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Full Length Research Paper

Response of broiler finisher birds to varying regimes of feeding

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In a study to determine the response of finisher broiler birds to varying regimes of feeding, 240 twenty-eight days old unsexed Hubbard broilers were subjected to different regimes of feeding where the control (T_1) was fed ad-libitum, T_2 was fed 9% of body weight once daily, T_3 was on 9% of body weight, split and fed twice daily and T_4 was fed 9% of body weight, split into three and fed three times daily in a completely randomized design for 28 days. Each treatment was replicated three times with 60 birds in each treatment and 20 birds per replicate. Growth indices of final weight, change in weight, average weight gain, average feed intake, feed conversion ratio (FCR), feed cost per kg, feed cost/kg gain and mortality were determined. Significantly higher ($p<0.05$) change in weight was observed for T_1 birds which consumed significantly higher ($p<0.05$) more feed than the other treatments. T_2 produced the cheapest ($p<0.05$) meat per kg feed as well as the best FCR which was however statistically similar ($p>0.05$) other treatments. Results showed that feed restriction did not impact negatively on the health of the birds as there was no mortality. T_2 birds utilized their feed better than other treatments had a superior feed cost per kg gain and consumed less feed in comparison with the control.

Keywords: Finisher broiler birds, feeding regimes, growth indices

INTRODUCTION

The stiff competition between man, other monogastrics and user industries, seasonality of plant feed ingredients, high exchange and inflation rates, inconsistent economic policies, have all elicited prohibitive cost of poultry feed which accounts for 70% - 80% of the total cost of poultry production (Wilson and Beyer, 2010). This is challenging the continued reliability on the poultry enterprise as a major supplier of affordable animal protein to man. The success of raising broilers for maximum weight gain depends not only upon the strains of the birds and management but also on feeding patterns and quality (Mehmood *et al.,* 2013). Therefore, any improvement on the performance of broilers due to diet can inevitably have a profound effect on the profitability of broiler production. The full potential of poultry products as a panacea to insufficient animal protein intake of people in the developing countries of the world has not been achieved principally because of inadequate supply of conventional feedstuffs at economic prices. Any effort to improve commercial poultry production and enhance its efficiency needs to emphasize on better utilization of existing resources (Abbas *et al.,* 2015). This study was therefore designed to investigate the response of broiler finisher birds to different regimes of feeding as a means of reducing high cost of feeding by maximizing nutrient utilization, increase net profit and reduce wastage which may have considerable negative impact on cost of production and the environment.

MATERIALS AND METHODS

Experimental site

This study was carried out at the poultry production unit of the Imo State University Teaching and Research Farm,

Owerri, Nigeria. Situated on longitudes 7°. 01^{1} 6^{11} E and 7°. $03^{1}.00^{11}$ E and latitudes $5^{0}.28^{1}.24^{11}$ N and $5^{0}.30^{1}.00^{11}$ N (Imo State Ministry of Land and Survey Atlas, 2004).

Procurement and rearing of experimental birds

A total of 280 day-old unsexed Hubbard breed of broiler chicks were procured from a reputable dealer and brooded for 28 days. Thereafter, 240 of the brooded birds were selected on the basis of sound physical appearance and good health based on visual appraisal. The selected birds were randomly allotted to four feeding (treatment) regimes represented as T_1, T_2, T_3 and T_4. Each treatment was replicated three times in a completely randomized design, with 60 birds in each treatment and 20 birds in each replicate. Adequate number of feeders and drinkers were provided for the birds in each replicate so as to achieve equal access to feed and water. Standard and sound management practices of sanitation, appropriate vaccination and medication were strictly adhered to throughout the period of the study. The study lasted for 28 days.

Experimental Diet

Balanced broiler finisher diets were formulated for the birds. The ingredients composition of the diet is given in (Table 1). The experimental treatments were offered the same diet formulation but at varying regimes of feeding thus:

Table 1. Composition of ingredients for experimental diet.

Ingredients	% inclusion level
Whole maize	54.00
Soybean meal	10.00
Palm kernel cake	12.00
Fish meal	4.00
Wheat offal	5.20
Groundnut cake	12.00
Bone meal	4.00
Vit./min. premix	0.25
Sodium chloride	0.30
Lysine	0.15
Methionine	0.10
Total	100.00
*Calculated nutrient level	
% Crude protein	20.48
ME (kcal/kg	2871.20
% Crude fiber	4.02
% Ether extract	4.13
% Calcium	1.69
% Phosphorus	1.10
% Lysine	1.05
% Methionine	0.47

T_1 (control)-ad-libitum
T_2 - 9% of body weight once daily
T_3 - 9% of body weight split and fed twice daily
T_4 -9% of body weight split and fed trice daily i.e 3% of body weight fed three times.

