

# Performance of Finishing Broilers Fed Dietary Levels of Groundnut Pod

Ajayi M. A., Okonkwo P. N., Ayodele E. A.

**Abstract**— Effect of supplementing diets with groundnut pod in partial replacement of maize on carcass and organs weight of finishing broilers was investigated using 80 ANAK strains of four weeks old broilers. The birds were randomly assigned to four treatments (A: control diet 0% groundnut pod, B: 5% groundnut pod, C: 10% groundnut pod and D: 15% groundnut pod) the feeds were formulated and offered in mash form to the respective birds from day 21 until week 8. At day 56, six birds from each treatment were selected and sacrificed for the determination of carcass characteristics, Gizzard weight was significantly higher ( $p < 0.05$ ) for birds on dietary treatment D than the values recorded for the birds on dietary treatment A, B and C. However, the values observed for the heart and liver were significantly affected by the treatment ( $p < 0.05$ ) the values observed for these parameters increased linearly ( $p < 0.05$ ) from the control to the 10% level of GNP after which the values declined at 15% inclusion. The final body weight and breast weight for the birds on treatment A was not significantly different ( $p > 0.05$ ) from the values recorded for the birds on dietary treatment D. However, the birds on treatment B and C had higher values which differed significantly ( $p < 0.05$ ) from the values observed for the birds on treatment, A and D. The dressing weight of the birds on dietary treatment D was significantly lower ( $p < 0.05$ ) than values observed for the birds on treatment A, B and C. The same trend was observed for the thigh weight and Head and neck. The birds on dietary treatment D differed significantly ( $p < 0.05$ ) from the values observed for the birds on treatment A, B and C. The eviscerated weight observed for the birds on dietary treatment A, B, C and D had no significant difference ( $p > 0.05$ ). The value observed for the residual weight for the birds on dietary treatment B was significantly lower ( $p < 0.05$ ) than the birds on treatment A, C and D. In conclusion, the result of this study showed that Groundnut pods can be incorporated at 10 per cent level in diet of finishing broiler chickens without compromising carcass performance.

**Index Terms**— groundnut pod, carcass, organ, Broiler.

## I. INTRODUCTION

In a developing country like Nigeria, there is inadequate supply of animal protein sources. An average Nigerian consumes only about 8.6g of animal protein per day as against 53.3g by the inhabitants of developed countries [1]. Sanni and

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Ogundipe, [2] reported that poultry industry occupies a major position in the livestock sector of agricultural production because birds have faster gestation than other farm animals to produce meats and eggs for human consumption. According to Ogundipe and Sanni, [3] and FAO [4] reports, poultry is considered to be a means of livelihood towards achieving certain level of economic independence. Adebola, [5] reported that 41.23% of animal protein yield per annum in Nigeria is sourced from poultry meat and eggs, 9.79% from cattle and 12.43% from pigs. FAO [6] reported that the best logical solution to Nigeria's meat scarcity is to increase broiler chicken production.

Nutrition is perhaps the most important consideration in livestock management. Inadequate supply of feeds, nutritionally unbalanced rations, adulterated ingredients or stale feeds are some of the factors responsible for low productivity of livestock in tropics [7].

Apart from nutrition, Poultry industry contributes significantly to family income. Therefore the major interest of the farmer is to reduce feed cost, which usually accounts for 60 to 70% of the total cost of production. Research efforts are now geared towards evaluating alternative feed ingredients for poultry. According to Atteh and Ologbenla [8], such alternatives should have comparative nutritive values but cheaper than the conventional protein and energy sources and should also be available in large quantities.

Maize is used for other purposes such as biofuel, brewing, starch industries and for human consumption. However, inadequate production of this grain and the intense competition for maize between man, industries and livestock especially in the drier areas of the tropics has made poultry rations to be expensive [4]. This however, could be alleviated by the use of available agricultural byproducts that are less exploited by humans [9]. Hence, partial replacement of maize with groundnut pods will be considered. The aim of the study is to evaluate the growth performance of finishing broilers fed graded levels of groundnut pod as partial replacement for maize.

## II. MATERIALS AND METHODS

### A. Experimental birds and management:

Total of eighty (80) ANAK broilers were used in this study, the chicks were brooded together and randomly divided into four treatments, replicated twice and assigned to the four different diets in a completely randomized design. The birds were fed and watered ad libitum daily and this lasted for four weeks.

*B. Experimental diet:*

The diet consisted of four treatments containing inclusion of groundnut pod at 0%, 5%, 10% and 15%.

**Table 1: calculated Feed**

	<b>T1 (Kg)</b>	<b>T2 (Kg)</b>	<b>T3 (Kg)</b>	<b>T4 (Kg)</b>
Maize	60	55	50	45
Groundnut pod (GNP)	00	05	10	15
Soya bean cake	15	15	15	15
GNC	20	20	20	20
Meth	0.25	0.25	0.25	0.25
Bone meal	3.75	3.75	3.75	3.75
Lysine	0.25	0.25	0.25	0.25
Salt	0.50	0.50	0.50	0.50
Premix	0.25	0.25	0.25	0.25
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>CP</b>	<b>20.94</b>	<b>20.99</b>	<b>21.05</b>	<b>21.12</b>
<b>CF</b>	<b>3.36</b>	<b>5.70</b>	<b>7.13</b>	<b>10.38</b>

*A. Experimental Design:*

Completely randomized design (CRD) was used for this study. The eighty broilers were divided into four groups and replicated twice. Each group was assigned to one of the four experimental diets.

