



# Performance and Nutrient Utilization of Pullet Chicks Fed Diets Containing *Prosopis Africana* Seed Coat Meal Treated with Polyzyme

M.O. Odeh<sup>1</sup>, S. Attah<sup>2</sup>, I. O. A. Oluremi<sup>3</sup>, F.B.P. Abang<sup>2</sup>

<sup>1</sup>Department of Agricultural Education, School of Vocational & Technical Education, College of Education, Oju Benue State Nigeria.

<sup>2</sup>Department of Animal Production, College of Animal Science, University of Agriculture, Makurdi Benue, State, Nigeria.

<sup>3</sup>Department of Nutrition, College of Animal Science, University of Agriculture, Makurdi Benue State, Nigeria.

\*Corresponding author: mosesodeh65@gmail.com

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**Abstract**— The study was conducted to evaluate the effect of *prosopis africana* seed coat meal (PASCМ) on the performance and nutrient utilization of three hundred (300) Nera brown day-old pullet chicks that were fed for 56 days. The birds were randomly allotted to 5 experimental diets with 3 replications of 20 birds each. The diets were formulated with the inclusion of PASCМ at 0, 15, 20, 25 and 30% levels, respectively and the data collected were subjected to analysis of Variance in a completely randomized design. Results obtained showed that the 0%(control diet) had the highest feed intake of 31.94g/bird/day. While the best FCR (3.09) and highest final weight gain (608.33g/bird) were obtained in 0% PASCМ inclusion level. Also birds on 0% PASCМ inclusion level had the highest value of weight gain (10.33g/bird) and best protein efficiency ratio (0.64). Mortality was not observed. The digestible CP and EE were highest ( $P < 0.05$ ) in 0% PASCМ inclusion but did not differ significantly ( $P > 0.05$ ) from 15% and 20% inclusion levels. It was therefore concluded that 20% PASCМ inclusion level could be adopted for optimum growth performance and digestibility in pullet chicks' diets.

**Keywords**— Pullet Chicks, Performance, Nutrient Utilization and PASCМ.

## I. INTRODUCTION

Inadequate supplies of feedstuffs at economic prices continue to limit the production of animal protein in Nigeria. This is because the cost of animal feed accounts for 60% and 70% of the cost of production in poultry enterprises in Nigeria. Nutritionist and other professionals therefore, strive to reduce this cost to maximize profit [1,2].

This high cost of feed ingredients has scared some farmers from poultry business [3]. The conventional feed like maize continues to be expensive. Maize constitutes the main component of energy diet in poultry production in Nigeria, suggesting that any increase in the price of maize may

increase the price of animal products. Therefore, there is the need to find an alternative feed resource which can replace maize [4, 5] in the diets of pulletchicks. The use of agricultural by-products and kitchen wastes like maize bran, rice bran and *Prosopis africana* seed coat meal (PASCМ) etc. as feed resources can be achieved in poultry diet after careful study. This will help to reduce the competition for maize and increase animal protein at a relatively lower cost and improve net profit [6, 7,8, 9].

The availability of PASCМ and its free acquisition brings it into focus as a replacement for maize in poultry nutrition. PASCМ is high in crude fibre and low in energy compared

to maize diet but can be used to replace maize as energy source [10, 11] in pullet chick diets with some exogenous enzymes (e.g polyzyme) fortification [12, 13, 14]. This study was sought to provide alternative feedstuffs to address the global feed crisis with the use of PASCAM without affecting the performance and nutrient digestibility in pullet chicks.

## II. MATERIALS AND METHODS

### Experimental Site

This study was conducted at the poultry unit of Ohagwu farm, Ochodu Ukpa Igede, Oju Local Government Area of Benue State, Nigeria. Oju Local Government Area lies between Latitude 6°51' north and Longitude 8°25' east in the Southern Guinea Zone of Nigeria, with a climate that has two distinct seasons. The wet season covers mid-March to mid-November, while dry season starts in late November to early March in which high temperature is experienced between February and April. Oju Local Government Area has an annual rainfall ranging from 1200 mm to 1500 mm. The temperatures are generally very high during the day, particularly in March and April with a mean daily temperature of 26°C, and daily minimum temperature of 16°C to 21°C and maximum daily temperature of 31°C to 37°C in dry and wet seasons. The relative humidity ranges from 42% to 75% depending on the time of the day and season of the year [15].

