

**NSAP****47th Annual Conference**
(JOS 2022)**CONFERENCE PROCEEDINGS**THEME
SECURING ANIMAL
AGRICULTURE AMIDST
GLOBAL CHALLENGES**NUTRIENT DIGESTIBILITY OF BROILER STARTER CHICKS FED PROCESSED BAOBAB SEED MEAL-BASED DIETS SUPPLEMENTED WITH ENZYME*****Parmata¹, A., Alu², S.E. and Adua², M.M.**¹National Biotechnology Development Agency, PMB 5118, Lugbe, Abuja Nigeria.²Department of Animal Science Nasarawa State University, Keffi, P.M.B.135, Shabu-Lafia campus, Nasarawa State, Nigeria,

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email: parmamamza@gmail.com**Abstract**

A 28-days feeding trial was conducted to evaluate the effect of enzyme supplementation on processed baobab seed meal-based (PBSM) diets on nutrient digestibility of broiler starter chicks. Two hundred and forty (240) day old chicks (COBB 500) of similar live weights were randomly assigned to a four (4) dietary treatments with four (4) replicates having 15 birds each in a 2x2 factorial arrangement fitted into Completely Randomized Design. Processed baobab seed meal was included at 0 and 20% while enzymes were supplemented at 0 and 200 ppm for treatments combination T1, T2, T3, and T4 respectively. All other routine management practices were adhered to throughout the experimental period. The result showed significant ($P < 0.05$) improvement in the ether extract (64.74%) digestibility for birds fed 20%BM compared to those fed 0%BM. Similarly, enzyme significantly ($P < 0.05$) increased the digestibility of crude fibre (37.33%) and ash (30.78%) for birds fed 200ppm enzyme supplementation compared to those on 0ppm enzyme. However, interaction showed significant ($P < 0.05$) depression in the digestibility of dry matter (46.39%) for birds fed T4 (20%BM+200ppm) but improved crude protein (73.08%) and ether extract (65.27%) digestibility for birds fed T3 (20%BM+0ppm) compared to those fed T1 (72.57 and 63.18%). Similarly, birds in T4 had higher crude fibre (39.17%) and ash (32.21%) digestibility compared to those on diet T1 and other treatments combinations. It is concluded that 20% of processed baobab seed meal should be supplemented with 200ppm enzyme for improved nutrients digestion in broilers

Keywords: Baobab, Broiler, Starter, Nutrient digestibility.**INTRODUCTION**

Poultry production is a part of the livestock industry and the fastest means of increasing animal protein supply thus, holding the greatest promise of bridging the prevailing wide animal protein gap in Nigeria through its meat and eggs (Egbewande and Olorede, 2011). Nutrition and diseases are the major limiting factors in poultry production as the cost of feed alone accounts for about 70-80 % of the total cost of producing commercial poultry in Nigeria (Adegbowale, 2004). Shortage of feed resources in developing countries and Nigeria in particular is worsened by its competition with humans and growing livestock production in the tropics (Alu *et al.*, 2018). One of the alternative ways of solving this problem is perhaps the use of non-conventional sources of protein to supplement the diets of poultry and reduce cost of production. However, this non-conventional feed resources contained a lot of antinutritional factors such as oxalates, phytate, saponin and trypsin inhibitors which need to be processed and sometimes supplemented with exogenous enzymes (Alu *et al.*, 2018). Among these non-conventional feedstuffs is baobab seed which is rich in protein and contains a substantial amount of energy (Mwale *et al.*, 2008) and the fruit pulp is rich in vitamin C (Sidibe *et al.*, 1998). It is on this note, this research is necessary to evaluate the effects of processed baobab seed meal on nutrient digestibility of broiler starter chicks.



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Material and methods

Experimental site

The experiment was carried out at Ibas poultry farm, number 117 Ibrahim Barde Street Keffi, Nasarawa State. Keffi is located in the guinea savanna zone of North Central Nigeria. It is found on latitude 08° 35'N and longitude 08° 33'E. The mean monthly maximum and minimum temperatures are 35.06°C and 20.16°C respectively while the mean monthly relative humidity is 74%. The average rainfall is about 1168.90mm (NIMET, 2008).

Source of birds, feed ingredients and boiling of baobab:

Day old chicks (COBB 500) were purchased from Olam Hatcheries Limited and the Baobab seed were purchase from two local markets at Mafa and Gomboru in Borno state while other ingredients were purchase from feed suppliers in Keffi town of Nasarawa state. Phytase was purchase from a registered dealer of animal feed. The baobab seeds were dehusked from the pulp and washed in clean water, dried and added to boiling water with a temperature of 100°C and allowed to cook for 30 minutes, after which it was oven dried and ground using a grinding machine.

