broiler finisher chickens. It is therefore, recommended that up to 75 %BSM can be included in broiler finisher diets without adverse effects on carcass yield of broilers

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