EFFECTS OF NUTRIENT-RESTRICTION AT THE STARTER PHASE ON GROWTH PERFORMANCE OF BROILERS AT THE FINISHER PHASE

P.C. Okere, V.U. Odoemelam, E.U. Ahiwe, T.C. Iwuji, L.C. Ikpamezie, and A.B.I. Udedibie
Department of Animal Science and Technology, Federal University of Technology, PMB 1526, Owerri, Nigeria
Corresponding author: P.C. Okere;
E-mail: okerepeacefuto@gmail.com Phone No.: 08060657957

Abstract
Eighty (80) day old broiler chicks of Anak strain were used in a 9 week feeding trial to investigate the effect of nutrient restriction at the starter phase on growth performance of broilers at the finisher phase. The birds were randomly distributed into two groups 1 and 2 using completely randomized design (CRD). Each group was replicated 4 times with 10 broiler chicks per replicate, and each replicate housed in a pen measuring 1.5 m x 2 m. Broilers in group 1 were given standard broiler starter for 4weeks and finisher diets for the next 5 weeks while broilers in group 2 received a low-quality cheap-diet based mainly on palm-kernel cake and wheat offal for the first 4 weeks and then placed on standard finisher diet for the remaining 5 weeks of the finisher phase. Feed and water were offered ad-libitum. At the end of the trial, there was no significant ($p>0.05$) difference in feed intake between the groups, but the group on the high fibre low-quality diet consumed significantly ($p<0.05$) more feed during the starter phase. Daily body weight gain of the birds on the low-quality diet (group 2) was lower than that of their counterparts (group 1) in the first 4 weeks, but remarkably increased as from the fifth week when the low quality diet was replaced with the standard diet. There was no significant difference ($p>0.05$) between the two groups in their final body weights. Feed cost of producing a broiler in group 2 at the end of the experiment was N692.3 as against N682.4 for a broiler in group 1. The results have shown that broilers subjected to nutrient restriction at the starter phase have the potential to catch up with those on regular feeding programme at the finisher phase but the system is not economically viable.

Keywords: Nutrient-restriction, low-quality diet, compensatory growth, broilers.

Introduction

Food security and the need to develop sustainable agriculture are pre-dominant issues affecting the whole world. Global population is projected to increase rapidly in the next 30 years, causing unprecedented increase in demand for food and increased pressure on land. Precisely, Nigeria is one of the countries where their animal protein intake ranks among the lowest (Udedibie, 2003).

However, poultry production has the ability to bridge this gap, but the industry is faced with a lot of challenges. Feed cost, as a major challenge to the expansion of poultry industry in Nigeria, constitutes about 70 to 80 percent of the total cost of production. This is partly because non-ruminants compete with humans for grains. Soybeans (*Glycine max*) and groundnut (*Arachis hypogaea)* currently play key roles as major plant protein sources in the feeding of poultry in Nigeria. The prices of commercial poultry feeds increased dramatically with the increasing unavailability of these materials coupled with high cost of imported ingredients leading to crisis situation in the industry (Okere *et al*., 2011). Therefore, there is urgent need to search for alternative sources of feed stuffs or methods of feeding poultry to ameliorate this problem in the country. One possible way of reducing cost of poultry production in Nigeria may be the application of compensatory growth phenomenon. Compensatory growth is a phenomenon that enables an animal with retarded growth to catch up with the final live weight of the contemporary unretarded animal (Lawrence and Fowler, 1997).

Meremikwu (2009), showed that restricted growth for 4-12 weeks with low nutrient intake was more efficient than continuous growth with appropriate calorie/protein ratios in the production of heavy weight broilers.

According to McDonald *et al.* (1995), nutrient intake might be kept relatively low in early life and high thereafter as a way of achieving compensatory growth. Not much work has been done on the phenomenon of compensatory growth in Nigeria. Recent research in our station (Udedibie and Adibe, 2014) has also demonstrated that a saving of about N6.00 (six naira) per bird can be achieved by applying the principle of compensatory growth in raising starter broilers.

The study herein reported was designed to compare the performance and economics of production of finisher broilers fed low quality cheap diet only at the starter phase with that of the group fed conventional broiler diet continuously from starter to finisher phase.

Materials and Methods

The experiment was carried out at the poultry unit of the Teaching and Research Farm of the Federal University of Technology, Owerri, Imo State. Nigeria

in 2018. In a completely randomized design (CRD), eighty (80) dayold broiler chicks of Anak strain were allotted to 2 dietary treatments of 4 replicates each. Each replicate had 10 birds. Diet 1 was the standard balanced diet for starter broilers while diet 2 was a cheap, low-quality high fibre diet not ideal for starter broilers. A standard broiler finisher diet was also made for the finisher phase of the trial. The groups were fed the respective starter diets for 4 weeks and then placed on the standard finisher diet for five (5) weeks. Feed and water were provided *ad-libitum*. The ingredient composition of the two experimental diets is shown in Table 1. The birds were weighed at the beginning of the study to obtain their initial body weights and thereafter on weekly basis. Feed intake was recorded daily. Vaccination and other routine management practices were carried out. Data were collected on feed intake, body weight gain, feed conversion ratio and feed cost of production.

