

An Assessment of Growth Performance of Broilers Fed on *Cajanus cajan* (Pigeon Pea) at Varying Levels of Inclusion

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Commercial feedstuffs in Nigeria are expensive, which has led to the search for alternative cheap and locally available feeding materials for poultry birds and these ingredients might have reasonable level of anti-nutritional factor(s). The animal protein market trends are rising globally, and the sector is expected to be one of the fastest growing agricultural sectors in the coming decades. This study was conducted to examine the dietary effect of pigeon pea meal on the growth performance of broiler chicken. A total of 24 broilers of four weeks old, were allocated into four dietary treatments. Each treatment had two cages and six replicates per treatment in a Completely Randomized Design. Treatment 1 (control) was based diet with 0% pigeon pea while the other treatments contained 20, 40 and 60% of pigeon pea in the diets respectively. The experiment lasted for seven (7) weeks during which data were recorded for feed intake and body weight. The results of the study indicated that 60% inclusion of pigeon pea significantly ($p < 0.05$) reduced body weight gain, specific growth rate and increased feed conversion ratio respectively, compared to 20% or 40% inclusion rates respectively. The results from the study showed that the highest specific growth rate was recorded in the broiler chicks fed with 40% inclusion of pigeon pea. Also, the treatment group with 40% pigeon pea inclusion has the highest feed conversion ratio ($p < 0.05$). The results obtained from the experiment indicate that pigeon pea diet could be included up to 40% in the diets of broiler without negatively influencing the growth performance of the broiler.

Keywords: Broilers, *Cajanus cajan*, growth.

INTRODUCTION

Broiler industry in Nigeria is playing a fundamental role in agricultural economy. It supplies prime high-quality animal protein for human consumption. Low animal protein intake has remained a major human nutritional problem in Nigeria, especially for the low income and non-wage earners Mottet and Tempio, (2017).

Adeyemo and Onikoyi, (2012) had identified

exorbitant prices of commercial poultry feeds, arising mainly from high cost of conventional feedstuffs (maize, soybean meal, groundnut cake and fish meal) as the major constraint towards increased animal protein supply Thirumalaisamy et al., (2016). The formulation of balanced diet for poultry by using a good number of feed ingredients following the nutrient allowances recommended in different

