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Determination of the Optimal Four Phase Feeding Regime in a Fifty-Six Day Broiler Production Period

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Abstract

This study determined the variants of the four-phase feeding regime with the optimal performance and net income of broilers in a fifty-six day production period. Ninety-six, unsexed day-old Arbor Acer broiler chicks were distributed to groups of 24 birds each. Experimental broiler pre starter, starter, grower and finisher diets were formulated, produced and assigned to the four groups randomly in a completely randomized design (CRD) experiment as follows: T1(control) Starter, 0 – 28 days and finisher diet from 29 – 56 days, T2 (pre starter 0 – 6 days, starter 7 – 14 days, grower 15 – 28 days 29 – 56 days), T3 (pre-starter 0 –7 days starter 8 – 13 days, grower 14 – 42 days and finisher 43 –to 56 days) and T4 (pre-starter 0 – 7 days, starter 8 - 21 days, growers 22-35 days and finisher 36–56 days). Feed and water were offered *ad libitum*. Results indicated that birds on the four-phase feeding regimes (T2, T3, and T4) produced significantly ($p < 0.05$) higher final body weights and body weight gains, better feed conversion ratio and lower feed cost per kg body weight gain than those in the dual- phase [control (T1)] feeding regime. Birds on T3 produced the best values in most of the parameters measured. It is recommended that the four-phase feeding regime particularly T3 (pre-starter 0 –7 days, starter 8 – 13 days, grower 14 – 42 days and finisher 43 – 56 days) be adopted for optimal broiler performance and net income.

Keywords: Broilers, phase feeding, feed cost

Introduction

Multiphase feeding like the four-phase regime meets the nutrients requirement of commercial broiler chicken at specific points of their life cycle through optimizing diets. This occurs by matching mash feed ingredients with nutrient requirements of broilers in a certain stage of growth. Ferket *et al.* (2002) pointed out that feeding requirements are like “moving targets” having in mind considerable genetic variation in characteristic of growth especially when it is protein retention. Therefore, phase feeding is a good means of reducing feed cost during the grower and finishers phase (Pope and Emmert, 2001) without influencing performance and having the environmental benefit (Gutierrez *et al.*, 2008). Also the finding of Mehmood *et al.* (2012) showed that phase feeding is co-related with feed intake (FI), body weight gain and feed conversion ratio (FCR). Four phase feeding can help in managing the nutrient requirements of commercial broiler chicken needed to maximize productivity and performance. However, there are several variants of the four-phase feeding regime.

The objectives of this study, therefore, were: to determine the optimal growth performance net income of broilers on variants of the four-phase feeding regime in a 56 day production period.

Materials and Methods

Feedstuff used for the experimental diets were maize, soya bean meal, palm kernel cake, fish meal, bone meal, oyster shell, salt and vitamin/mineral premixes, lysine and methionine. The formulated experimental broiler chicks were pre-starter, starter, grower and finisher mash (Table 1).

Ninety-six, unsexed day-old Arbor Acre broiler chicks were divided into four groups of 24 birds each on weight equalization basis. Each group was further subdivided into three replicates of 8 birds on an equal basis. The experimental broiler chick groups were randomly assigned to the experimental broiler feed regimes (Table 2) in a completely randomized design (CRD). Feed and water were offered *ad libitum* and feeding trial lasted 56 days.

Table 1: Gross and calculated nutrient composition of experimental broiler diets

Ingredients*	Broiler Pre-starter	Broiler Starter	Broiler Grower	Broiler Finisher
Maize	45.30	48.00	50	61.25
Soya beans meal	34.75	28.25	28	23.30
Others*	19.95	23.75	22.00	15.45
Total	100.00	100.00	100.00	100.00
Calculated nutrient composition of experimented broiler diets (%)				
Metabolize Energy (kcal/kg)	2833.00	2850.00	2917.40	3030.30
Crude protein (%)	25.00	234.00	21.50	20.00

