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**Original article**

## Effects of *amaranthus spinosus* (green) leaf meal on the performance of broiler chicks

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### ABSTRACT

A twenty eight -day feeding trial was conducted with one hundred and twenty 7-day old Anak 2000 broiler chicks to study the effects of green leaf (*Amaranthus spinosus*) as a dietary energy source. *Amaranthus spinosus* leaves dried and ground were used to each replace wheat offal in the following dietary levels: 0%, 2.5%, 5%, 7.5% and 10% respectively. The chicks were divided into five treatment groups, each group replicated four times at the rate of five chicks per replicate. The performance and organ weight characteristics were evaluated. *Amaranthus spinosus* leaf meals improved the mean feed intake, body weight gain and live weight of broilers. The performance of broilers in the *Amaranthus spinosus* leaf meal based diets was inferior to the control. *Amaranthus spinosus* caused significant proportionate growth in % daily weight ( $p < 0.05$ ) and carcass evaluation ( $p < 0.05$ ). Utilization of *Amaranthus spinosus* significantly increased ( $p < 0.05$ ) the % live weight of the abdominal fat thus improving the nutritive value of the meat.

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## 1. Introduction

In poultry production, feed cost claims the largest share of the total expenses involved in the production process. Feed alone accounts for over 75% of the total cost of production, out of which 50% is expended on protein and energy sources (Ahaotu et al., 2013a). An approach that seems to have the greatest potential products is the evaluation of the alternative feed sources including *Amaranthus spinosus*. It was felt that *Amaranthus spinosus* could be an untapped energy source that can substitute wheat offal, which is currently the plague and limiting factor in the expansion of poultry and poultry feed industry. The utilization and incorporation of *Amaranthus spinosus* into broiler feed will go a long way in increasing broiler production, conserve the Nations Foreign exchange used in importation of cereals and finally reduce the pressure on the major energy source in broiler rations.

## 2. Materials and methods

The study was carried at the Teaching and Research Farm (Poultry unit) of the Department of Animal Production and Health Technology, Imo State Polytechnic Umuagwo, Ohaji, Nigeria.

### 2.1. Animals, diets and experimental design

A total of one hundred and twenty (120) seven day old Anak 2000 broiler chicks were randomly allotted to five experimental treatments in a completely randomized design. The chicks were divided into five treatment groups, each group replicated four times at the rate of five chicks per replicate. The experimental diets and water were provided ad libitum throughout the experimental period that lasted for four weeks. Prior to the beginning of the experiments, birds were weighed to obtain their initial body weight and subsequently on a weekly basis. The performance parameters measured were feed intake, body weight gain and feed conversion ratio.

**Table 1**

Chemical composition of the experimental diet.

Ingredients	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>
Amaranthus spinosus	0.00	2.5	5.0	7.5	10.0
Wheat Offal	10.0	7.5	5.0	2.5	0.00
Fish Meal	3.0	3.0	3.0	3.0	3.0
Groundnut Cake	10.0	10.0	10.0	10.0	10.0
Soya-bean Meal	22	22	22	22	22
Maize	40	40	40	40	40
Palm Kernel Cake	10.0	10.0	10.0	10.0	10.0
Bone Meal	4.20	4.20	4.20	4.20	4.20
Lysine	0.1	0.1	0.1	0.1	0.1
DL-Methionine	0.06	0.06	0.06	0.06	0.06
Premix (Broiler)	0.25	0.25	0.25	0.25	0.25
Common Salt	0.3	0.3	0.3	0.3	0.3
Total	100	100	100	100	100
Chemical Composition					
Nutrients					
Crude Protean	23.20	22.50	21.80	21.10	20.40
Crude Fiber	3.40	3.86	3.96	4.34	4.36
Ether Extract	3.61	3.73	3.76	3.89	3.94
ME/Kcal /kg)	2809.9	2805.9	2802.2	2798.5	2794.7

\*2.5kg Premix/tonne contain; Vitamin A 10,000 I.U; Vitamin D3 2000,000 I.U, Vitamin E 12,000 I.U. Vitamin K 2.5gm, Thiamine 1.5g, Riboflavin 5g, Pyriboflavin (B6) 1.5g, Vitamin B12 10mg, Biotin 2mg, Niacin 15g, Pantothenic acid 5g, Zinc 50g, Iron 25g, Copper 5g, Iodine 1.4g, Selenium 100mg, Cobalt 300mg, B. H. T. 125g.