*B. Determination of the feed intake:*

The chicks were weighed at the beginning of the study and subsequently on weekly intervals for the period of four weeks. The feed was always measured before feeding and leftover before the next feeding to determine the feed intake.

*C. Determination the organs weight:*

At the end of the four weeks (8weeks from day old) six birds were randomly selected from each treatment, the birds were starved for 24 hours and slaughtered human decapitation of the neck. They were dressed and weighed to determine the dressing weight; certain organs like gizzard, heart, liver, thigh, breast, head and neck were weighed by the use of an electronic sensitive scale.

*D. Statistical Analysis:*

Data collected were subjected to analysis of variance procedure as described by Steel and Torries.[10]. The mean separation for significant effect was done using Ducans New Multiple Range Test as described by Gomez and Gomez [11]

Statistical model  $Y_{ij} = \mu + T_i + E_{ij}$

Where  $Y_{ij}$ =overall observation

$\mu$ =overall mean

$T_i$ =effect of treatment

$E_{ij}$ =error term

III. RESULTS AND DISCUSSION

*A. Effect of Feeding varying dietary levels of Groundnut Pod on Organ characteristics of Boilers:*

Table 2 shows that the gizzard of finishing broiler fed 0% dietary GNP had a significant lower value ( $p < 0.05$ ) when compared to the birds on 5, 10 and 15% dietary level of GNP. There was an observed increase in the parameter as the level of GNP increased; this may be attributed to the high level of fibre present in the experimental diet which agrees with an earlier report that fibre in monogastric diets specifically has a mechanical effect on gizzard and cause the gizzard to increase [12]. However, there was no significant difference ( $p > 0.05$ ) when the birds on 5 and 10% were compared.

For the heart and liver, the birds on the control were significantly affected by the treatment ( $p < 0.05$ ) the values observed for these parameters increased linearly ( $p < 0.05$ ) up to the 10% level of GNP after which the values declined at 15% inclusion. The increase observed for the control, 5 and 10% GNP was in agreement with [13] who argued that the presence of anti-nutrient triggers these organs. Hence, the higher values observed for these parameters could possibly be attributed to the presence of anti-nutritional factors in the feed, which also agreed with Ajayi, 2015 who reported that groundnut pod contains high level of anti-nutrients if not processed. However, the cause for the decrease at 15% GNP remains unclear.

**Table 2: Organ characteristics of broilers fed varying dietary levels of groundnut Pod**

Organs (g)	Dietary Levels of Groundnut Pod			
	0%	5%	10%	15%
Gizzard	49.20 ± 6.15 <sup>a</sup>	55.70 ± 1.91 <sup>b</sup>	55.80 ± 1.09 <sup>b</sup>	58.55 ± 0.78 <sup>c</sup>
Heart	8.43 ± 0.08 <sup>a</sup>	8.80 ± 0.12 <sup>b</sup>	10.34 ± 0.74 <sup>c</sup>	8.50 ± 0.12 <sup>b</sup>
Liver	45.45 ± 2.31 <sup>a</sup>	50.30 ± 2.45 <sup>b</sup>	54.50 ± 5.60 <sup>c</sup>	37.65 ± 2.27 <sup>d</sup>

<sup>abcd</sup> Row means with different superscript are significantly different (P < 0.05) (n = 6)

**A. Carcass characteristics of broilers fed varying dietary levels of groundnut pod:**

Table 3 shows carcass weight of broilers fed varying dietary levels of GNP. The final body weight and breast weight of the birds on (the control) 0% had no significant difference when compared to the birds on 15% GNP, although there was an observed increase in these parameters up to 10% inclusion of GNP but declined at 15% inclusion, this could be attributed to higher level of fibre which might have reduced the palatability of the experimental diets which would affect the feed intake, hence affecting the muscle formation and the weight but significantly lower (p<0.05) when compared to the birds on 5% and 10%, which had no significant difference (p>0.05).

