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Effect of feed restriction on performance of broiler chicken

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Abstract

The study was conducted to find the appropriate level of quantitative feed restriction without affecting the performance in broiler chicken. One hundred fifty day old commercial broiler chicks were individually weighed and distributed randomly into five treatment groups of three replicates of ten chicks each. The treatment groups comprised control (T₁) without any feed restriction and T₂, T₃, T₄ and T₅ with 5%, 10%, 15% and 20% feed restriction respectively. The results indicated that body weight and body weight gain decreased with increase in the level of feed restriction with significant decline for 10% feed restriction and above. Highest feed consumption was observed in control group and lowest in the group where in 20% of feed restriction was done. No significant effect ($p > 0.05$) was however observed in the FCR of broiler chicken among all treatment groups. Highest live ability of 97.78% was observed in 15% feed restriction group while the lowest live ability was observed in *ad-lib* fed control group. Overall performance as indicated by taking in to consideration all the performance parameters together in form of BFEI index revealed most optimum value of 1.39 for 15% feed restricted group. Therefore it was inferred that 15% feed restriction was the optimum level of feed restriction that could be applied to broilers without affecting their overall performance.

Keywords: broilers, feed restriction, body weight, FCR

1. Introduction

Growth performance of broiler chicken improved by genetic progress, improvement in nutrition and controlled environment. Unfortunately, when birds are fed *ad libitum*, the fast growth rate is accompanied by body fat deposition, mortality and incidence of metabolic disorders such as ascites, sudden death syndrome and high occurrence of skeletal problems. Fat is an undesirable product that not only increases the occurrence of metabolic diseases and skeletal deformities, but also causes problems in feed efficiency, difficulties in meat processing, and rejection of meat by consumers for health reasons [1]. It is a proven fact that broilers with heavy deposits of abdominal fat indicate poor finishing [2]. Over the last two decades there has been increase in consumer preferences for leaner meat because of correlation between cardiovascular diseases and consumption of certain fats by human. This thing in turn led the researchers to concentrate on reducing abdominal fat deposition in broiler chicken and produce leaner carcasses [3]. One of the managerial interventions to reduce fat deposition is feed restriction. As feed cost encompasses more than 70% of the total production cost in broiler chicken, restricted feeding prevents the feed wastage and thereby minimizes the cost of production. There are different methods of feed restriction employed in broiler production to improve efficiency of feed utilization and weight gain, and these include intermittent feeding, skip-a-day feeding [4], appetite suppression with glycolic acid [5], time of restriction [6], diet dilution [7] and quantitative feed restriction [8]. The researchers documented that feed restriction reduced feed intake, weight gain and body weight in all feed restricted birds. However, other investigators [9] observed no significant effects of feed restriction on body weights, average daily gain and average daily feed intake at week 6. In view of the conflicting reports on effect of feed restriction on broiler performance, this study was undertaken to examine the effectiveness of different levels of feed restriction on various performance parameters.

2. Materials and Methods

The study was conducted in the poultry farm, Division of Livestock Production Management, F.V.Sc & A.H., Shuhama, Alusteng to find the appropriate level of quantitative feed restriction

in broiler chicken. A standard broiler ration comprising of pre-starter and starter broiler diet was fed to the birds in experiment. One hundred fifty day old commercial broiler chicks were procured and reared in cages for a period of 36 days during which the chicks were subjected to similar management conditions such as light, space, temperature, ventilation and relative humidity. Fresh and clean water was available *ad libitum*. All the chicks were vaccinated against Ranikhet disease on 5th day with F₁ strain vaccine and B₂K vaccine against Infectious Bursal Disease on 16th day. One day old chicks were individually weighed, distributed randomly into five treatment groups of three replicates with ten chicks each. The treatment groups comprised of the control (T₁) without any feed restriction, T₂, T₃, T₄ and T₅ with 5%, 10%, 15% and 20% feed restriction. Feed Restriction in treatment groups (T₂- T₅) was based on feed intake of a control group (T₁) on a preceding day. Performance parameters like live body weight at 0 day and at 5 weeks of age and feed consumption from 0-5 weeks of age was recorded. The body weight gain and FCR for the period was calculated. The Group wise mortality was also recorded and economics based on Broiler Farm Economy Index (BFEI) was worked out using the formula:

$$\text{BFEI} = \frac{\text{Average live weight (Kg)} \times \text{Percent Liveability}}{\text{FCR} \times \text{Growing Period (days)}}$$

The data obtained was analysed by one-way ANOVA [10] and to test significance of difference between means Duncan's multiple range test [11] was used. Analysis was carried out using Statistical Package for the Social Sciences (SPSS ver 15.0).

