

<http://www.pjbs.org>

PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

ANSI*net*

Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Early Feed Restriction, a Tool to Improve the Feed Efficiency in Broilers

A. Mahmud, F.M. Khattak, Z. Ali, T.N. Pasha and U. Farooq

Department of Poultry Production, University of Veterinary and Animal Sciences,
Big Bird (Pvt) Ltd. 2A Ahmad Block New Garden Town, Lahore, 54000 Pakistan

Abstract: A restricted feeding trial involving broiler chicks was conducted to investigate the effects of different levels of feed restriction. An experiment was carried out with straight run broiler chicks (Hubbard) in which commercial feed from 11 to 18 days of age was restricted to 100, 90, 80 and 70% in groups A, B, C, and D, respectively. Each treatment had 3 replicates, having 30 chicks each. The results indicated that feed restricted with 70 and 80% resulted in a significant ($p<0.05$) reduction in body weight at the age of 18 days. After return to adlib feeding the birds were fully recovered from their body weight depression. Comparable increase in all growth parameters (body weight, feed intake and FCR) were observed in birds fed on restricted diets in week 2 and 3. However in last week, the significant improvement ($p<0.05$) in weight gain was noted in group B (90% restriction) but FCR was significantly improved in group D (50% restriction) when compared with control.

Key words: Feed restriction, broilers performance, feed efficiency

INTRODUCTION

When an animal, whose growth has been related by dietary restriction, is given adequate nutrition, it grows at a faster rate than an animal of the same age that had not been subjected to restriction. (Jones and Farrel, 1992). Al-Taleb (2003) reported that feed restriction programme applied to broiler chickens have produced varied response with respect to growth performance (body weight, feed efficiency and carcass fat). Other factors such as severity, timing and duration, feed intake during period of refeeding, sex, or strain may affect the subsequent ability of broiler chicken to recover from a growth deficit (Yu *et al.*, 1990). Various methods of feed restriction are in practice such as reduced nutrients intake by means of diet dilution (Leeson *et al.*, 1992), use of an appetite suppressant such as glycolic acid (Pinchasov and Jensen, 1989), limiting the time to access the feed (Samara *et al.*, 1996) and limiting quantity of feed offered to the birds daily (Lee and Leeson, 2001). These methods are being used invariably with the objective to improve weight gain and efficiency of feed utilization. This study was conducted to investigate the effect of early-life feed restriction compared to full feeding until marketing age on growth performance.

MATERIALS AND METHODS

Unsexed 120 day old broiler chicks (Hubbard) were brooded together for the first 10 days on deep litter and

were fed adlib commercial starter diet. On 11th day, these chicks were divided into four treatments designated, A, B, C and D. Each treatment had 30 chicks with three replicates of 10 chicks each. The following treatments were given:

Treatment	Restriction (%)
A (control)	<i>Ad libitum</i> feed
B	900% of the <i>Ad libitum</i>
C	80% of the <i>Ad libitum</i>
D	70% of the <i>Ad libitum</i>

The 70, 80 and 90% of the feed quantity was calculated on the previous day feeding of adlib i.e., day 10. The feed restriction started from day 11 to 18, after that chicks were weighed and fed commercial feed till the market age (42 days). Body weight, feed intake were recorded weekly to calculate Feed Conversion Ratio (FCR). The data collected was subjected to Analysis of Variance (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Feed restriction resulted significant effect on weight gain i.e. in first week birds fed on 70 and 80% of *ad libitum* had significantly lower body weight (Table 1). Whereas 90% restriction resulted numerically lower but statistically similar body weight to that of 100% feeding. A 25 to 35% reduction in weight gain was due to lower amount of nutrient available as a result of quantitative

Table 1: The effect of varying levels of feed restriction 11 to 18 days of age followed by full feeding on the growth performance of broilers (Week 1-2)

Treatments	Week 1			Week 2		
	Wt. Gain (gm)	Feed intake (gm)	FCR	Wt. gain (gm)	Feed intake (gm)	FCR
A: adlib	262.4 ^a	479.5 ^a	1.8 ^a	467.6 ^a	814.5 ^a	1.8 ^a
B: 90%	246.7 ^a	443.7 ^b	1.8 ^a	429.3 ^a	896.6 ^a	2.1 ^a
C: 80%	199.7 ^b	400.0 ^c	2.0 ^a	433.2 ^a	885.8 ^a	2.1 ^a
D: 70%	171.5 ^b	350.0 ^d	2.0 ^a	466.2 ^a	842.4 ^a	1.8 ^a

Same superscripts on means show non-significant difference ($p>0.5$)

Table 2: The effect of varying levels of feed restriction 11 to 18 days of age followed by full feeding on the growth performance of broilers (Week 3-4)

Treatments	Week 3			Week 4		
	Wt. gain (gm)	Feed intake (gm)	FCR	Wt. gain (gm)	Feed intake (gm)	FCR
A: adlib	276.2 ^a	779.0 ^a	3.3 ^a	209.3 ^a	679.8 ^a	3.3 ^a
B: 90%	395.7 ^a	862.2 ^a	2.2 ^a	279.3 ^a	743.2 ^b	2.6 ^a
C: 80%	346.6 ^a	799.8 ^a	2.3 ^a	263.7 ^a	695.2 ^b	2.7 ^a
D: 70%	400.3 ^a	777.3 ^a	1.9 ^a	209.7 ^a	786.7 ^a	3.2 ^a

Same superscripts on means show non-significant difference ($p>0.5$)

feed restriction. Compensation for this reduction was achieved in following weeks.

