TEMPORARY INITIAL FEEDING OF LOW-QUALITY CHEAP DIET AS A MANAGEMENT STRATEGY FOR RAISING STARTER BROILERS.

A.B.I. Udedibie and J.U. Adibe
Department of Animal Science and Technology,
Federal University of Technology,
P.M.B. 1526, Owerri-Nigeria

Abstract
A 5-week experiment was conducted to investigate the effects of temporary initial feeding of low-quality cheap diet on broiler starter performance, to determine if sufficient compensatory growth can be achieved at that phase of broiler production. Seventy-two (72) day-old broiler chicks of Anak strain were randomly distributed into two groups, A and B, using completely randomized design. Each group was replicated 3 times with 12 broiler chicks per replicate and each replicate housed in a pen measuring 1.5 m x 2 m. Broilers in group A were given a standard broiler starter diet continuously for 5 weeks while broilers in group B received a low-quality cheap diet based mainly on palm kernel cake and wheat offal for the first two weeks and then placed on the standard diet for the remaining three weeks of the trial. The birds were weighed at the beginning of the trial and weekly thereafter. The birds in group B recorded relatively less feed intake (28.03 g/day vs 27.10 g/day) and reduced daily body weight gain (18.48 g/day vs 16.87 g/day) in the first 2 weeks of the trial. However, their daily feed intake increased astronomically as from the third week following the withdrawal of the low-quality diet and its replacement with the standard diet. Similarly, their daily body weight gain increased such that at the end of the 5 weeks, they were able to significantly ($P<0.05$) overtake the birds in group A in final body weights (975.82 g vs 1084.10 g). Economic analysis of the study showed that the feed cost of producing the broilers in group B (₦/kg broiler) was N206.04 as against ₦220.94 for group A, giving a saving of ₦14.32 per bird.
Keywords: Starter broilers, low-quality diet, compensatory growth.

INTRODUCTION

The development of poultry industry as an animal protein source in the diets of developing countries has been receiving a great deal of attention, particularly in Nigeria. Unfortunately, the supply of feeds has lagged behind the rapid and enthusiastic growth of the industry. The increasing demand for energy and protein feedstuffs and their subsequent spiraling cost, particularly of protein supplements, is already having adverse effect on the supply and, more importantly, on the quality of commercial feeds. This is partly because non-ruminants compete with humans for grains. The soybean (*Glycine max*) and the groundnut (*Arachis hypogaea*) currently play key roles in the feeding of poultry in Nigeria. However, with the increasing unavailability of these materials coupled with the high cost of imported ingredients, the prices of commercial poultry feeds have increased by about 2000 % within the last 20 years (Udedibie, 2003). This has resulted in a crisis situation in the industry. There is the need therefore to search for alternative sources of feedstuffs or methods of feeding poultry in the country. One possible way to reducing cost of poultry production in the country may be the application of compensatory growth phenomenon. According to Payne and Wilson (1999), considerable commercial use has been made of the phenomenon of compensatory growth particularly in the rearing of beef cattle because it is associated with greater efficiency in the use of stock feed. 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). It has been used in Britain to enhance the efficiency of growing heavy weight turkeys (Lesson and Summers, 1978). Their reports showed better body weight, feed utilization and meat yield for early restricted birds as compared to the control at 20 weeks of age. In the 80's, Israeli workers (Plavink and Hurwitz, 1985) investigated the possibility of utilizing a compensatory growth programme to improve the efficiency of market weight broilers. The result of the programme showed enhanced feed utilization and evidence of compensatory growth associated with fat deposition. This was confirmed by the work of Lee and Lesson (2001) and Summers (2002) who remarked that the potential benefits of feed savings and hence economic returns with the compensatory growth programme warrant serious consideration by the broiler industry. 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.

Limited work has been done on the phenomenon of compensatory growth in Nigeria. Recent work by 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.

The study herein reported was therefore designed to compare the performance and economics of production

of starter broilers fed temporarily on low-quality cheap diet with that of the group fed continuously on conventional broiler starter diet.

MATERIALS AND METHODS

Experimental Site

The experiment was carried out in the Poultry Unit of the Teaching and Research Farm of the Federal University of Technology. Owerri, Imo State-Nigeria. Owerri is in the south-eastern agro-ecological zone of Nigeria and lies between latitudes 4^0 4^1 and 6^0 3^1 and longitudes 6^0 15^1 and 8^0 15^1 with mean annual rainfall, temperature, relative humidity of 2500 mm, 26.5 -27^0c and 70 – 80 %, respectively. The duration of the dry season (number of months with less than 65 mm of rainfall) is 3 months and the annual evapotranspiration is 1450 mm. The soil is sandy loam with average pH of 5.5. (Atlas of Imo State, 1984; Adeyemi, 2011).

