EFFECT OF FEED RESTRICTION DURING GROWING PERIOD ON LAYING PERFORMANCE OF WHITE LEGHORN HENS

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ABSTRACT

The experiment was conducted to study effect of feed restriction during growing period on the subsequent performance of commercial White Leghorn (Babcock) layers. Two hundred and seventy chicks (6-weeks-old) were randomly divided into three equal groups i.e., A, B and C. The birds in group A were given feed *ad libitum* (full feeding -FF) while those in groups B and C maintained on the restricted feeding (RF) were given 10 and 20 percent less feed than the recommended daily feed allowance, respectively from 7 to 9 and 13 to15 weeks and 20 and 30 percent lesser feed respectively, of the daily allowance from 10 to12 weeks of age. From 16 weeks onward till 58 weeks of age all the groups were fed *ad libitum*. The results showed reduction ($p<0.01$) in feed intake and body weight ($p<0.05$) of pullets and delay in age of sexual maturity ($p<0.01$) due to feed restriction. During the laying phase a non-significant effect of the feed restriction programme on egg production, feed consumption, feed conversion efficiency (feed/dozen eggs), mortality rate and cost of feed/dozen eggs was noted. An overall benefit of Rs.13.54 and 21.54 on RF-I (group-B) and RF-II (group-C), respectively, in comparison to that of FF during the growing period reflect on better economics of feed restriction programme in laying stock under given environmental conditions.

Keywords: Feed restriction, laying performance, growing period, White Leghorn hens

INTRODUCTION

In Pakistan, poultry production has been playing a very vital role of supplying eggs and meat which are considered to be a good source of animal protein of high biological value. This sector has shown an annual growth rate of about 8 percent for the last decade and has successfully shown its merit over other allied sectors as far as efficient and economical production of animal protein foods is concerned (Bhatti, 2000). However, this sector faces numerous challenges which tend to adversely affect its further development and growth. The high cost of production due to increase in prices of poultry feeds accounts for more than 60 percent of the cost of total inputs in egg and broiler production (Sahota *et al.*, 1979). The cereal grains such as maize, rice, and wheat constitute major portion of poultry feed which directly compete with humans for their food supply. Under these circumstances production of efficient and cheaper poultry rations has become very difficult and has in turn resulted in an increase in feed prices.

Feed restriction is reported to have great prospects for reducing expenditure on feed (Sahota *et al.*, 1979; Karunjeewa, 1987). Feed restriction during growing period of the pullets has been described to reduce body weight in pullets, besides delay in the sexual maturity and increase in egg production (Fuller and Dunahoo, 1962; Karunjeewa, 1987). In Pakistan, very little research work has been conducted to study the effect of feed restriction during growing periods on the subsequent laying performance of birds maintained under prevailing environmental conditions. This study was undertaken to examine effects of feed restriction during the growing period on the subsequent performance of White Leghorn layers.

MATERIALS AND METHODS

The present study was conducted under two different phases (growing and laying) at Breeding and Incubation Section, Poultry Research Institute, Rawalpindi. Two hundred and seventy, White Leghorn (WLH) chicks (6-weeks-old) of commercial Babcock strain were randomly divided into 3 groups i.e. A, B and C each consisting of 3 replicates. The birds were weighed and wing banded individually for identification and were reared in 9 separate pens on littered floor under optimal managemental conditions. The birds were fed grower ration *ad libitum* (group A) or put under feed restriction programme (groups B and C) from 7-15 weeks of age during the growing phase as

recommended by Karunjeewa (1987) (Table 1). From 16 weeks onward of laying phase birds in all the experimental groups were fed commercial layers ration *ad libitum*. They had free access to clean and fresh drinking water. Sixteen hours of light was provided. The experiment was conducted upto 58 weeks of age. The experiment was conducted according to completely randomized design and data on body weight gain, feed intake, mortality rate, age of sexual maturity and egg production were collected. Feed conversion efficiency (feed/dozen eggs) and economics of egg production were worked out. The data thus collected were statistically analyzed using analysis of variance technique (Steel and Torrie, 1980). The comparison of means was made by using least significant difference technique.

Table 1: Feeding programme for grwoing pullets (7-22 weeks)

Age (weeks)	Experimental groups		
	A (FF)	B (RF-I)	C (RF-II)
	Full feeding	RF (Percent less feed of the recommended feed allowance)	
7-9	*ad libitum*	10	20
10-12	*ad libitum*	20	30
13-15	*ad libitum*	10	20
16-22	*ad libitum*	*ad libitum*	*ad libitum*