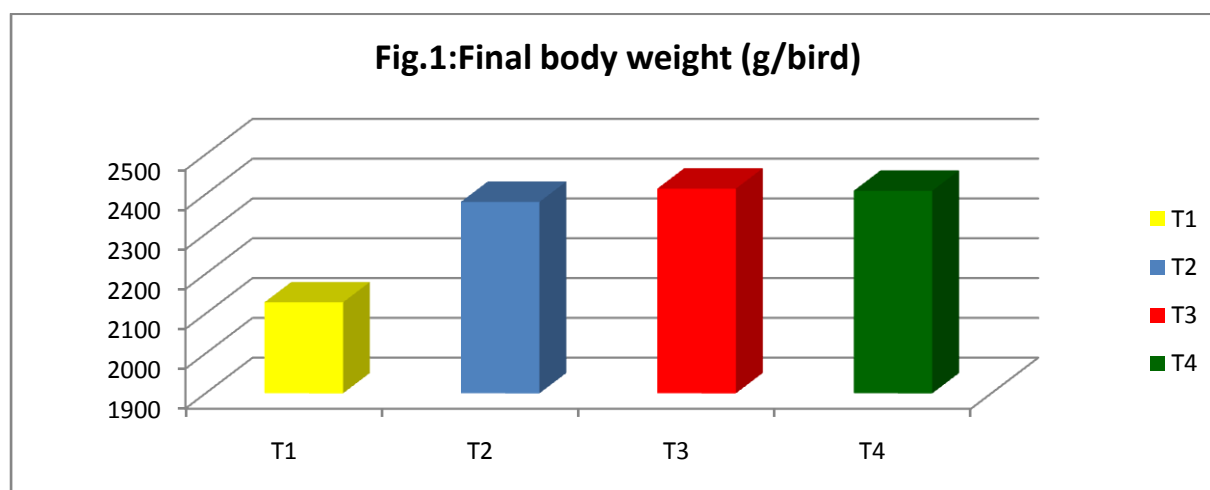
Table 2: Variants of the three-phase feeding regime representing the treatment groups

Feed type	Treatments (Feeding durations in days)			
	T1	T2	T3	T4
Pre-starter	-	0 - 6	0 - 7	0 - 7
Starter	0 - 28	7 - 14	8 - 14	8 - 21
Grower	-	15 - 28	15 - 42	22 - 35
Finisher	29 - 56	29 - 56	43 - 56	36 - 56

Means of data obtained were subjected to analysis of variance (ANOVA) and where significant differences were observed, the means were separated using the Least Significant Differences (LSD) (Snedecor and Cochran, 1975) using the R Core Team (2014).

Results and Discussion

Final body weight and body weight gain: The final body weight (Figure 1) and body weight gains (Table 3) of birds on the four-phase feeding regimes (T₂, T₃ and T₄) were significantly ($p < 0.05$) higher than the values obtained for birds on the control (T₁). Birds on T₃ however, recorded the highest body weight gain and final body weights (Ullah *et al.*, 2012).



Feed intake: The total feed intake of the birds on T₂, T₃ and T₄ were numerically higher than those on T₁ with birds on T₃ producing the highest feed intake value (Fig. 2). Feed intake increased with increasing duration of broiler starter diet feeding among the groups on the four-phase feeding regimes. (Ullah *et al.*, 2012).

Feed conversion ratio: Birds on the four-phase feeding regimes (T₂, T₃, and T₄) produced significantly ($p < 0.05$) better feed conversion ratio (FCR) than those on the control (T₁) (Table 3). Feed conversion ratio significantly improved as the time of feeding finisher diet reduced from 28 days to 14 days (Gajana *et al.* (2011).

Feed cost (N/kg): The feed cost (N/kg) ranged from N166.02 for diets in T₁ to N166.22 for diets in T₂, T₃ and T₄ (Table 3). The variation in feed cost/kg could have been due to the varied protein and energy levels in the diets (Pope and Emmert, 2001).

Feed cost per kg body weight gain (N): The feed cost per kg body weight gain (N) was significantly ($p > 0.05$) higher for birds in the control (T₁) than those in T₂, T₃ and T₄ (Fig. 3). Lowest value (N361.15) was, however, obtained among birds in T₃. These results agree with the report of Pope and Emmert (2001) that cost of production generally decline as the time of feeding broiler starter and finisher rations reduced.

Net income of broilers raised on variants of the four-phase feeding regime: Birds on T₃ produced the highest revenue (N2, 504.29) while those in the control (T₁) produced the least value (N2, 218.50). Oyedeji *et al.* (2005) stressed that feeding varying levels of protein and energy will positively impact livability and increase the live weight of broilers, which will consequently result in profitability of broiler farming.