Experimental Diets

Two broiler starter experimental diets were made. Diet I was the standard balanced diet for starter broilers while diet 2 was a cheap, high fibre low-quality diet based mainly on palm kernel cake and wheat offal, not ideal for starter broilers. Ingredient composition of the diets is shown in Table 1.

Table 1: Ingredient Composition of the Experimental Diets

Ingredient (%)	Diet 1 (standard)	Diet 2 (low-quality)
Maize	50.00	25.00
Soya bean meal	28.00	14.00
Fish meal	2.00	2.00
Blood meal	2.00	5.00
Palm kernel cake	7.00	30.00
Wheat offal	7.00	20.00
Bone meal	3.00	3.00
Vit/Tm premix*	0.25	0.25
Salt	0.25	0.25
L-lysine	0.25	0.25
L-methionine	0.25	0.25
Total	100.00	100.00
Calculated Chemical Composition (% DM)		
Crude protein	23.26	20.17
Crude fibre	3.01	7.13
Ether Extract	3.73	4.27
Ash	3.20	3.37
ME (Mcal/kg)	2.70	2.40
Feed cost (₦/kg)	97.76	75.21

*To provide the following per kg of feed: Vitamin A, 12100 iu; Vitamin D_3, 2,500 iu; Vitamin E, 8 mg; Vitamin K, 2 mg; Vitamin B_1, 3 mg; Vitamin B_2, 5 mg;, Niacin, 15 mg; Pantothenic acid, 6 mg; Folic acid, 4 mg; Manganese, 8 mg; Zinc, 0.05 mg; Iron, 29 mg; Copper, 3 mg; Iodine, 1.2 mg; Selenium, 0.16 mg; Cobalt, 2 mg.

Experimental Birds and Design

A total of 72 day-old broiler chicks of Anak strain were used for the experiment. They were divided into two (2) groups of 36 birds each (A and B) and each group randomly assigned to one of the experimental diets, using completely randomized design (CRD). Each group was further sub-divided into three (3) replicates of 12 birds each and each replicate housed in a pen measuring 1.5 m x 2 m. The birds were distributed in such a way that the initial average weights of the groups were about the same. The group on diet 1 (group A) was fed the diet continuously for 5 weeks while the second group (B) was fed the low-quality diet for 2 weeks and then placed on the standard diet for the remaining three weeks. Water and feed were provided to them *ad libitum*. The birds were weighed at the beginning of the trial and weekly thereafter. The experiment lasted 35 days (5 weeks).

Data Collection and Analysis

Data were collected on feed intake, body weight gain, feed conversion ratio and cost of production. Feed intake was obtained by subtracting the weight of left-over feed from the weight of the feed offered the previous day. Feed conversion ratio which is the amount of feed used to achieve a unit gain in weight was obtained by dividing daily feed intake by daily body weight gain. Cost of production (₦/kg body weight gain) was determined by multiplying cost of feed (₦/kg) by feed conversion ratio.

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

RESULTS AND DISCUSSION

Performance of the Experimental Birds

Data on the performance of the experimental birds are shown in Table 2 and graphically in Figures 1 and 2.

Feed Intake

Average daily feed intake of both groups increased with time. The group on the low-quality cheap diet consumed less feed within the first 2 weeks of the trial when they were on the low-quality diet but thereafter started to record relatively higher feed intake than the group on standard diet although the difference between them was not significant (P>0.05). This trend was probably as a result of the large quantity of palm kernel cake and wheat offal in the low-quality cheap diet with resultant high dietary fibre. High dietary fibre has been reported to reduce feed intake of young chicks (Oluyemi and Roberts, 2002).

Growth Performance

Average live weight of the groups increased progressively from initial weight across treatments throughout the five weeks of the trial. Daily weight gain was, however, higher in the group on the standard diet during the first two weeks of the trial but an astronomical increase occurred in group B within the last three weeks during which they were placed on the standard diet. This resulted in significantly (P<0.05) heavier final body weight of the group. The same pattern occurred in daily body weight although statistically there was no difference between them (P>0.05).

Cost of Production

Cost of feed per kilogram of weight gain was higher for the control (group A) than the nutrient restricted group (group B) (₦220.94 vs ₦206.02), obviously due to the lower cost of the diet used for the birds in group B. This agrees with the report of Lawrence and Fowler (1997) on the economic benefit of phasing of nutrient intake. Economic analysis of the study showed that a saving of ₦14.32 per bird was achieved with application of the system used in producing the broilers in group B.