### Test ingredient

*Prosopis africana* seed coat meal (PASCAM) was sourced from women in Oju Local Government Area that produced food condiment (Okpehe or Dawadawa) from *prosopis africana* seeds.

### Experimental Birds and Management

A total of 300 Nera brown day-old pullet chicks were randomly divided in five groups in a complete randomized design with each treatment having three replicates containing twenty birds per replicate. Five experimental diets were formulated from a mixture of maize, *Prosopis africana* seed coat meal soybean meal, rice bran, blood meal, bone meal, palm oil and vitamin/mineral/premix as shown in Table 1. They were intensively managed in deep litter system throughout the experimental period. Feed and water were given *ad libitum*. Record of initial weight, final weight, body weight gain and feed intake were taken while feed conversion ratio, protein intake and protein efficiency ratio were estimated.

### Dietary treatment

The PASCAM was sundried for 10 days and milled. It was then incorporated into 5 diets at 0, 15, 20, 25 and 30% levels as replacement for maize (Table 1).

### Digestibility trials

At the 7<sup>th</sup> week of the experiment, 2 pullet chicks from each replicate were randomly selected and managed in clean disinfected metabolic cages. They were allowed 3 days of acclimatization and four (4) days of fecal collection. A known weight of feed was given daily. The feces voided each day per treatment per replicate were weighed fresh and oven dried to a constant weight, ground and used for proximate analysis as outlined in A.O.A.C [16].

### Statistical analysis

The data obtained were subjected to one way analysis of variance (ANOVA) and in a completely randomized design using the procedure outlined in the Minitab [17]. Where significant difference between treatment means occurred, they were separated using Minitab [17] software.

## III. RESULTS AND DISCUSSION

### Pullet Chick Performance

Table 2 showed the effect of PASCAM treated with polyzyme on the performance of pullet chicks. Average final weight, average weight gain, average feed intake and feed conversion ratio were observed to be significantly different ( $P < 0.05$ ) among treatment groups but there was no discernable pattern. The average final weight (463.33 – 608.33g/bird) obtained in this study are comparable with the value (580.00g/bird) reported by [7] as growth performance of pullet chicks from 0 – 8 weeks in the tropics. However, protein intake and protein efficiency ratio were not significantly difference ( $P > 0.05$ ) among the treatments.

Birds placed on 0% (control) PASCAM inclusion level recorded the highest feed intake (31.94g/bird/day). This result disagrees with the reports of [18, 19] who obtained higher feed intake (38.72 – 57.86g/bird/day) in which the fibre content of feed was increased when non-conventional feedstuffs were used. The decrease in feed intake observed in the PASCAM based diets may be attributed to inherent anti-nutritional factors in PASCAM. [20, 21, 22] have reported some anti-nutritional factors like non-starch polysaccharides (NSP) and phytotoxins in *Prosopis africana* products that effect performance. [23] had earlier suggested the use of exogenous enzymes in the nutrition of poultry when fibrous feed materials were included in the diet. The best Feed Conversion Ratio (FCR) was recorded in 0%

PASCM inclusion level, though polyzyme was included in the diets, the ability of the chicks to utilize the fibre content of PASCM was less efficiency beyond 20% level. [24, 19] reported that higher levels of fibre in the diets have negative effect on protein intake and this was evident in the 25% and 30% PASCM inclusion levels.

#### Nutrient Digestibility

The result of nutrient digestibility as shown in Table 3 indicated significant difference ( $P < 0.05$ ) in the digestible dry matter (DM), crude protein (CP), ether extract (EE) and nitrogen-free extract (NFE). However, crude fibre (CF) did not show significant difference ( $P < 0.05$ ) among the treatments. This may be due to inclusion of polyzyme in

PASCM based diets. [12, 14,19,23, 25] have reported increased apparent nutrient digestibility of high fibre diets in monogastric (e.g. Poultry) diets when exogenous enzymes were included in the diets.

#### IV. CONCLUSION

The non-significant difference in treatment 0, 15 and 20% in the final weight, weight gain, feed intake, feed conversion ratio, protein intake and protein efficiency ratio suggests that upto 20% of PASCM inclusion level in the diets of pullet chicks could be adopted for optimum growth performance and nutrient digestibility.