Experimental design

Two hundred and forty (240) day old chicks of similar live weights were randomly assigned to a four (4) dietary treatments with four (4) replicates haven 15 birds each in a 2x2 factorial arrangement fitted into Completely Randomized Design.

Experimental diets for starter phase

Four experimental diets tagged T1, T2, T3 and T4 were compounded to the isonitrogenous (24%) and isocaloric (2800 kcal/kg, ME). Treatment T1 contain no enzymes and no processed baobab seed meal and served as the control diet. Treatment T2 contain no baobab seed but 200ppm of enzymes added. Treatment T3 and T4 composed of 20% baobab seed meal with 0 and 200ppm of enzyme supplementation respectively. See Table 1.

Table 1: Nutrient composition of the experimental diets for starter chicks

Ingredients (%)	% inclusion of processed baobab seed meal			
	T1 (0%cbasn+0ppm)	T2 (0%cbasm+200ppm)	T3 (20%cbasm+0ppm)	T4 (20%cbasm+200ppm)
Soybean (full fat)	23.00	23.00	20.00	20.00
PBSM*	0.00	0.00	20.00	20.00
Rice bran	12.25	12.45	12.45	12.45
Maize bran	20.00	20.00	20.00	20.00
Groundnut cake	12.00	12.00	12.00	12.00
Maize	25.5	25.5	9.50	9.50
Palm oil	3.00	3.00	2.00	2.00
Blood meal	2.00	2.00	2.00	2.00
Bone meal	1.00	1.00	1.00	1.00
Methionine	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
Salt	0.30	0.30	0.30	0.30
Total	100kg	100kg	100kg	100kg
Phytase	0ppm	200ppm	0ppm	200ppm

**Nutrients composition**

Energy kcal/kg ME	2877.11	2877.11	2832.67	2832.67
Lysine (%)	1.55	1.55	1.42	1.42
Methionine (%)	0.68	0.68	0.59	0.59
Ether extract (%)	5.29	5.29	5.51	5.51
Crude fibre (%)	6.64	6.64	6.74	6.74
Protein (%)	24.07	24.07	24.09	24.09
Calcium (%)	1.68	1.68	1.62	1.62
Available	0.68	0.68	0.69	0.69
Phosphorus (%)				
Ash (%)	4.30	4.30	4.31	4.31

*PBSM = processed baobab seed meal inclusion levels. 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 B₁ (thiamin) 200mg, Riboflavin (B₂) 600mg, pyridoxine (B₆), Niacin 40.0mg, vitamin B₁₂ 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.

Experimental design and management of birds

The following statistical model was used: $Y_{ijk} = U + A_i + B_j + (AB)_{ij} + e_{ijk}$ where Y_{ijk} = individual observation, U = population mean, A_i = effect of factor A, B_j = effect of factor B, and AB_{ij} = effect of interaction of factor A&B. Each pen was equipped with feeders and drinkers. Light was provided at night using electric bulbs throughout the period of the experiment. Birds were fed with weighed amount of the experimental diets and drinking water *ad-libitum* and vaccines were administered. Anti-stress was administered in drinking water after each vaccination. Other routine management practices such as daily washing of drinkers and changing water, cleaning of pen when necessary, repairing of pen and daily inspection were strictly observed.

Nutrient digestibility trial

Three (3) birds from each of the 4 units were used for digestibility studies during the last 7days of the feeding trial, apparent nutrient digestibility was determined. Fecal samples were collected over the period of one week. The droppings collected were oven dried for a period of 18 hours at a temperature of 105⁰C and weighed daily, bulked, ground and thoroughly mixed to obtain a homogenous mixture. Samples of the droppings were taken for proximate analysis according to standard methods (AOAC, 2006) and the results obtained were used to calculate the apparent digestibility by using the formula below: Apparent digestibility coefficient =
$$\frac{\text{Nutrients in feed} - \text{Nutrients in faeces}}{\text{Nutrients in feed}} \times \frac{100}{1}$$

Statistical Analysis

Data collected were subjected to two way analysis of variance (ANOVA) for factorial experiment using SPSS Model. Significantly different means were separated using Duncan's Multiple Range Test (Duncan, 1955).

Result and discussions

Table 2 showed significant ($P < 0.05$) improvement in the ether extract (64.74%) digestibility for birds fed 20%BM compared to those fed 0%BM. Table 3 showed significant ($P < 0.05$) increase



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in the digestibility of crude fibre (37.33%) and ash (30.78%) for birds fed 200ppm enzyme supplementation than those on 0ppm enzyme. Table 4 showed significant ($P<0.05$) depression in the digestibility of dry matter (46.39%) for birds fed T4 (20%BM+200ppm) but improve crude protein (73.08%) and ether extract (65.27%) digestibility for birds fed T3 (20%BM+0ppm) than those fed T1 (72.57 and 63.18%). Similarly, T4 had higher crude fibre (39.17%) and ash (32.21%) digestibility than those on the T1 and other treatments combinations.

