

EFFECT OF HIGH-DENSITY DIET ON THE GROWTH PERFORMANCE AND ECONOMIC EFFICIENCY OF MALE BROILERS

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Abstract: An experiment was carried out to find the effect of sex separate feeding in male broilers. 864 male broilers (Cobb-400) were divided into six groups each with four replicates of 36 birds each. Chicks were fed with broiler pre starter diet containing 23/2900 kcal (T1), 23/3000 kcal (T2), 23/3100kcal (T3), 24/2900 kcal (T4), 24/3000 kcal (T5), 24/3100kcal (T6) from 0-7 days of age and starter diet containing 22/3000 kcal (T1), 22/3100 kcal (T2), 22/3200kcal (T3), 23/3000 kcal (T4), 23/3100 kcal (T5), 23/3200kcal (T6) from 8-21 days of age and finisher diet containing 21/3100 kcal (T1), 21/3200 kcal (T2), 21/3300kcal (T3), 20/3100 kcal (T4), 20/3200 kcal (T5), 20/3300kcal (T6) from 22 -42 days of age. The results revealed that feeding of male broilers with high density diet has significantly ($P<0.05$) improved weight gain (4.80%) and FCR (1.69 vs 1.78) over that of control. The breast meat was significantly ($P<0.05$) increased up to 9.97 per cent by high density diet. High density diet improved broiler production index (BPI) to 5.47% over control. However, the net profit per kg of live weight was increased in BIS protein with low energy diet by Rs.3.78 when compared to birds fed with control diets. In conclusion, sex separate feeding with diets BIS specifications had positive effect on the growth performance in male broilers.

Keywords: Broiler, protein level, metabolizable energy, carcass traits, sex-separate growing.

Introduction

The genetic potential for growth of the modern broiler chicken is continuously improving by 50 g each year. As a result of this genetic improvement, today's broiler is gaining an average of 50 g per day under conditions existing in developed countries, but it is estimated that the same broiler has the potential to double this performance (Creswell, 2007). The sexual difference of the birds has made a big difference in physiological requirements and also nutrient requirements. Veerapen (1999) showed that Ross 208 male broilers require less feed to produce a unit gain in body weight, and are more efficient feed converters than females and also male broilers could be slaughtered 4.5 days earlier than females, saving on feed costs, when raised separately. The nutrient requirements of males and females are different due to the faster growth (Creswell, 2007). However, there is a paucity of studies on the nutrient requirements of male and female broilers and effect of sex separate feeding of

broilers and it is the field problems addressed by the farmers. Hence, an experiment was carried out to find the effect of different protein and energy level on the production performance of male broilers.

Materials and Methods

Eight hundred and sixty-four male broilers (Cobb-400) were divided into 6 groups each with 4 replicates of 36 birds each. The experimental birds were fed with six types of experimental rations. Chicks were fed with broiler pre starter diet containing 23/2900 kcal (T1), 23/3000 kcal (T2), 23/3100 kcal (T3), 24/2900 kcal (T4), 24/3000 kcal (T5), 24/3100 kcal (T6) from 0-7 days of age and starter diet containing 22/3000 kcal (T1), 22/3100 kcal (T2), 22/3200 kcal (T3), 23/3000 kcal (T4), 23/3100 kcal (T5), 23/3200 kcal (T6) from 8-21 days of age and finisher diet containing 21/3100 kcal (T1), 21/3200 kcal (T2), 21/3300kcal (T3), 20/3100 kcal (T4), 20/3200 kcal (T5), 20/3300kcal (T6) from 22-42 days of age. The experimental diets were analyzed as per AOAC (2007). The birds were fed *ad libitum* and provided clean drinking water. Standard broiler managemental practices were followed.

Body weight and feed intake recorded bi-weekly interval by using an electronic balance with 0.1 g accuracy. Feed conversion ratio was calculated by dividing average feed consumption by average body weight gain. Feed efficiency was calculated at 2nd, 4th and 6th week of age. Also mortality recorded bi-weekly interval. Bi-weekly body weight gain recorded as, weight of bird in gram minus hatch weight in gram and Feed conversion ratio (FCR) was calculated as a feed consumption (in kg) to body weight (in kg). All the statistical analysis was performed by using statistical Package for Social Science (SPSS, 1999) software (version 20.0). Means were compared by Duncan multiple range comparison test with level of significance at 5 percent level.

All the experimental procedures were assessed and approved by the Institutional Animal Ethics Committee from the Tamil Nadu Veterinary and Animal Sciences University, Chennai -600 051 and all the institutional guidelines were followed.

