

EFFECT OF GENOTYPE AND PIGEON PEA SEED MEAL LEVEL OF INTERACTION ON GROWTH PERFORMANCE OF PULLET CHICKS

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ABSTRACT

A study was conducted with 180 Lowman Brown purchased from zatech hatchery located in Ibadan in Oyo State through their Marketing agent, Animal Health Concept in Enugu and 120 local pullets which was hatched locally. The hens were purchased from the market around and within Umuahia. The eggs laid by the hens were collected and hatched and the chicks were used for this experiment to evaluate the effect of genotype and pigeon pea seed meal level interaction on growth performance of pullet chicks. The experimental design was Completely Randomized Design (CRD). Five experimental diets were formulated such that diet 1 (control) was maize-soybean meal based with (0% PSM). Diet 2, 3, 4 and 5 had 15, 20, 25, and 30% PSM, respectively replacing part of maize and soybean in the diets. Measurements were daily feed intake, daily weight gain final live weight. It was concluded that boiled pigeon pea seed meal (PSM) could be incorporated in the diets of exotic and local pullets chicks as high as 30% of the whole diet without any adverse effect on pullet performance.

INTRODUCTION

The shortage of animal protein supply in Nigeria is due to high cost of poultry feed. This

arises from the competition between man and livestock for conventional ingredients like cereal grains (maize, sorghum, wheat and millet), oil seed cakes (groundnut cake and Soya bean meal) and fish meal (Amaefule and Obioha, 2005). According to Amaefule and Onwudike (2000), Pigeon pea (*Cajanus cajan*) seeds is a legume widely grown in Nigeria for both human and livestock feeding with about 146 to 149 tonnes produced in Nigeria annually (Caswell, 1979). Pigeon peas contain high levels of protein and the essential amino acids-methionine, lysine and tryptophan (Amaefule and Onwudike, 2000). Pigeon peas (*Cajanus cajan*) has shown promise as a source of leaf and seed protein for livestock in Nigeria. As with most tropic legumes its seeds contain toxic and growth inhibitory substance (Udedibie and Igwe, 1989). Caswell (1979) reported that the difference can be traced to the variation of soil nutrients and other climatic factors. Pigeon pea seed and leaves have been used in feeding cattle, sheep, goat, poultry and rabbit, Oyenuga (1968). Like other legumes seeds, pigeon pea contains protease which is heat labile (Amaefule and Nwagbara 2004) In Nigeria, two varieties have been identified namely ex-Ibadan and ex-Trinidad. The ex-Ibadan is oily and a fibrous plant. It is of low quality in all respect to the ex-Trinidad. (Oyenuga, 1968). Pigeon pea seeds

and leaves have been used in feeding cattle, sheep, goat, poultry and rabbit.

Philip (1977) reported that pigeon peas yield up to 7 tonnes of seeds per hectare. The yield could be higher in more favourable environment with input of fertilizer and good management (Wallis *et al.*, 1983). Pigeon peas are currently considered as non-conventional feed stuff in poultry feeding and is a valuable protein feed resource (Preston, 1987; Udedibie and Igwe 1989; Amaefule and Obioha 1992; Amaefule and Onwudike, 2000). The Utilization of this abundant feed source by livestock will contribute to the needed animal protein production.

MATERIALS AND METHODS

Experimental Area

The study was carried out in the experimental Unit of the Poultry Farm of Michael Okpara University of Agriculture, Umudike. The area is located 050 29" North and 070. 33" East. It has maximum and minimum daily temperature of 270C-360C and 20-260C, respectively and relative humidity of 57-91% (Nwachukwu *et al.*, 2006). It is therefore a humid tropical environment.

Source and Processing of Experimental materials

Pigeon pea seeds and other materials for the experiment were purchased from Aba, Abia State. Processing of seeds were boiling of raw seeds in water for 30 minutes and was milled at feed mill of National Root Crop Research Institute Umudike.

Experimental Birds and Management

The experiment was conducted with 180 Lohman Brown purchase from zatech hatchery located in Ibadan in Oyo State through their Marketing agent, Animal Health Concept in Enugu and 120 local pullets which was hatched locally. The hens were purchased from the market around and within Umuahia. The eggs laid by the hens were collected and hatched and the chicks were used for this experiment. The chicks were weighed and assigned to five treatment diets. Each treatment was replicated three times with twelve birds. Before the commencement of the experiment the chicks were brooded in a deep litter (wood shavings) pen of a tropical-type open side poultry house whose sides and demarcations between pens were covered with wire gauze. Heat was provided with kerosene stoves under galvanized metal hovers. Feed and water were provided to the birds *ad libitum*, while additional light was supplied at night using kerosene lanterns. The open sides of the poultry house were covered with black tarpaulin cloth during the brooding (1-4 weeks) period to conserve heat and prevent drought. Routine medication was carried out as outlined by obioha (1992).

Experimental Diets

The diets were formulated with boiled pigeon pea seed meal at inclusion levels of 0, 15, 20, 25 and 30%. Diet one was the control, while diets 2, 3, 4, and 5 had boiled pigeon pea seed meals at 15, 20, 25 and 30% levels respectively as shown in Table 1. The feeding trial ended at the end of eight weeks.