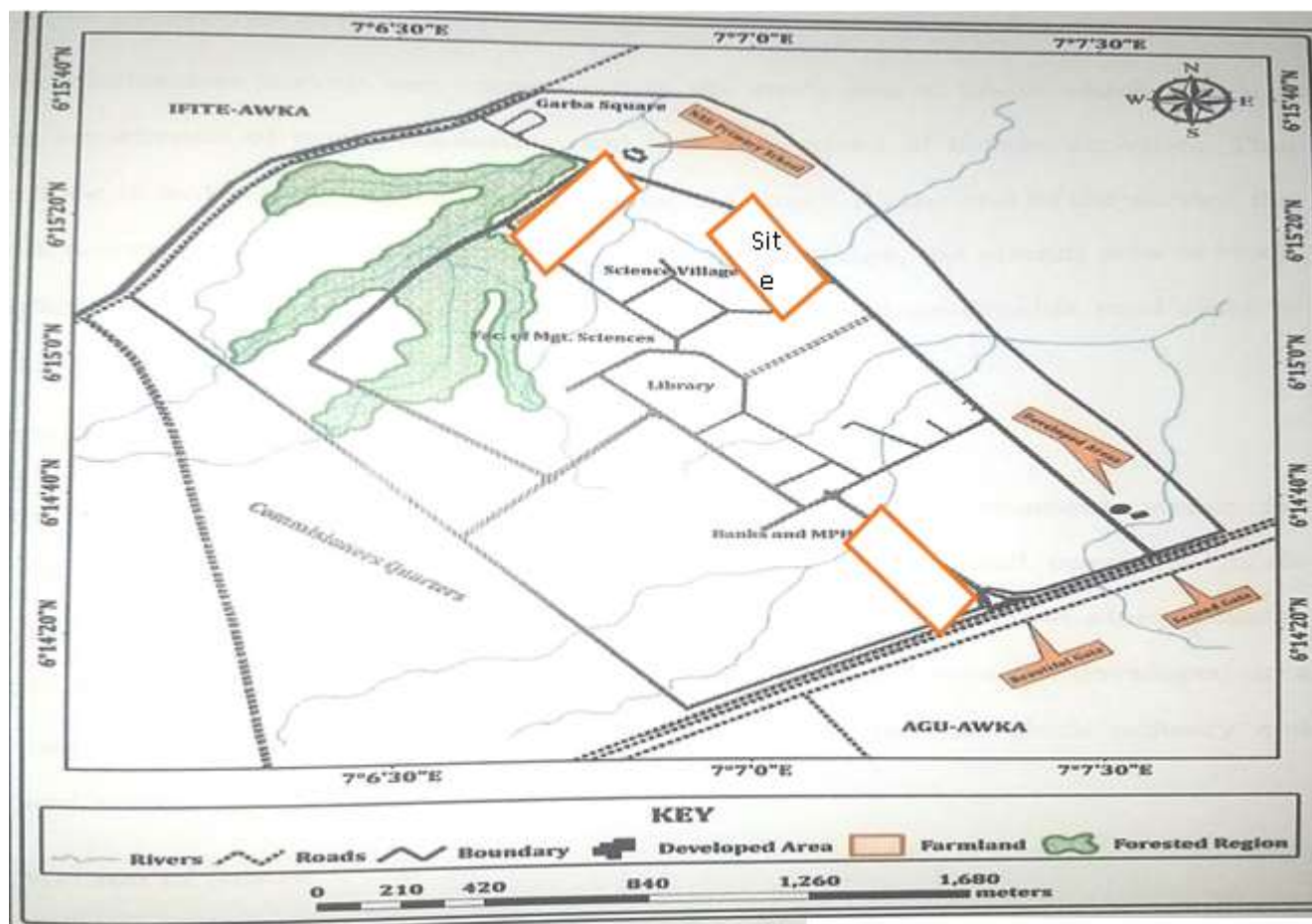


Figure 1. Map Showing the Animal House of Zoology Department.

feeding standards is a common practice in developed countries Aboki et al., (2013). Oloso et al., (2020) stated that plant proteins are less balanced than animal proteins, this imbalance of plant proteins led some to suggest more reliance on the animal proteins. The protein content of essential selected leguminous seed is high, for example; Faba bean (20%), cow pea (24-26%), pigeon pea (22%) and soya bean (38%). Amaefule and Okereke, (2019) reported that legumes are the richest sources of protein among plant food but are deficient in sulphur containing amino acids. The use of pigeon pea as an energy or protein source in diets for monogastrics would be an attractive alternative to expensive oil-seed meals and cereal grains. Adam et al. (2018) observed that fed broiler chicks different levels of pigeon pea meal (0, 100, 200, 300, 400 and 500 g/Kg) pigeon pea replacing maize and Soya bean meal. They observed no palatability problems and a high

feed intake was recorded for the broilers fed diets containing the highest levels of pigeon pea.

This study aims to assess the growth performance of broilers fed on *Cajanus cajan* (foi-foi or pigeon pea) at varying levels of inclusion.

MATERIALS AND METHOD

Study Area

This research was carried out in the Animal House of the Department of Zoology (Figure 1), Nnamdi Azikiwe University, Awka, Anambra State, Nigeria which falls within the humid tropics. Awka is the capital of Anambra State with an estimated population of 301,657 inhabitants as of 2006 Nigeria census. Awka lies in the south eastern Nigeria at latitude $06^{\circ}15'40''N$ and longitude $07^{\circ}07'30''E$

Table 1. Weight gain performance.

