



Effect of *Prosopis African* Seed Coat Meal Treated With Multi-enzymes on the Growth Performance of Broiler Chickens

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ABSTRACT

The study evaluated the effect of *Prosopis Africana* seed coat meal treated with multi-enzymes on the growth performance of broiler chickens. One hundred and fifty (150) day-old broiler chicks unsexed that were fed for eight (8) weeks in the deep litter management system. The birds were randomly allotted to five (5) dietary treatments with three (3) replications of ten (10) birds each. The diets were formulated with the inclusion of PASCAM at 0, 5, 10, 15, and 20% levels for T₁-T₅ respectively. Data collected were subjected to analysis of variance in a completely randomized design. The result obtained indicated that the experimental diets significantly ($P < 0.05$) affected final body weights, average daily weight gain, and feed conversion ratio across the treatment groups, while initial body weight, average daily feed intake were not significantly ($P > 0.05$) affected across the treatment groups. It is, therefore, suggested that 10% of the PASCAM inclusion level could be adopted for optimum growth performance in broiler chicken's diet. Above 10% growth performance was retarded and losses were incurred.

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INTRODUCTION

Animal protein requirement in developing countries has become critical due to rapid population growth. This creates adverse consequences on food security and has resulted in a high incidence of hunger and malnutrition, consequently, efforts are geared towards increasing the animal production component of agriculture, and this fact has become prominent in agriculture because of the malnutrition condition characterized by developing countries (Igbedioh, 1996). In Nigeria, there is a widening gap between the production and consumption of animal protein and per capita animal protein intake is already below recommended levels (Ukachukwu and Obioha, 2000).

The major item of cost in poultry production is feed; one of the first manifestations of this problem for

feeding animals is the competition for feedstuffs that can commonly be used by humans and livestock, like maize, soya bean, sorghum, and groundnut (Iyeghe *et al.*, 1992).

Maize as a conventional feedstuff has remained the chief energy source in compounding rations for birds and other non-ruminant animals. The scarcity and high cost of cereal grains especially maize has necessitated research into alternative energy sources for livestock feeding (Ijaiya and Awonusi, 2001; Orayaga *et al.*, 2015a). Consequently, there is a worldwide interest in the search for new plant species capable of supplementing traditional crops and staple (Jurgen *et al.*, 1998).

Given this, there is increasing interest by Nigerian livestock farmers to harness unconventional feed ingredients



such as *Prosopis Africana* seed coat meal treated with multi-enzymes which is readily available with little or no cost and non-competitive feed materials that can be developed as a component of animal feeds. *Prosopis Africana* is a leguminous tree and one of the 44 species of the genus *Prosopis*. It is a savannah tree found in semi-arid and arid regions of tropical Africa (Keay, 1989). The tree is of great economic value to man and animal, it fixes nitrogen to enrich the soil, generates hardy timbers, produces protein-rich leaves, and sugary pods used as feedstuffs for ruminants. (Annongu *et al.*, 2004). However, the disadvantage of *Prosopis* is the high content of anti-nutritive factors such as tannins, haemagglutinins, prosopine, and toxic amino acids which are capable of inducing adverse effects on simple stomached animals when consumed without adequate processing (Cheeke and Shull, 1985). However, appropriate treatment of non-conventional feedstuffs can improve their utilization and thus better the health, productivity, and profitability of farm animals (Tuleun *et al.*, 2011). It is in the light of this that' boiled *Prosopis Africana* seed coat meal treated with multi-enzymes will be considered as potential feedstuffs for poultry. This research was conducted to provide alternative feedstuffs to address the global feed crisis with the use of PASC without affecting the growth performance of the broiler chickens.

MATERIALS AND METHODS

Location

The study was conducted at the Poultry Unit of the Livestock Teaching and Research Farm, University of Agriculture, Makurdi, Benue State. Makurdi lies between Latitude 7°44'N and longitude 8°21'E in the Southern Guinea Savanna zone, Benue State. The area has an annual rainfall of 6-7 months in duration (i.e March-October) and ranging from 508 to 1016mm with a temperature range of 24.20 to 36.33°C. The relative humidity

ranges between 39.50% and 64.00% (NIMET, 2009).