Table1. Ingredients and dietary Composition of Pullet Chick Diets

Experimental diets					
Ingredients	0%	15%	20%	25%	30%
Maize	51.45	43.73	41.16	38.58	36.02
PASCM	-	7.72	10.29	12.86	15.44
Sobean meal	31.00	31.00	31.00	31.00	31.00
Rice bran	9.00	9.00	9.00	9.00	9.00
Palm oil	1.00	1.00	1.00	1.00	1.00
Blood meal	2.00	2.00	2.00	2.00	2.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Limestone	1.50	1.50	1.50	1.50	1.50
Vit./Min/permit	0.25	0.25	0.25	0.25	0.25
Salt (NaCl)	0.30	0.30	0.30	0.30	0.30
Enzymes	-	+	+	+	+
Total	100.00	100.00	100.00	100.00	100.00
Determined nutrients					
Dry matter	88.37	88.34	86.30	87.47	86.82
Crude protein	22.77	22.45	23.31	22.84	223.35
Crude fibre	5.68	6.79	6.39	7.13	6.73
Ether extract	4.69	5.29	5.39	4.78	5.55
Ash	10.44	9.53	9.388.98	8.75	8.61
Nitrogen-free Extract (NFE)	56.43	56.16	55.30	56.49	55.77
Metabolizable Energy (kcal/kg)	3226.11	3253.35	3262.75	3238.13	3301.90

PASCM = *Prosopis africana* seed coat meal

Table 2: Effect of *Prosopis africana* Seed Coat Meal on the Performance of Pullet Chicks

Parameters	PASCML INCLUSION					P.V.
	0%	15%	20%	25%	30%	
Initial weight	29.45	29.58	29.98	29.10	29.87	0.83
Final weight	608.33 <sup>a</sup>	558.33 <sup>a</sup>	560.00 <sup>a</sup>	478.33 <sup>b</sup>	463.33 <sup>b</sup>	0.01
Weight gain(g/bird/day)	10.34 <sup>a</sup>	9.44 <sup>a</sup>	9.46 <sup>a</sup>	8.02 <sup>b</sup>	7.74 <sup>b</sup>	0.01
Feed intake(g/bird/day)	31.94 <sup>a</sup>	31.34 <sup>a</sup>	30.74 <sup>ab</sup>	30.42 <sup>ab</sup>	28.88 <sup>b</sup>	0.03
Feed conversion ratio	3.09 <sup>b</sup>	3.37 <sup>ab</sup>	3.25 <sup>ab</sup>	3.79 <sup>a</sup>	3.74 <sup>a</sup>	0.04
Protein intake (g/bird/day)	6.64	6.39	6.23	6.14	5.79	0.68
Protein efficiency ratio	0.64	0.68	0.66	0.77	0.75	0.30

a.b means within each row with different superscripts are significantly different ( $P < 0.05$ ), NS = Not significantly different ( $P > 0.05$ ).

Table 3: Effect of *Prosopis africana* Seed Coat Meal on the Nutrient Digestibility

Digestible	PASCML INCLUSION					SEM
	0%	15%	20%	25%	30%	
Dry matter	74.12 <sup>a</sup>	71.40 <sup>b</sup>	74.28 <sup>a</sup>	70.16 <sup>bc</sup>	68.63 <sup>c</sup>	0.00
Crude protein	70.56 <sup>a</sup>	68.33 <sup>ab</sup>	69.65 <sup>a</sup>	64.52 <sup>b</sup>	67.99 <sup>ab</sup>	0.05
Crude fibre	67.17	64.90	67.20	63.49	62.90	0.19
Ether extract	81.03 <sup>a</sup>	79.57 <sup>a</sup>	78.54 <sup>a</sup>	73.18 <sup>bc</sup>	74.21 <sup>b</sup>	0.01
Nitrogen free Extract	70.71 <sup>a</sup>	68.03 <sup>ab</sup>	70.59 <sup>a</sup>	66.75 <sup>bc</sup>	64.19 <sup>c</sup>	0.00

a.b.c: Means in the same row with different superscripts differed significantly ( $P < 0.05$ ). SEM = Standard Error of Mean.

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