### 2.2. Carcass characteristics

At the end of the feeding trial, 3 birds from each replicate group were randomly taken; fasted over night and slaughtered by severing the jugular vein. The birds were dressed and eviscerated. During the evisceration, the internal organs and other parts were carefully removed and weighed. Their weights were expressed as a percentage of the dressed carcass weight.

### 2.3. Data analysis

Data analysis was done using analysis of variance technique of Steel and Torrie (1980) while significant differences in means were separated using the method of Duncan's Multiple Range Test as outlined by Gordon and Gordon (2004).

## 3. Results and discussions

Effect of *Amaranthus spinosus* leaf meal on the performance of Anak broiler chicks is presented in Table 2. There was significant ( $p < 0.05$ ) variations in body weight gain and feed conversion ratio of the chicks. Inclusion of higher levels of *Amaranthus spinosus* leaf meal was accompanied by a significant ( $p < 0.05$ ) improvement in final body weight and daily weight gain of Anak broiler chicks.

**Table 2**

Effects of *Amaranthus spinosus* leaf meal on performance of Anak broiler chicks

Parameters	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	SEM
Initial Body Weight (g)	55	54.10	54.40	54.80	55.70	0.03 <sup>ns</sup>
Final Body Weight (g)	492.4 <sup>a</sup>	382.2 <sup>b</sup>	356.9 <sup>c</sup>	336.7 <sup>d</sup>	325.6 <sup>a</sup>	3.16*
Body Weight Gain (g)	34.57	31.28	30.85	30.20	28.50	2.98*
Daily Weight Gain (g)	5.84 <sup>a</sup>	28.15 <sup>b</sup>	29.39 <sup>b</sup>	31.55 <sup>c</sup>	34.32 <sup>d</sup>	0.29*
Daily Feed Intake (g)	48.21	49.71	50.96 <sup>a</sup>	53.03 <sup>a</sup>	58.26 <sup>b</sup>	3.65 <sup>ns</sup>
Feed Conversion Ratio	2.28 <sup>a</sup>	2.49 <sup>b</sup>	2.61 <sup>c</sup>	2.91 <sup>d</sup>	3.12 <sup>d</sup>	0.93*
Feed Cost	201.16 <sup>e</sup>	195.6 <sup>d</sup>	184.48 <sup>c</sup>	178.92 <sup>b</sup>	171.44 <sup>a</sup>	2.17*

a, b, c, d, e Means with different superscripts on same row differ significantly ( $p < 0.05$ ).

\* = Significant ; ns = Not significant.

The observed improvement ( $p < 0.05$ ) in weight gain of the broiler chicks fed T4 might be due to the presence of supplementary wheat offal. Addition of 2.5% wheat offal and 7.5% *Amaranthus spinosus* leaf meal improve feed intake suggesting that energy was not the reason for the trend of feed intake. This agrees with the findings of (Ahaotu et al., 2012; Uwalaka et al., 2013; Price, 2008 and Berganza et al. 2003) that consumption of high fibre diets resulted in significant ( $p < 0.05$ ) increase in feed intake. The result of the organ weight characteristics of the broiler chicks is shown in Table 3. The result showed that *Amaranthus spinosus* leaf meal and wheat offal had no significant ( $p < 0.05$ ) effect on heart and kidney weights. This finding is in agreement with the reports of (Ahaotu et al., 2013b; Bressani et al. 1993 and Brenner et al., 2000). These authors observed significant ( $p < 0.05$ ) improvement in heart girth of broiler chicks with increased dietary energy density.

**Table 3**

Effects of *Amaranthus spinosus* leaf meal diets on organ weight characteristics of Broiler chicks.

Heart Girth	9.86 <sup>a</sup>	9.53 <sup>b</sup>	9.52 <sup>b</sup>	10.80 <sup>b</sup>	11.80 <sup>c</sup>	1.90*
Liver	2.37	2.37	2.39	2.41	2.45	0.08 <sup>ns</sup>
Heart	0.60	0.59	0.68	0.70	0.7	0.06 <sup>ns</sup>
Kidney	0.48	0.46	0.47	0.49	0.52	0.09 <sup>ns</sup>
Gizzard	3.38	3.39	3.37	3.59	4.01	0.03 <sup>ns</sup>

## 4. Conclusion

In conclusion, it can be said that *Amaranthus spinosus* leaf meal and wheat offal supplementation in broiler chicks diets produce positive results in broiler chick production. It also enhances the productivity and feed conversion ratio of broiler chick rearing. For optimizing the profits from broiler production, *Amaranthus spinosus* leaf meal and offal may be incorporated to the diets of commercial broiler starter diets.

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