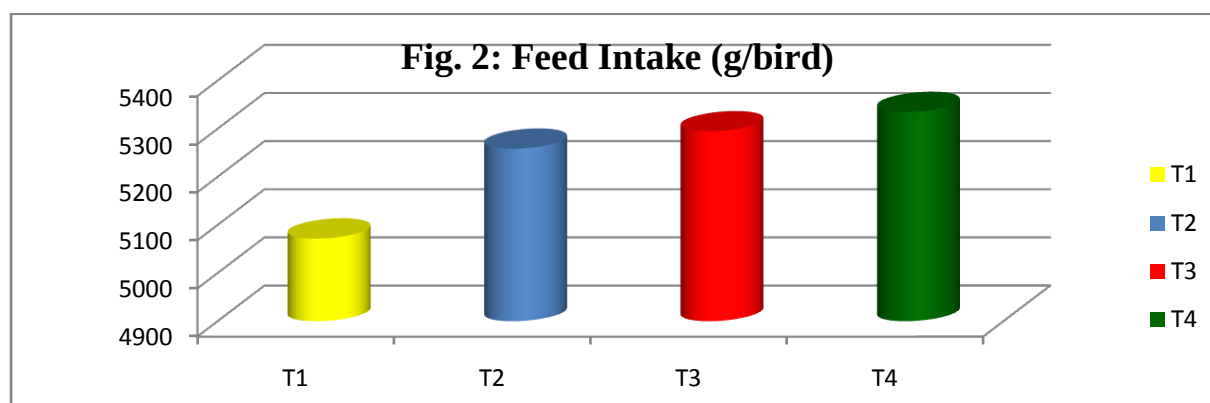


Table 3: Performance of Broilers on Four Phase Feeding Regimes

Parameters	Treatments (Feeding Duration in days)				SEM
	T ₁	T ₂	T ₃	T ₄	
Total body weight gain (g)/bird	2084.82 ^b	2337.20 ^a	2370.54 ^a	2365.18 ^a	43.72
Feed conversion ratio	2.43 ^a	2.25 ^b	2.24 ^b	2.26 ^b	0.04
Feed cost (₦/kg)	166.02	166.22	166.22	166.22	0.00
Mortality (%)	12.5 ^a	4.2 ^b	4.2 ^b	4.2 ^b	1.88

^{ab} : Means within a row with different superscript are significantly different ($p < 0.05$).

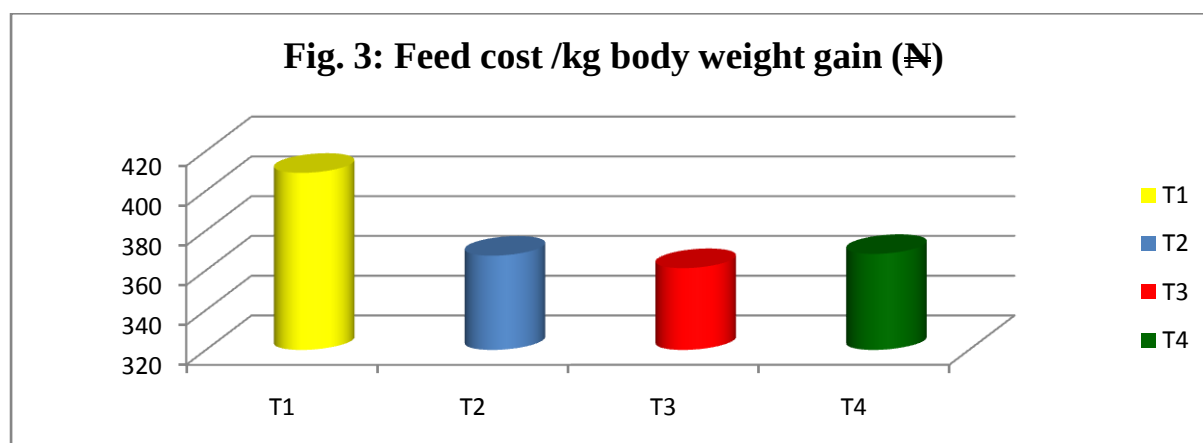


Table 4: Net income of broilers raised on variants of the four-phase feeding regimes.

Parameters	Feeding Regimes			
	T1	T2	T3	T4
Variable Input cost (₦/bird) (A)	1757.51	1592.12	1574.43	1595.55
Price per kg live weight (₦)	1000.00	1000.00	1000.00	1,000.00
Revenue per bird (₦/bird) (B)	2218.50	2470.95	2504.29	2498.93
Net income per bird (B – A)	460.99	878.83	929.86	903.38
*Estimated profit (%)	26.17	32.00	50.00	49.00

^{ab}: Means within a row with different superscript differ significantly ($P < 0.05$)*Capital input cost not discounted.

Conclusion and Recommendations

The results of this study indicated that the four-phase feeding regimes produced a much better performance of broilers than the two-phase (control) feeding. Most parameters measured, however, indicated that T₃ with the following feeding durations: 0-7 days pre-starter, 8-14 days, 15-42 days grower and 43-56 days finisher was the optimal four-phase feeding regime for broilers. It

is recommended that the four-phase feeding regime is used in broiler feeding particularly, the T3 regime to achieve optimum performance in terms of growth, cost reduction, and profitability.

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