Table 2: Performance of the Experimental Starter Broilers

Parameters	Group A	Group B	SEM
Av. initial body weight (g)	37.25	36.76	0.07
Av. body weight at 2 weeks (g)	189.57[a]	162.96[b]	3.50
Av. final body weight (g)	975.82[b]	1048.10[a]	21.93
Av. body weight gain (g)	938.57[b]	1012.40[a]	22.36
Av. daily weight gain (g)	26.82	28.92	0.92
Av. daily feed intake in the 1st 2 weeks (g)	28.03	27.10	0.72
Av. daily feed intake in 5 weeks (g)	60.70	63.73	1.59
Feed conversion ratio (g feed/g gain)	2.26	2.20	0.05
Feed cost (₦/kg)	97.76	75.92	-
Feed cost of production (N/kg gain)	220.94	206.02	-

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

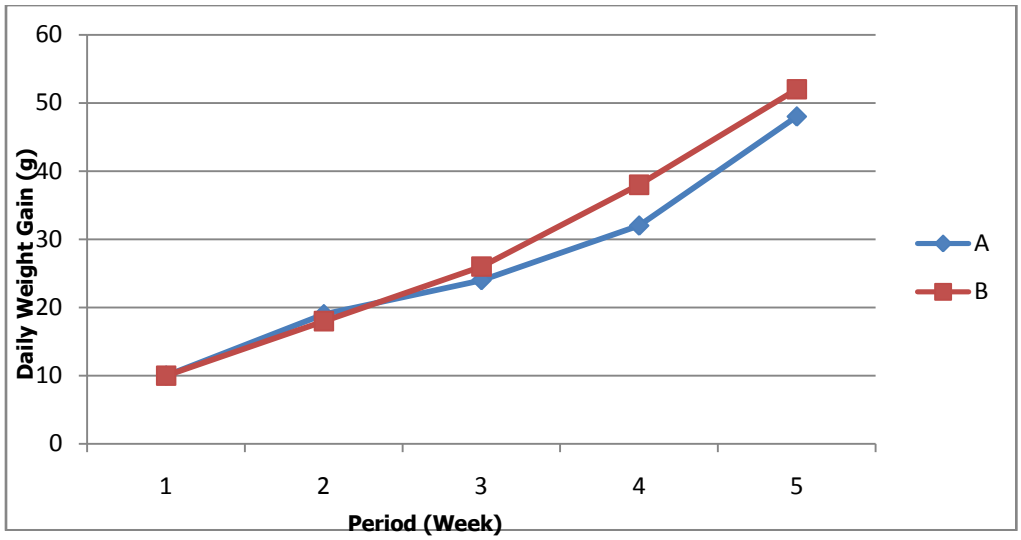

Fig.1: Average Daily Body Weight Gain by Week of the Experimental Birds

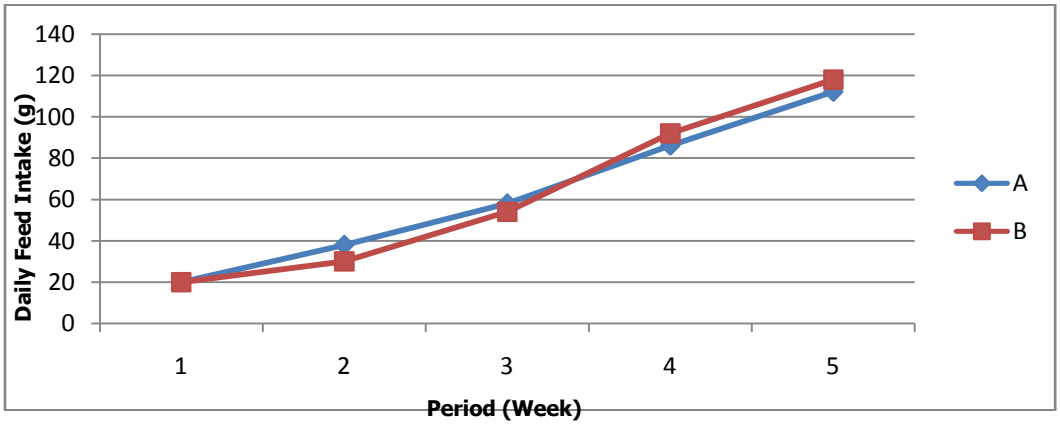

Fig.2: Average Daily Feed Intake by Week of the Experimental Birds

Discussion

The use of compensatory growth programme is relatively common with beef cattle and turkey that have relatively long feeding period extending into months as compared to the chicken broiler which has only a short growing period running into weeks. Therefore, it would be expected that broilers on a compensatory growth programme might have problem achieving similar weight at market age as compared to birds reared on a regular feeding programme (Plavink and Hurwitz, 1991). The results of this trial have tended to prove otherwise. The primary aim of any commercial poultry production is to make profit and broiler production is known to generate quicker returns than the other kinds of poultry production.