Experimental Design

The study evaluated the effect of *Prosopis Africana* seed coat on the growth performance of broiler chickens. One hundred and fifty (150) dietary treatments comprising were randomly allotted to five (5) dietary treatments comprising 0%, 5%, 10%, 15%, and 20% inclusion levels of PASC representing T₁-T₅ respectively. Each of the treatments was replicated into three (3) places with ten (10) birds in each replicate. The birds were fed for eight (8) weeks under a deep litter system of management. Biosecurity and sanitary measures were strictly adhered to. Data collected were subjected to Analysis of Variance (ANOVA) in a Completely Randomized Design (CRD).

Sources of the feed Ingredients

Prosopis Africana Seed Coat (PASC) meal was obtained from the producers of *Prosopis* food seasoning within Ohimini Local Government Area of Benue State; all the other conventional ingredients were purchased from the open market within Makurdi and Guma Local Government Area of Benue State. The micro-ingredients; (bone meal vitamin/mineral premix, and multienzyme was obtained from a reputable and recommended livestock store within Benue State

Chemical analysis of the boiled *Prosopis Africana* seed coat was conducted in the Animal Nutrition Laboratory using the procedure described by AOAC (1990) before it will be used, in feed formulation.

Diet Preparation/Formulation

The basic feed materials/ingredients that were used in the experiment are maize, soybean full fat, *Prosopis Africana* seed coat meal, fish meal, rice bran, bone meal, blood meal, premix, and salts. The five diets were



formulated such that the boiled *Prosopis Africana* seed coat meal treated with multi-enzyme was included at the rate of 0%, 5%, 10%, 15%, and 20% to constitute the five diets respectively. Again, the multi-enzyme was added to 100 kg of the test diets according to the prescription on the pack of the multi-enzymes. All diets were balanced for protein, meta-bolizable energy, crude protein, calcium, phosphorus, and methionine. The composition of the test diet is presented in the table below:

Growth Performance

Growth performance indices measured were; Average initial body weight (AIBW), Average Final Body Weight (AFBW), Average Daily Feed Intake (ADFI), Average Daily Weight Gain (ADWG), and Feed Conversion Ratio (FCR).

Data Analysis

All data generated during the experimental period were subjected to one-way analysis of variance (ANOVA) in a completely randomized design (CRD) using a procedure outlined in the Minitab (2014) and where significant differences between treatment means occur, they were separated using Duncan's new multiple range tests (Duncan, 1955).

DISCUSSION

Growth Performance

Table 3 shows the result of the performance of broiler chickens fed a diet containing graded levels of *Prosopis Africana* seed coat meal. It shows that the average final body weight of birds (g), average daily weight gain, and feed conversion ratio were significantly ($P < 0.05$) different among the treatment groups while average initial body weight and average daily feed intake were not significantly ($P > 0.05$) different among the

treatment groups. This research result was in agreement with Odeh *et al.*, (2019) who reported both significant ($P < 0.05$) and no significant ($P > 0.05$) differences in all the performance indices measured. Average final body weight and average daily weight gain decreased significantly across the treatment groups as the inclusion level of *Prosopis Africana* seed coat meal increased and this could be attributed to the presence of some levels of anti-nutritional factors in the *Prosopis Africana* seed coat meal that could impede the utilization of other nutrients. The range of values of AFBW and ADWG obtained in this present research was 1184.00-1916.67 (g) and 15.63-28.33 (g) respectively and were higher than 1073.30-1215.00 (g) and 13.56-15.39 (g) reported by Odeh *et al.* 2019 for average final body weight and average daily weight gain respectively, while 32.60-33.00 (g) for average initial body weight, 56.54-58.02g for average daily feed intake and 2.10-3.89g for FCR were below the range of values 463.33-608.33 for AIBW, 64.13-68.09 for ADFI and 4.42-4.83 for FCR reported by Odeh *et al.* 2019. Consequently, feed conversion ratio (FCR) increased across the treatment groups with an increase in the level of *Prosopis Africana* seed coat meal. It has been established that the lower the value of FCR the better the utilization of feed by animals and the result showed that the least value of feed conversion ratio was observed in treatment one (T_1) which is the control, implying that, they were best converters of feed to the flesh.