3. Results and Discussion

The initial body weight, 5 week body weight, body weight gain, feed consumption, FCR, liveability and BFEI of different groups subjected to different levels of feed restriction is depicted in Table-1. The results revealed that body weight and body weight gain decreased with increase in the level of feed restriction. A significant effect ($p < 0.05$) was observed in the body weight and body weight gain of broiler chicken beyond 5% (i.e. T₃, T₄ and T₅) restriction level when compared with the control group. However, no significant effect in the body weight and body weight gain was observed between the control group and the group wherein 5% feed restriction was done (T₂).

There was a significant effect of level of feed restriction on feed consumption of broiler chicken. Highest feed consumption was observed in control group and lowest in the group wherein 20% feed restriction was done. However, no significant ($p > 0.05$) effect on feed consumption was noticed between the control group and the group wherein 5% feed restriction was applied (T₂). No significant effect ($p > 0.05$) was observed in the FCR of broiler chicken among various treatment groups. Numerically best FCR was found in the control group followed by the group wherein 20% feed restriction was applied (T₅), the poor FCR was found in the group wherein 10% feed restriction was done (T₃). The liveability of 71.11%, 75.56%, 88.89%, 97.78% & 86.67% was observed in T₁, T₂, T₃, T₄ & T₅ respectively and the Broiler farm Economy Index (BFEI) of the groups was calculated 1.377, 1.223, 1.304, 1.387 & 1.339.

The results of present study revealed that body weight and body weight gain decreased with increase in the level of feed restriction. Similar results has been reported by other workers that feed-restricted birds gained less weight than fully-fed birds [12, 13, 14, 15]. The result of the present study contrasts with those of other workers [16, 17] who observed similar weight gain in feed-restricted and *ad libitum* fed birds. On the other hand, Lee and Leeson [8] reported higher weight gain in birds subjected to feed restriction than in those fed *ad libitum*. The contrasting results may be due to the intensity or level of feed restriction. Milder feed restriction such as 15% appeared beneficial, and could be practiced and was therefore, recommended to farmers [18]. With regard to economics of production, taking into consideration all the parameters like body weight gain, feed consumption, FCR and liveability taken together in form of an index it was evident that 15% feed restriction was ideal. Comparing different levels off feed restriction with *adlib* feeding revealed that no doubt body weight gain decreased in feed restricted groups, the decreased feed consumption consequent to restricted feeding resulted in comparable FCR between feed restricted and *adlib* fed groups. A profound effect on liveability with highest liveability of 97.77% in 15% feed restricted group as compared to 71.11% in *adlib* fed group probably affected the overall performance. The overall performance in terms of BFEI index revealed most optimum value of 1.39 for 15% feed restricted group. A BFEI value of 2.0 and above indicates better management of the farm and optimal performance of the birds; whereas a value less than 1.3 indicates poor performance of the flock [19].

Table 1: Performance parameters of broiler chicks subjected to different levels of feed restriction

Treatments	T ₁ (Control)	T ₂ (5% feed restriction)	T ₃ (10% feed restriction)	T ₄ (15% feed restriction)	T ₅ (20% feed restriction)
Initial Body Weight (0 day) g	57.34 ±0.21	59.03 ±0.43	57.38 ±0.80	58.55 ±0.88	57.31 ±0.54
Final Body Weight (36 day/5 Weeks) g	1150.41 ±65.71 ^b	1034.48 ±53.51 ^{ab}	955.95 ±25.74 ^a	915.06 ±7.64 ^a	923.49 ±14.57 ^a
Body Weight Gain (0-5 Weeks) g	1093.06 ±65.88 ^b	975.45 ±53.86 ^{ab}	898.57 ±26.38 ^a	854.84 ±7.95 ^a	866.18 ±14.99 ^a
Feed Consumption (0-5 Weeks) g	2155.65 ±81.30 ^d	2060.34 ±2.25 ^{cd}	1947.26 ±2.13 ^{bc}	1838.30 ±1.62 ^{ab}	1726.90 ±0.83 ^a
FCR (0-5 Weeks)	1.97 ±0.06 ^a	2.12 ±0.12 ^a	2.17 ±0.06 ^a	2.15 ±0.02 ^a	1.99 ±0.03 ^a
Liveability % age (0-5 Weeks)	71.11	75.56	88.89	97.78	86.67
BFEI (0-5Weeks)	1.377	1.223	1.304	1.387	1.339

Means across columns bearing different small case superscript differ significantly ($P < 0.05$)

4. Conclusion

In conclusion, the milder feed restriction to the extent of 15% is beneficial, economical and practicable, and has no detrimental effects on birds' welfare and performance.

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