Results and discussions

The results revealed that feeding of male broilers with high density diet (i.e 24/23/21 per cent crude protein, 3100/3200/3300 of kcal ME /kg of feed) had significantly ($P < 0.05$) improved weight gain (103 g) and FCR (1.69 vs 1.78) over that of control fed with BIS rations. Starr Jackson, 1982^[5] observed that increased growth was observed up to the 24% crude protein level for male broilers, resulting in a significant ($P < .01$) protein x sex interaction. Moran (1973) also reported similar observations in broilers. In this study, body weight increased

with increased dietary energy levels at the higher protein levels as reported by Starr Jackson *et al*, 1982. Similar findings were reported by Summers *et al*. (1964) who observed a growth depression with increasing levels of dietary energy when dietary protein was reduced below 18%. However, with higher protein levels, this trend was reversed.

The positive interaction was observed between protein and energy for feed efficiency ($P < .05$) which resulted in the improvement of feed conversion ratio by increasing protein levels with the low energy diet. Conversely, Sunde (1956) who observed that an increase in dietary protein from 20 to 28% in low energy diets actually reduced feed efficiency and thus stressed the necessity of a proper balance between dietary protein and energy. However, Kazemi and Amin (1977) observed no significance difference in feed efficiency when comparing highly unbalanced diets to a balanced control.

The ready-to-cook weight was not affected whereas, the breast meat was significantly ($P < 0.05$) increased up to 9.97 per cent by high density diet in the male boilers. This finding was contrary to the findings of Lilly *et al*, 2011 who observed no differences ($P < 0.05$) existed among birds fed with different amino acid levels diets with regard to carcass yield and thigh yield.

Table1. Effect of high-density diet on the growth performance and economic efficiency of male broilers

Protein	Metabolizable Energy (kcal/kg)	6 th week Weight gain (g)	6 th week Feed consumption (g)	6 th week FCR	BPI	Net profit / kg live weight (Rs)
Protein x Energy Interaction						
BIS recommended level Prestarter/Starter/ Finisher 23/22/20	2900/3000/3100 (Low)	2048.88 ^b ±31.24	3647.01 ^{bc} ±42.34	1.78 ^b ± 0.03	272.97 ^b	14.83 ^a
	3000/3100/3200 (BIS)	2165.51 ^a ±30.11	3984.54 ^a ±38.45	1.84 ^a ± 0.02	254.77 ^c	11.05 ^b
	3100/3200/3300 (High energy)	1893.46 ^c ±45.24	3483.97 ^d ±34.29	1.84 ^a ± 0.03	237.55 ^d	7.14 ^c
High protein diet Pre starter/Starter/ Finisher 24/23/21	2900/3000/3100 (Low)	1919.32 ^c ±38.49	3243.65 ^e ±42.17	1.69 ^c ± 0.04	254.33 ^c	10.45 ^b
	3000/3100/3200 (BIS)	2061.54 ^b ±29.37	3607.70 ^c ±28.43	1.75 ^b ± 0.03	287.31 ^a	11.69 ^b
	3100/3200/3300 (High energy)	2070.21 ^b ±36.25	3684.97 ^b ±43.29	1.77 ^b ± 0.03	275.70 ^b	11.39 ^b
Effect of protein						
BIS	23/22/20	2042.56 ^b ±35.34	3880.86 ^a ±32.45	1.90 ^a ± 0.04	253.21 ^b	13.45 ^a

High protein diet	24/23/21	2145.34 ^a ±31.45	3711.90 ^b ±32.21	1.78 ^b ± 0.03	270.24 ^a	11.20 ^b
Effect of Energy						
Low energy diet	2900/3000/3100	1987.26 ^b ±39.21	3895.02 ^a ±40.25	1.96 ^a ± 0.06	254.21 ^a	12.45 ^b
BIS diet	3000/3100/3200	2058.21 ^a ±25.64	3869.43 ^a ±31.27	1.88 ^b ± 0.02	259.27 ^a	13.28 ^a
High energy diet	3100/3200/3300	1927.46 ^{bc} ±41.54	3687.58 ^b ±32.54	1.91 ^{ab} ± 0.05	245.87 ^b	10.27 ^c

The livability was not significantly ($P>0.05$) affected by the high-density diet in this experiment. However, there was numerical improvement in the survivability of broilers fed with high density diets. The present finding was contrary to the findings of Corzo *et al.*, 2005 who noted no difference in the survivability of broilers fed with high- and low-density diets. High protein with BIS energy level diet improved broiler production index (BPI) in male broilers (287.31) as compared with control (254.77). The net profit per kg of live weight was also improved in BIS protein with low energy diet by Rs.3.78 when compared to birds fed with control diets. Similarly, high protein, high energy and low energy experimental diets reduced the net profit by Rs.2.25, 3.01 and 0.83 respectively per kg of live weight. Similar finds were noted by Allison *et al.* (1978) and Kaiser and Strong (1980) who observed that the low energy diet being the most economically efficient ration.

Conclusion

In conclusion, the broilers fed with BIS 2007 recommended protein and energy level diet had positive effect on the production performance of male broilers based on net profit per kg of live weight realized.

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Conflict of Interests

The author expresses no conflict of interest with regard to the information discussed in this manuscript.

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