Treatments	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Total Mean
0%	736.67 ^a ±91.797	1006.67 ^a ±103.28	1296.67 ^a ±42.269	1441.67 ^a ±38.687	1638.33 ^b ±80.353	1776.67 ^b ±32.66	1875ab±44.609	1138.33a±68.823
20%	818.33 ^a ±55.287	1188.33 ^a ±74.409	1401.67 ^b ±21.37	1656.67 ^b ±53.166	1780 ^b ±39.497	1858.33 ^b ±67.355	2223.33 ^b ±382.71	1405b±381.667
40%	788.33 ^a ±58.793	19233.33 ^a ±43976.617	1480 ^c ±77.717	1718.33 ^b ±76.529	2221.667 ^c ±202.92	2601.67 ^c ±168.216	3205c±492.575	2416.67c±484.63
60%	825 ^a ±38.859	1230 ^a ±117.132	1348.33 ^{ab} ±73.598	1431.67 ^a ±65.549	1475 ^a ±85.965	1616.67a±67.429	1780a±111.714	921.67a±100.283

Column sharing different superscript are significantly different (p<0.05).

(Ebenebe et al., 2012).

Housing and Management of the Broilers

The broilers used for this experiment were assigned to four treatment groups. Each treatment contained six broilers. The broilers were kept in a cage with dimension of 100 cm length, 60cm width and height of 55 cm. The cages were kept in the poultry unit. During the experimental period, the broilers in each group were fed the experimental diets daily. The cages, feeding and drinking troughs were cleaned daily.

Experimental diet

Pigeon pea was purchased from Eke Awka market in Anambra State, was grounded using constructed commercial blending machine. After grinding, the pigeon pea feed was sun dried and packaged in an air tight bag to protect from moulds and other insects'

infestations.

Weighing of the animals and Determination of Growth Performance

The animals were weighed using electronic weighing balance Model. The weights of the birds were taken weekly using a sensitive weighing balance (CAMRY: Model: EK5055). From the weight of the bird's other parameters were generated thus:

- Weight gain = Final weight (W^2) (g) - Initial weight (W^1) (g)
- Feed conversion ratio (FCR): The amount of feed consumed per unit of weight gain is considered as feed conversion ratio. This was calculated by using the following formula: Feed conversion ratio (FCR) = Feed intake (g)/ Body weight gain (g)
- Specific growth rate (SGR)

Where:

$SGR = (\ln(\text{final weight in grams}) - \ln(\text{initial weight in grams}) \times 100) / t$ (in days).

Data Analysis

The data collected on growth performance during the experiment was subjected to Analysis of Variance (ANOVA), using SPSS statistics (version 25) at 0.05 significance levels. The comparison of mean was done using a Post Hoc test (Duncan's Multiple Range Test).

RESULTS

The result of feed utilization indices and growth performance of broilers fed on *Cajanus cajan* (Pigeon Pea) At Varying Levels of Inclusion for 7 weeks are presented in tables. **Table 1** shows the result of the weekly weight gain of broiler chicks fed with *Cajanus cajan* at varying levels. The highest weight gain value was obtained in the diet with 40g inclusion of *Cajanus cajan* (2416.67), followed by 20% (1405.00) and 0% (1138.33) respectively

Table 2. Percentage weight gain.

Treatments	Percentage Weight Gain (%)
A 0%	157.49 ^{ab} ±28.635
B 20%	172.42 ^b ±48.587
C 40%	307.82 ^c ±63.877
D 60%	115.99 ^a ±14.026

Table 3. Specific growth rate.

Treatments	Specific Growth Rate
A 0%	10.77 ^b ±0.061
B 20%	10.96 ^b ±0.233
C 40%	11.51 ^c ±0.204
D 60%	10.56 ^a ±0.109

Table 4. Feed conversion ratio.