Experimental design, data collection and data analysis

The experimental design was completely randomized design (CRD). Live weights of the birds were taken at the start of the study and birds under feed restriction were weighed daily thereafter with salter top loading weighing scale while the birds on control were weighed weekly. The daily body weights of the feed restricted birds were multiplied by 0.09 to obtain their daily feed supply. The daily feed intake of each replicate was measured by subtracting the weight of left over feed from the weight supplied.

The final weights of the birds were recorded at the termination of the experiment and change in weight was recorded as the final weight minus the initial weight. Feed conversion ratio (FCR) was calculated thus:

$$FCR = \frac{\text{Average daily feed intake}}{\text{Average daily weight gain}}$$

Feed cost per kilogram was calculated by summing the cost of the feed ingredients of the formulation and dividing by 100. Feed cost/kg gain was calculated as the function of FCR and feed cost per kg i.e FCR x feed cost/kg = feed cost/kg gain. The data were subjected to one-way analysis of variance (ANOVA) according to Steel and Torrie, (1980) while differences in treatment means were separated using the Duncan's Multiple Range Test as outlined by Onuh and Igwemma, (1998).

RESULTS AND DISCUSSION

Performance indices of finisher broiler birds on varying regimes of feeding are summarized in (Table 2). Change in weight declined from T_1 to T_4 with T_1 (control) being significantly higher ($p<0.05$). T_2, T_3 and T_4 were however similar ($p>0.05$). The higher significant ($p<0.05$) change in weight observed in T_1 could be due to optimum time of feeding.

Vadivukkarasi *et al.* (2007) observed higher weight gain in groups of Japanese quails that received maximum time of feeding. It has been reported that feed restricted birds gained less weight than birds on maximum feeding time (Benyi *et al*., 2010; Benyi *et al.,* 2011; Jalal and Zakavia, 2012; Njoku *et al.,* 2012). This however contrasts with the finding of Abdul and Afriani, (2017) who stated that there was no significant difference ($p>0.05$) among the treatment

Table 2. Performance of the experimental birds.

Parameters	T_1	T_2	T_3	T_3	SEM
Mean initial body weight (g)	705.56	708.33	708.33	705.56	8.56
Mean final body weight (g)	1687.22^a	1353.88^b	1276.11^c	1222.22^c	17.19
Mean change in weight (g)	981.66^a	645.55^b	567.77^b	516.66^b	42.86
Daily change in weight (g)	35.05^a	23.05^b	20.27^c	18.45^c	0.26
Daily feed intake/bird (g)	146.78^a	84.00^b	82.13^b	80.24^b	1.72
Feed conversion ratio	4.16	3.64	4.05	4.34	0.26
Feed cost per kg (N)	155	155	155	155	NA
Feed cost/kg weight gain (N)	644.8^{ab}	564.20^c	627.75^b	672.70^a	10.82
Mortality	0.00	0.00	0.00	0.00	NA

NA = Not analyzed
SEM: Standard error of mean
Means within the same horizontal row with different superscripts are significantly different ($p<0.05$).

groups at the finisher phase. Dissanayaka and David (2017) even posited from their findings that 90% of the diet performed better ($p<0.05$) than the control at the finisher phase. Contrasting results may be due to the intensity of feed restriction. Even though there was no significant difference ($p>0.05$) among the treatments for feed conversion ratio, T_2 showed better feed conversion ratio (3.64) which reflected in a significantly superior ($p<0.05$) feed cost per kg weight gain. Vathana *et al.* (2002) reported improved feed efficiency and minimization of feed wastes with increase in feed restriction.

Rincon and Leeson, (2002) also observed better feed utilization efficiency in broilers kept on restricted feeding as compared to those fed ad libitum. McDonald *et al.* (2010) stated that an increase in the quantity of feed consumed by an animal generally causes an increase in the passage of digesta and subsequently the feed is exposed to a shooter period of time to the action of digestive enzymes and as such digestibility and feed utilization are compromised. Feed intake was similar ($p>0.05$) for treatments on restricted feed and were significantly lower ($p<0.05$) than the control. Significantly higher feed intake was observed in full-fed (ad libitum) birds as compared to restricted fed birds (Ewa *et al.,* 2006; Mahood *et al.,* 2007; Ocak and Erener, 2005). The result of the study showed that T_2 recorded the best feed cost per kg weight gain and this could be attributed to efficient feed utilization.

Conclusion

Birds fed 9% of their body weight once daily (T_2) exhibited better feed utilization (FCR) than the other treatments, had a superior feed cost per kg weight gain and consumed less feed in comparison to the control. The lower mean change in weight for T_2 when compared with the control could be compensated for by the reduced cost of production.

Authors' declaration

We declared that this study is an original research by our research team and we agree to publish it in the journal.

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