For the eviscerated weight, head and neck and residual

**Table 3: Carcass Weight of broilers fed varying dietary levels of groundnut pod**

Parameters (kg)	Dietary Level of Groundnut Pod (%)			
	0	5	10	15
Final Body Weight	2.12 ± 0.08 <sup>a</sup>	2.50 ± 0.07 <sup>b</sup>	2.55 ± 0.11 <sup>b</sup>	2.10 ± 0.09 <sup>a</sup>
Eviscerated Weight	1.33 ± 0.12	1.45 ± 0.08	1.40 ± 0.13	1.15 ± 0.15
Dressing Weight	1.60 ± 0.10 <sup>a</sup>	1.62 ± 0.17 <sup>a</sup>	1.65 ± 0.08 <sup>a</sup>	1.40 ± 0.14 <sup>b</sup>
Thigh Weight	0.60 ± 0.07 <sup>a</sup>	0.43 ± 0.06 <sup>b</sup>	0.43 ± 0.05 <sup>b</sup>	0.35 ± 0.06 <sup>b</sup>
Breast Weight	0.20 ± 0.03 <sup>a</sup>	0.28 ± 0.02 <sup>b</sup>	0.27 ± 0.02 <sup>b</sup>	0.20 ± 0.01 <sup>a</sup>
Head and Neck Weight	0.10 ± 0.009	0.07 ± 0.01	0.10 ± 0.006	0.08 ± 0.24
Residual Weight	1.10 ± 0.13	0.63 ± 0.02	0.90 ± 0.24	1.00 ± 0.08

<sup>abcd</sup> Row means with different superscript are significantly different (P < 0.05) (n = 6)

**A. Performance of Broilers fed varying dietary levels of Groundnut Pod**

The average daily weight gain, daily feed intake, average weight gain and feed efficiency of the treatment were significantly affected. There was a significant increase for the values recorded for the control, up to 10% inclusion of GNP and declined at the 15% GNP. This suggests that finishing broilers can make maximum use of GNP up to 10% inclusion but the decrease at 15% inclusion may be attributed to the high fibre content of the feed which might have reduced the palatability of the experimental diets, hence the feed intake is reduced at this level of inclusion. Also, the reduction in weight gain at 15% inclusion could be attributed to the reduction in feed intake; moreover, the presence of anti-nutrients such as Tannin could also be a reason. This

**Table 4: Performance of Broilers fed varying dietary levels of Groundnut Pod**

Parameters	Dietary Levels of Groundnut Pod			
	0%	5%	10%	15%
Average initial Life Weight (kg/bird)	0.570 ± 0.679	1.075 ± 0.021	1.125 ± 0.049	1.165 ± 0.049
Average Final Life Weight (kg/bird)	2.150 ± 0.071	2.350 ± 0.071	2.250 ± 0.071	2.120 ± 0.028

weight, there was no significant difference (p<0.05) within the birds on the control, 5%, 10% and 15% when compared.

For the dressing weight, the birds on 15% GNP had a significant lower value (p<0.05) when compared to the birds on the control, 5 and 10% GNP. However, there was no significant difference (p>0.05) between the birds on the control, 5% and 10%

For the thigh weight, the birds on the control had a significant higher value (p>0.05) when compared to the birds on 5, 10 and 15% GNP but there was no any significant difference (p>0.05) between the birds on 5, 10 and 15% GNP.

agrees with the report of Aleto, [14] that, tannin in the biological system has the ability to chelate protein thereby impeding digestion. The finishing broilers fed varying dietary level of GNP in all the treatments did not show any significant weight difference (p>0.05) in the average feed conversion ratio, average initial life weight and average final life weight. This could be due to the better utilization of the GNP diet facilitated by the dietary nutrient balanced in the experimental diets. The methods of milling (fine meal) may also have contributed to the high degree of absorption which facilitated the degree of conversion of the nutrients into muscles. These agree with the report of Okorie, [15] who argued that the method of milling may have aided the build-up of the muscular and structural tissues of the experimental broilers.

Average Daily Weight Gain	0.300 <sup>a</sup>	0.310 <sup>a</sup>	0.300 <sup>a</sup>	0.250 <sup>b</sup>
Average weight Gain	0.038 ± 0.018 <sup>a</sup>	0.039 ± 0.016 <sup>a</sup>	0.038 ± 0.015 <sup>a</sup>	0.031 ± 0.016 <sup>b</sup>
Daily Feed Intake (kg/bird)	0.138 ± 0.039 <sup>a</sup>	0.135 ± 0.028 <sup>a</sup>	0.135 ± 0.038 <sup>a</sup>	0.130 ± 0.031 <sup>b</sup>
Feed Conversion Ratio	3.630	3.460	3.560	4.190
Mortality	0.000	0.000	0.000	0.000
Feed Efficiency (%)	28.00 <sup>a</sup>	29.00 <sup>a</sup>	28.14 <sup>a</sup>	24.00 <sup>b</sup>

<sup>abcd</sup> Row means with different superscript are significantly different (P < 0.05) (n = 6)

**A. Conclusion**

It was concluded that feeding finishing broilers 10 per cent dietary level of GNP yielded best carcass, and organ qualities! Hence, poultry farmers are encouraged to incorporate this level of GNP in finishing broiler’s diet as it can be used without any negative effects on the carcass characteristics.

**IV. DECLARATIONS**

All the experimental procedures were performed according to the ethical guidelines for research using animal studies established by the Ethical Committee of AkanuIbiam Federal Polytechnic, Unwana which is in compliance with guide for the care and use of laboratory animals.

**Consent of publication:** All the authors unanimously consent to this publication.

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