CONCLUSION

It was concluded that a 10% PASCAM inclusion level should be adopted for optimum growth performance in broiler chicken's diet. Above 10% growth performance was retarded and losses were incurred



Table 1: Feed formulation test (starter diet) Percentage composition of starter diet

Ingredients	T1 (0%)	T2(5%)	T3(10%)	T4(15%)	T5(20%)
Maize	46.00	43.70	41.40	39.10	36.80
(Soyabean) F.F	39.00	39.00	39.00	39.00	39.00
Fish meal	3.00	3.00	3.00	3.00	3.00
PASCM	-	2.30	4.60	6.90	9.20
Rice bran	5.00	5.00	5.00	5.00	5.00
Blood meal	4.00	4.00	4.00	4.00	4.00
Bone meal	2.50	2.50	2.50	2.50	2.50
Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Enzyme	-	+	+	+	+
Total	100	100	100	100	100
Calculated nutrients					
ME/kCal/kg	3195.20	3184.25	3173.31	3162.36	3151.41
CP	23.93	23.82	23.72	23.61	23.50
CF	3.53	3.87	4.22	4.58	4.90
EE	10.03	9.99	9.95	9.91	9.87
Lysine	1.52	1.51	1.51	1.50	1.50
Methionine	0.41	0.41	0.40	0.40	0.39
Calcium	1.25	1.25	1.24	1.24	1.24
Phosphorus	0.54	0.53	0.53	0.52	0.51

Table 2: Percentage composition of finisher diet

Ingredients	T1	T2	T3	T4	T5
Maize	50.00	47.50	45.00	42.50	40.00
(Soyabean) F.F	34.00	34.00	34.00	34.00	34.00
Fish meal	2.00	2.00	2.00	2.00	2.00
PASCM	-	2.50	5.00	7.50	10.00
Rice bran	8.00	8.00	8.00	8.00	8.00
Blood meal	3.00	3.00	3.00	3.00	3.00
Bone meal	2.50	2.50	2.50	2.50	2.50
Premix	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Enzyme	-	+	+	+	+
Total	100	100	100	100	100
Calculated nutrients					
ME/kCal/kg	3128.40	3116.50	3104.60	3092.70	3080.81
CP	21.34	21.22	21.11	20.99	20.87
CF	3.97	4.35	4.72	5.09	5.47
EE	9.19	9.14	9.10	9.05	9.01
Lysine	1.29	1.29	1.28	1.28	1.27
Methionine	0.37	0.36	0.36	0.35	0.35
Calcium	1.20	1.20	1.20	1.20	1.20
Phosphorus	0.55	0.54	0.53	0.53	0.52



Table 3: Effect of Diet Containing Graded Levels of Boiled *Prosopis Africana* Seed Coat Meal Treated with Multi-enzyme on the Performance of Broiler Chickens

Parameters	T1 (0%)	T2 (5%)	T3 (10%)	T4 (15%)	T5 (20%)	SEM	P. Value
AIBW/g/bird	33.00	33.00	33.00	32.70	32.60	0.52 ^{NS}	0.522
AFBW/g/bird	1916.67 ^a	1726.67 ^a	1694.33 ^a	1400 ^b	1184.00 ^b	68.43 [*]	0.018
ADFI/g/bird	56.87	57.63	56.54	57.70	58.02	1.02 ^{NS}	0.827
ADWG/g/bird	28.33 ^a	24.94 ^{ab}	24.52 ^{ab}	18.87 ^{bc}	15.63 ^c	2.08 [*]	0.010
FCR	2.10 ^c	2.34 ^{bc}	2.38 ^{bc}	3.08 ^{ab}	3.89 ^a	0.28 [*]	0.006

^{ABC} Means with different superscripts in the same row are significantly different ($P < 0.05$), *

NS = Not significantly different ($P > 0.05$), SEM = Standard Error of Mean

AIBW = Average Initial Body Weight, AFBW = Average Final Body Weight

ADFI = Average Daily Feed Intake, ADWG = Average Daily Weight Gain

FCR = Feed Conversion Ratio

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