A new system of broiler production in our agro-ecological zone, the South-east, a system popularly called "brood and sell" is fast gaining ground. It is a system whereby the poultry farmer raises broilers up to the end of the starter phase and then sells them off. Such birds are very common in the markets today. The "brood and sell" system of production can therefore benefit from the practice of compensatory growth programme as demonstrated in this study. The results of the study showed that a bird on compensatory growth programme was produced at a cost ₦14.32 (fourteen naira thirty-two kobo) cheaper than the one on the regular feeding programme. Given that much cheaper feeds can be used than the one used in this study, the farmer on compensatory growth programme is expected to make much more profit than the farmer on regular feeding programme.

The profitability of the concept of phasing nutrient intake and compensatory growth as stated by Lawrence and Fowler (1997) has been demonstrated by this study. However, a sensible utilization of this concept is

advised to avoid subjection of the birds to undue growth restrictions as to make them to suffer. The word sensible implies that the phenomenon is well understood and that feed or nutrient restriction to retard growth is such that the birds do not suffer but are kept in a mild restriction allowing small but subnormal increase in live weight so that growth from relatively cheap nutrient source is maximized.

Conclusion

The results of the experiment have shown that restricted growth followed by compensatory growth results in better performance than continuous growth in the production of starter broilers, indicating that it is more efficient than continuous growth economically and biologically. Locally available and cheap feed resources such as palm kernel cake and wheat offal can be used to operate the system since the anti-nutritive factor, B-mannan, in palm kernel cake did not appear to constitute a health hazard to the birds.

It is therefore recommended that broiler farmers can use the phenomenon of compensatory growth to enhance their economic returns in the business.

REFERENCES

Adeyemi, A. 2011. Complete guide to Nigerian Tourism, Local Culture and Investment Opportunities. www.cometonigeria.com

Lawrence, T. L J. and Fowler, V.R. (1997). *Growth of Farm Animals*, CAB International, Wallingford U.K., Cambridge Press. 300p.

Lee, K.H. and Leeson, S. (2001). Performance of broilers fed limited quantities of feed or nutrients during seven to fourteen days of age. Poultry Science, 80: 446 – 454.

Leeson, S.J.D. and Summers, J.D. (1978). Dietary self selection by turkeys. Poultry Science, 80: 446 – 454.

Leeson, S.J.D. and Summers, J.D. and Caston, L.J. 1991. Diet dilution and compensatory growth in broiler. Poultry Science, 70: 867 – 873.

McDonald, P., Edward, R.A. and Greenhalgh, J.F.D. (1995). *Animal Nutrition*, 5th Edition, ELBS with Longman. 607p.

Meremikwu, V.N. (2009). Determination of the Efficiency of Compensatory Growth in Production of Heavy Broilers. PhD Thesis, Federal Univ. of Technology, Owerri. 168P.

Oluyemi, J.A. and Roberts, F.A. (2002). *Poultry Production in Warm Wet Climate*. The Macmillan Press Ltd, London, p. 134.

Payne, W.J.A. and Wilson, R.R. (1999). *An Introduction to Animal Husbandry in the Tropics.* 5th ed., Blackwell Science Limited, U.K.

Plavnik I. and Hurwitz, S. (1985). The performance of broiler chicks during and following a severe feed restriction at an early age. Poultry Science, 64: 348 – 355.

Plavnik I. and Hurwitz, S. (1991). Response of broiler chicks and turkey poults to feed restriction of varied severity during early life. British Poultry Science, 32: 343 – 352.

Snedecor, G.W. and Cochran, W.G. (1978). *Statistical Methods*, 6th ed., Iowa State Univ. Press, Ames-Iowa.

Summers, J.D. (2002). Compensatory Growth. http://www.omafra.gov.on.ca/english/livestock/poultry/fact/compgrow.htm.page30of3.

Udedibie, A.B.I. (2003). *In Search of Food: FUTO and the Nutritional Challenge of Canavalia Seeds*. Inaugural Lecture Series 6, Federal University of Technology, Owerri. FUTO Press Ltd, p. 7.