Treatments	Feed conversion ratio
A 0%	2.41 ^b ±0.149
B 20%	2.23 ^b ±0.44
C 40%	1.18 ^a ±0.244
D 60%	3.87 ^c ±0.416

inclusion of *Cajanus cajan*, while the lowest weight gain was obtained from the broiler chicks fed with the 60% (921.67) of *Cajanus cajan*. Table 2 shows that the broiler birds fed with 40g of *Cajanus cajan* had the highest percentage weight gain (307.82±63.877) followed by those fed on 20g of *Cajanus cajan* (172.42±48.587), then followed by those fed on the 0% diet (157.49±28.635) while those fed on 60g of *Cajanus cajan* (115.99±14.026) had the least percentage weight gain. The difference in percentage weight gain of poultry birds on varying inclusions of *Cajanus cajan* was significant at $p < 0.05$. The inclusion of 40% pigeon pea diets significantly ($P < 0.05$) increased the specific growth rate of broiler chicks, (Table 3). There were no significant differences between the specific growth rate of 20% inclusion of pigeon pea and the control group. The results also showed that inclusion of pigeon pea inclusion at 60% had no effect on the specific growth rate of the broiler chicks for the whole period of seven

weeks ($P < 0.05$). The feed conversion ratios of broilers fed with pigeon pea at varying levels are shown in Table 4. The values range from 1.18±0.244 in the 40% pigeon pea inclusion to 3.87±0.416 in the 60% pigeon pea inclusion. There are significant differences in the feed conversion ratio between all the treatment groups.

DISCUSSION

The highest weight gain value was obtained in the diet with 40g inclusion of *Cajanus cajan* (2416.67), followed by 20% (1405.00) and 0% (1138.33) respectively inclusion of *Cajanus cajan*, while the lowest weight gain was obtained from the broiler chicks fed with the 60% (921.67) of *Cajanus cajan*. This finding is in line with the work of Igene et al., (2012) who reported that broiler chickens at both starter and finisher phases can be fed diets containing up to 40% pigeon pea meal substituting soybean meal without decreasing live weight gain. The results from the study showed that the highest specific growth rate was recorded in the broiler chicks fed with 40% inclusion of pigeon pea with a value of 11.51±0.204, while the least value for the specific growth rate was obtained from treatment group with 60% pigeon inclusion (10.56±0.109). In broiler trials there were no significant differences between the growth rate of birds fed 30-50% pigeon pea and the control, even though pigeon pea contains trypsin inhibitor Abdelati et al., (2009). The feed conversion ratios (FCR) of broilers fed with pigeon pea at varying levels. The values range from 3.87±0.416 in the 60% pigeon pea to 1.18±0.244 in the 40% pigeon pea inclusion. This is in line with the findings of Santhanam and Egigu, (2014) who reported that increase in the inclusion levels of pigeon pea in the diet of broiler chicks decrease the body weight and increase the food conversion ratio, likely due to high concentrations of anti-nutritional factors. The significant increase in weight gain, specific growth rate observed when broilers were fed with 40% pigeon pea inclusion confirmed the assumption that the birds were adapted to the diet and therefore tolerate the effects of anti-nutritional factors (trypsin inhibitors) by increasing feed intake and hence feed conversion ratio. From the outcome of the study, feeding pigeon pea meal to broiler chicken is recommended when the inclusion of pigeon pea meal in broiler is at 40% levels, which improves the growth performance of broiler chicks with no deleterious

effect on growth performance of the broiler chicks.

CONCLUSION

The results obtained from the experiment indicate that pigeon pea diet could be included up to 40% in the diets of broiler without negatively influencing the performance of the broiler. It is therefore, concluded from the results of this study that there is great potential and possibility of dietary inclusion of pigeon pea meal feed diet in broiler feed in the future, particularly in those communities where pigeon pea is locally available and affordable and where commercial feed ingredients are expensive.

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