Data collected were subjected to statistical analysis using t-test as outlined by Snedecor and Cochran (1978).

Table 1: Ingredient composition of the experimental diets

Ingredients (%)	Diet 1 (standard)	Diet 2 (low quality)	Finisher diet
Maize	50.00	25.00	60.00
Soybean meal	28.00	14.00	20.00
Fish meal	2.00	2.00	2.00
Blood meal	2.00	2.00	2.00
Palm kernel cake	7.00	21.00	4.00
Wheat offal	7.00	32.00	8.00
Bone meal	3.00	3.00	3.00
Vit/min premix	0.25	0.25	0.25
Salt	0.25	0.25	0.25
L – lysine	0.25	0.25	0.25
L – methionine	0.25	0.25	0.25
Total	100.00	100.00	100.00
Calculated chemical compos ition (% dm)			
Crude protein	22.86	18.94	19.38
Crude fibre	3.01	6.13	3.50
Ether extract	3.74	4.27	3.79
Ash	3.20	3.37	3.28
ME (Mcal/kg)	2.70	2.40	3.00
Feed cost (N/kg)	95.80	76.40	88.60

Results and Discussion

The performance of the experimental broilers at starter phase is presented in Table 2.

Table 3 presents the performance of the experimental broilers at the finisher phase.

Table 2: Performance of the experimental starter broilers

Parameters	Group 1	Group 2	Sem
Av. initial body weight (g)	33.38	34.38	1.13
Av. final body weight (g)	1008.13[a]	837.05[b]	30.90
Av. body weight gain (g)	994.758	803.68[b]	30.57
Av. daily weight gain (g)	34.80[a]	28.65[b]	1.09
Av. daily feed intake (g)	50.71	58.04[b]	1.52
Feed conversion ratio (g feed/ g gain)	1.46[a]	2.03[a]	0.10
Feed cost (₦/kg)	95.80	76.40	
Feed cost of production (₦/kg gain)	139.87	155.09	
Feed cost of production (₦/bird)	134.40	124.30	

[ab] Means within a row with different superscripts are significantly different ($p<0.05$).

The birds on poor quality feed consumed significantly ($p<0.05$) more feed than those on the control diet at

the starter phase. This result was most probably due to the low energy density of the feed, since birds eat to satisfy their energy requirement (Oluyemi and Robert, 2000). However, the daily feed intake of the two groups in the last 5 weeks of the experiment (finisher phase) were similar when they were both placed on the same diet. There was significant difference ($p<0.05$) in the body weight gain between the groups. The body weights of the birds on low-quality diet was relatively lower than those on standard diet at starter phase, but tended to increase with time when the low-quality diet was replaced by standard finisher diet. There was no significant ($p>0.05$) difference between the 2 groups in their final body weights at the end of the trial. There was therefore appreciable compensatory growth among the birds in group 2 in the finisher phase.

The feed conversion ratio (FCR) of the two groups at the starter phase recorded significant ($p>0.05$) difference. The relatively higher feed conversion ratio of the birds in group 2 at the finisher phase was as a result of their higher feed intake. The system investigated in this study failed to show any promise in terms of cost of production. The cost of producing a broiler in the group that suffered initial nutrient restriction was higher as against the results obtained by Udedibie and Adibe (2014).

Udedibie and Adibe (2014) recorded some financial gain in their studies. The financial loss recorded in this study could be caused by the length of restriction that the group was subjected to. Earlier work by Meremikwu (2009) showed that broilers that were nutrient-restricted for 2 weeks did better than those that were restricted for longer period.

Table 3: Performance of the experimental broilers at finisher phase

Parameters	Group 1	Group 2	Sem
Av. initial body weight (g)	1008.13[a]	837.05[b]	30.90
Av. final body weight (g)	3121.01	2917.48	85.20
Av. body weight gain (g)	2112.98	2080.42	89.72
Av. daily weight gain (g)	58.69	57.79	2.49
Av. daily feed intake (g)	167.24	170.94	8.66
Feed conversion ratio (g feed/ g gain)	2.86	2.96	0.19
Feed cost (₦/kg)	95.08	95.08	
Feed cost of production (₦/kg gain)	273.03	283.57	
Feed cost of production (₦/bird)	682.40	692.30	

[ab] Means within a row with different superscripts are significantly different ($P<0.05$)

Conclusion

The results of the study have shown that nutrient-restriction of broilers at the starter phase can result in appreciable compensatory growth at the finisher phase, enough to enable the nutrient-restricted birds to catch-up with the non-restricted birds in final body weight. However, feed cost of producing the broilers in the nutrient restricted group was relatively higher than that of the unrestricted group. It is therefore concluded that the system is not economically viable. Further studies would be carried out in this area to determine the optimal period of nutrient restriction that would give better and positive returns

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