Table 1: Composition of Experimental Diets

Ingredients	0%	15%	20%	25%	30%
PSM	0	15	20	25	30
Local fishmeal	2.00	2.00	2.00	2.00	2.00
Maize	48.16	38.45	35.22	31.98	28.75
Soybean meal	20.41	15.12	13.35	11.59	9.82
Wheat offal	25.93	25.93	25.93	25.93	25.93
Bone meal	3.00	3.00	3.00	3.00	3.00
Salt	0.25	0.25	0.25	0.25	0.25
Vitamin Premix	0.25	0.25	0.25	0.25	0.25
Total (%)	100	100	100	100	100
CP (%)	18.52	18.70	18.92	19.04	19.16
ME (MJkg ⁻¹)	11.74	11.61	11.57	11.52	11.48

Vitamin Mineral Premix per kg of feed

Vit A, 10,000,000 I.U; Vit E, 10,000 I.U; Vit D3, 2,000,000 I.U; Thiamine B, 15000 mg; Vit K, 2000 mg; Riboflavin B2, 4000 mg; Pyridoxine B6, 15000 mg; Niacin, 15000 mg; Biotin, 20 mg; Choline chloride, 2000 mg; Antioxidant, 125g; Manganese 80g; Zinc, 50g; Iron, 20g; Copper, 5g; Iodine, 1.2g; Selenium, 200 mg; Cobalt, 200 mg.

Experimental Design and Data Collection

The experimental design was completely randomized design (CRD). Feed consumption was determined by subtracting the quantity of feed left over from the total quantity offered on a weekly basis. The birds were weighed as replicate groups and the group weight was divided by the number of birds to obtain the average live weight per bird. Weighing of the birds were at the beginning of the experiment and subsequently on weekly basis usually in the morning (8.00-9 am) hours. Weight gain was

calculated as final weight minus initial weight, feed conversion ratio (FCR) was obtained by dividing feed intake by weight gain.

Data Analysis

All data collected were subjected to analysis of variance (ANOVA) and differences between treatment means were determined using Duncan's New Multiple Range Test (Duncan, 1955). All statistical procedures were according to Steel and Torrie (1980).

RESULTS AND DISCUSSION

Effect of Genotype and Inclusion level Interaction

The effect of genotype and PSM inclusion level interaction on the growth performance of pullet chicks is presented in Table 2. The interaction significantly ($P < 0.05$) affected daily feed intake, daily protein intake and protein efficiency ratio (PER). Also, genotype x PSM level interaction significantly ($P < 0.05$) influenced final live weight and daily weight

gain of the local genotypes but had no significant ($P>0.05$) effect on the exotic genotype. Feed conversion ratio was not significantly ($P>0.05$) affected. Local chicks fed the control diet obtained the highest weight gain though not significantly different ($P>0.05$) from those fed 15%, 20% and 30% PSM, while 25% gave the least value. Also, significantly ($p<0.05$), more feed were consumed by both local and exotic genotypes fed the control diet than the PSM based diets which were not

significantly different ($P>0.05$) from each other. The daily protein intake followed the same pattern with feed intake. From this result, the interaction, showed that PSM could be incorporated in the diets of local and exotic pullet chicks up to 30% without compromising the performance the chicks. This is in line with the report of Amaefule and Ukpanah (2010) who incorporated raw PSM in diet of starters broilers.

Table 2: Effect of Genotype and PSM level interaction on growth performance of pullet chicks

Parameters	Genotype	0	15	20	25	30	Mean
Initial Live Weight	Local	25.21	25.15	25.27	25.22	25.26	25.22
	Exotic	42.73	45.64	42.66	42.69	42.68	43.28
	Mean	33.97	35.40	33.97	33.96	33.97	
Final Live Weight	Local	256.86 ^a	188.52 ^{ab}	233.04 ^{ab}	163.33 ^b	232.14 ^{ab}	172.78
	Exotic	461.11	429.17	417.22	384.72	431.94	424.83
	Mean	358.99	308.85	325.13	274.03	332.04	
Daily Weight Gain	Local	4.14 ^a	2.92 ^{ab}	3.70 ^{ab}	2.46 ^b	3.70 ^{ab}	3.38
	Exotic	7.47	6.90	6.69	6.11	6.95	6.82
	Mean	5.81	4.91	5.20	4.29	5.33	
Daily Feed Intake	Local	8.95 ^a	7.73 ^b	7.42 ^b	7.30 ^b	7.58 ^b	7.80
	Exotic	33.24 ^a	27.63 ^b	27.87 ^b	28.13 ^b	28.57 ^b	29.09
	Mean	27.10	17.68	17.65	17.72	18.10	
Feed Conversion Ratio	Local	2.40	2.74	2.00	2.84	2.24	2.44
	Exotic	4.45	4.01	4.24	4.62	4.18	4.30
	Mean	3.43	3.38	3.12	3.73	3.21	
Daily Protein Intake	Local	1.61 ^a	1.39 ^{ab}	1.43 ^{ab}	1.31 ^b	1.37 ^b	1.42
	Exotic	5.98 ^a	4.97 ^b	5.02 ^b	5.06 ^b	5.14 ^b	5.32
	Mean	3.80	3.18	3.23	3.19	3.26	
Protein Efficiency Ratio	Local	2.57 ^a	2.10 ^{ab}	2.61 ^a	1.88 ^{ab}	2.70 ^a	2.37
	Exotic	1.25 ^{ab}	1.40 ^{ab}	1.34 ^{ab}	1.21 ^b	1.35 ^{ab}	1.31
	Mean	1.91	1.75	1.98	1.55	2.03	

abc means along the same row with different superscripts are significantly different ($p<0.05$)

CONCLUSION

Exotic pullet chicks showed significant ($p < 0.05$) superiority in terms of final live weight, daily weight gain, daily feed intake and daily protein intake over the local ones. Genotype and pigeon pea seed meal inclusion had an interaction effect on daily feed intake, protein intake and protein efficiency ratio.

RECOMMENDATIONS.

The result on the interaction showed that PSM could be incorporated in the diets of local and exotic pullet chicks up to 30% without compromising chick performance.

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