Performance of broiler fed on normal intake after restriction 11-18 day is represented in Table 1 and 2. Birds on restricted feed consumed higher feed at all restriction levels when compared to *ad libitum* feed during week 2-4. Although birds consumed slightly more feed and utilized that feed with relatively poor efficiency on 90 and 80% restriction but 70% restriction showed better feed conversion ratio compared to *ad lib* fed birds. Poor utilization of feed at less severe restriction level is in line with the findings of Rincon (2000), who reported that less severe (90%) restricted birds did not have better Apparent Metabolizable Energy (AMEn) than those *ad lib* birds. Getting better energy (feed) utilization need severe restriction in feed intake.

Growth performance in week 3 (Table 2) showed increased weight gain on all restriction levels. Birds on restriction consumed almost similar amount of feed but consumed feed was utilized with better efficiency than full feeding though statistically non significant ($p>0.5$). In third week, bird on restriction of 90, 80 and 70% gained higher weight compared to full fed group. Present results do not agree with the results of Plavnik and Hurwitz (1985), possibly because of longer restriction period imposed by them i.e., week 2 and week 3. In week 4, the final average weights were 1.5, 1.6, 1.5 and 1.5 kg for treatment A, B, C and D, respectively, indicating non significant weight gains in final week.

Early feed restriction up to 70% seems to be practical solution to economize broiler production. Bird restricted at early age (11 to 18 days) were able to compensate body weight reduction due to early feed restriction at their market age. The better performance could be the outcome of better utilization of nutrient from the feed consumed. A significant reduction in weight at 11-18 day restriction was equalized to *ad libitum* group in third week of feeding. Feed restriction upto 70% was compensated equally good as 80 and 90%. Hurwitz *et al.*, 1980 suggested that in order to produce a leaner body mass the body expend 0.5-0.7 kcal ME/g gain. It was hypothesized that energy and other nutrient needed to maintain compensatory growth comes from reduction in maintenance requirements of under fed birds. Because under fed birds had lower body weight at restriction and consequently reduced metabolic size (Zubair and Leeson, 1996).

This study indicated that early feed restriction had improved the efficiency which is not seen on full feeding and this economical benefit was obvious with every increment in feed restriction i.e., from 90-70%. Results of the present study will help the broiler grower to economize their broiler production along with reduced mortalities and other metabolic problems. It also indicate that maximum feed intake in present day broiler does not ensure efficient weight gain.

REFERENCES

- Al-Taleb, S.S., 2003. Effect of early feed restriction of broilers on productive performance and carcass quality. J. Biol. Sci., 3: 607-611.
- Hurwitz, S., M. Weiselberg, U. Eisner, I. Bartov, G. Reisenfeld, M. Sharvit, A. Nir and S. Bornstein, 1980. The energy requirements and performance of growing chickens and turkeys affected by environmental temperature. Poult. Sci., 59: 2290-2299.
- Jones, G.P.D. and D.G. Farrel, 1992. Early life food restriction of broiler chicken. I. Methods of application of amino acids supplementation and the age at which restriction should commence. Br. Poult. Sci., 33: 579-589.
- Lee, K.H. and S. Leeson, 2001. Performance of broilers fed limited quantities of feed or nutrients during seven to fourteen days of age. Poult. Sci., 80: 446-454.
- Leeson, S., J.D. Summers and L.J. Caston, 1992. Response of broilers to feed restriction on diet dilution in the finisher period. Poult. Sci., 71: 2056-2064.
- Palvik, I. and S. Hurwitz, 1985. The performance of broiler chicks during and following severe feed restriction at an early age. Poult. Sci., 64: 348-355.

- Pinchasov, Y. and L.S. Jense, 1989. Comparison of physical and chemical means of feed restriction in broiler chicks. *Poult. Sci.*, 68: 61-69.
- Rincon, M.U., 2000. Mild feed restriction and compensatory growth in broiler chicks. M.Sc. Thesis Graduate School, University of Guelph, Canada.
- Samara, M.H., K.R. Robinson and M.O. Smith, 1996. Interaction of feeding time and temperature and their relationship to performance of the broiler breeder hens. *Poult. Sci.*, 75: 34-41.
- Steel, R.G.D. and J.M. Torrie, 1980. Principles and Procedures of Statistics, 2nd Edn., Mc. Grow hill book co. Inc; New York.
- Yu, M.W., F.E. Robinson, M.T. Clandinin and I. Bodnar, 1990. Growth and body composition of broiler chickens in response to different regimes of feed restriction. *Poult. Sci.*, 69: 2074-2081.
- Zubair, A.K. and S. Leeson, 1996. Compensatory growth in broiler chicken: A review. *World's Poult. Sci.*, 52: 189-201.