The significant improvement in the ether extract (64.74%) digestibility for birds fed 20%BM compared to those fed 0%BM indicated that baobab has more digestible fat for the birds to gain more energy for growth and development. The significant increase in the digestibility of crude fibre (37.33%) and ash (30.78%) for birds fed 200ppm were due to enzyme supplementation. This observation is due to enzymes addition in the diets. This supported the general assertion that enzymes supplementation helps in releasing more nutrients for digestion and add mineral ions as reported by Alu *et al.* (2018) who stated the benefit of exogenous enzymes include the reduction of anti-nutrients found in feed ingredient, enhancing feed utilization and efficiency, decrease non-starch polysaccharides and intestinal viscosity as well as separate inherent thermo- stability and supply calcium, phosphorus and other mineral ions that would commonly remove and attached to the phytate by making it unavailable for absorption. This observation also agreed with the reports of Agboola *et al.* (2014) who reported that apparent nutrient digestibility in broiler chickens was significantly improved with enzyme supplementation the result which could be seen in the growth performance and economics of production of the animal. The significant depression in the digestibility of dry matter (46.39%) for birds fed T4 (20%BM+200ppm) and improvement of crude fibre (39.17%) and ash (32.21%) could be due to interaction of baobab and enzyme. Similarly, the improved crude protein (73.08%) and ether extract (65.27%) digestibility for birds fed T3 (20%BM+0ppm) is associated with absence of enzymes in the diet. This observations is generally due to the interactive effect of both enzymes and baobab in the diets.

Table 2. Effects of baobab meal on nutrient digestibility of broiler starter chicks

PARAMETERS (%)	BAOBAB MEAL INCLUSION LEVELS			
	0%BM	20%BM	SEM	LOS
Dry matter	46.47	46.45	0.02	NS
Crude protein	72.00	71.88	0.18	NS
Ether extract	62.87 ^b	64.74 ^a	0.54	*
Crude fibre	34.46	35.14	0.68	NS
Ash	29.59	28.81	0.26	NS
Nitrogen free extract	39.02	38.77	0.13	NS

ab means on the same column having different superscript differ significantly ($p<0.05$); NS = not significantly different ($p>0.05$); SEM = standard error of mean; LOS = level of significant; BM=baobab, %=percentage

Table 3. Effects of enzyme supplementation on nutrient digestibility of broiler starter chicks

PARAMETERS (%)	ENZYME SUPPLEMENTATIONS			
	0ppm	200ppm	SEM	LOS
Dry matter	46.53	46.40	0.02	NS
Crude protein	72.83	71.05	0.18	NS
Ether extract	64.22	63.39	0.54	NS
Crude fibre	32.27 ^b	37.33 ^a	0.68	*
Ash	27.62 ^b	30.78 ^a	0.26	*



Nitrogen free extract	39.08	38.70	0.13	NS
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ab means on the same column having different superscript differ significantly ($p < 0.05$); NS = not significantly different ($p > 0.05$); SEM = standard error of mean; LOS = level of significant; BM=baobab, %=percentage

Table 4. Interactive effects of enzyme supplementation and baobab nutrient digestibility of broiler starter chicks

PARAMETERS	T1	T2	T3	T4	SEM	LOS
	(0%BM+0ppm)	(0%BM+200 ppm)	(20%BM+0ppm)	(20%BM+200ppm)		
Dry matter	46.54 ^a	46.41 ^b	46.51 ^{ab}	46.39 ^b	0.03	*
Crude protein	72.57 ^a	71.42 ^b	73.08 ^a	70.68 ^b	0.25	*
Ether extract	63.18 ^{ab}	62.57 ^b	65.27 ^a	64.22 ^{ab}	0.76	*
Crude fibre	33.42 ^{ab}	35.50 ^b	31.11 ^b	39.17 ^a	0.97	*
Ash	27.82 ^b	31.36 ^a	27.41 ^b	32.21 ^a	0.37	*
Nitrogen free extract	39.18	38.85	38.98	38.56	0.19	NS

ab means on the same column having different superscript differ significantly ($p < 0.05$); NS = not significantly different ($p > 0.05$); SEM = standard error of mean; LOS = level of significant; BM=baobab, %=percentage.

Conclusion

It is concluded that 20% of processed baobab seed meal should be supplemented with 200ppm enzyme for improved nutrients digestion in broilers

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