FF = Full feeding; RF = restricted feeding

RESULTS AND DISCUSSION

The data on growth and laying performance of WLH chickens maintained on full feeding (FF) and restricted feeding (RF) are presented in Table 2. Economics of egg production have been given in Table 3. The results revealed that birds maintained in groups A (FF), B (RF-I) and C (RF-II) consumed 5.04, 4.64 and 4.45 kg feed, respectively during the growing phase (7 to 22 weeks of age). The birds reared on mild and severe feed restriction programmes in groups B and C respectively, consumed 7.94 and 11.70 percent lesser feed respectively, than those kept on full feeding. The results indicated depression ($p<0.01$) in feed intake due to restricted feeding. Comparison of means indicated significant difference in feed intake of the control and feed restricted birds as well as between the feed restricted groups. It was observed that birds in groups B and C consumed 0.40 and 0.59 kg lesser feed upto point of lay in comparison to those maintained on full feeding thus resulting in a saving of Rs.4.00 and 5.90 per bird in the production of ready to lay pullets (Table 2). The findings of this study are in agreement with those of Dronawat and McGinnis (1966), Wells (1980) and Karunjeewa (1987) who indicated significant reduction in feed intake of pullets subjected to restricted feeding. The data further showed that birds in groups A, B and C attained 1.27, 1.23 and 1.20 kg body weight (BW) at point of lay with an average age of sexual maturity (ASM) as 131, 143 and 150 days, respectively. The results showed significant effect of feed restriction on BW ($p<0.05$) and ASM ($p<0.01$). The reduction in body weight of pullets was found to be 3.15 and 5.51 percent in groups B and C in comparison to that of group A. The results are in line with those of Karunjeewa (1987) who reported reduction in body weight and delay in sexual maturity in birds subjected to feed restriction. A direct relationship between degree of feed restriction and body weight has been indicated by Fuller and Dunahoo (1962). The depression in body weight gain of the birds could be attributed to reduced intake of essential nutrients as a result of lesser feed intake in the experimental birds, which might have caused depression in growth rate of the pullets. Karunjeewa (1987) indicated that limiting feed intake of replacement pullets retarded their growth rate. The low availability of protein (9 to 12%) in growing chickens is reported to depress their growth rate (Carlson and Nelson, 1981; Douglas and Harms, 1982). The delay in sexual maturity of birds caused by feed restriction has been attributed to depression in body weight gain (Wells, 1980).

Table 2: Performance of white leghorn chickens on different feeding programmes

Particular	Groups		
	A (FF)	B (FR-I)	C (FR-II)
A-Growing Phase (7-22 weeks)			
Average feed intake (kg).	5.04[a]	4.64[b]	4.45[c]
Average body weight at point of lay (kg).	1.27[a]	1.23[ab]	1.20[b]
Age at sexual maturity (days).	131[a]	143[ab]	150[b]
Cost of feed per bird @ Rs.10/kg feed.	50.40	46.40	44.50
Saving in feed cost.	--	4.00	5.90
B- Laying Phase (23-58 weeks)			
Average egg production (dozen).	14.33	14.75	15.00
Average feed consumption (kg).	23.10	23.07	23.01
Feed conversion ratio (feed/dozen eggs).	1.61	1.56	1.53
Mortality (%).	0.74	1.11	0.74
Cost of feed/dozen eggs (Rs.).	16.12	15.64	15.17

Means with different superscript in a row indicate significant difference.

The results of laying phase indicated that birds in groups B and C maintained initially on feed restriction

programme produced 14.75 and 15.00 dozen of eggs, respectively, as compared to 14.33 dozens laid by birds kept initially on full feeding. The findings are in line with earlier report of Belyavin (1984) who indicated that with in a strain egg production was not affected due to early age feed restriction when 21 week's body weight varied between 1.3 and 1.8 kg. The birds subjected to feed restriction during growing phase consumed comparatively lesser feed during the laying cycle with outwardly better feed conversion efficiency and low feeding cost as compared to those kept on full feeding. A saving of Rs.0.48 and 0.95 on feed cost per dozen eggs produced was obtained in groups B and C, respectively in comparison to the control. The overall benefit under mild and severe feed restriction of Rs.13.54 and 21.54 per bird, in groups B and C, respectively, in comparison to those fed on full feeding programme during growing phase was noticed. The findings of this study provided evidence that feed restriction during growing phase and resultant benefits could not be transmitted forward to the birds in laying phase. The apparent difference in different parameters in laying phase is ascribable to chance variation. Further work using larger bird population is needed to ascertain any real treatments effects.

Table 3: Economics of egg production on full feeding and restricted feeding

Particular	Groups		
	A (FF)	B (RF)	C (RF)
Avg.egg production per bird (dozen)	14.33	14.75	15.00
Avg.return (Rs.) from eggs (Rs.22/dozen of eggs)	315.26	324.50	330.00
Difference in return on eggs/bird on FRP in comparison to control (Rs.)	--	9.24	14.74
Avg.feed consumed/bird during laying (kg)	23.10	23.07	23.01
Cost of feed/bird @ Rs.10/kg feed(Rs.)	231.0	230.70	230.10
Saving in cost of feed/bird on RF @ Rs.10/kg feed in comparison to control (Rs.)	--	0.30	0.90
Benefits/bird during laying period (Rs.)	--	9.54	15.64
Total benefits/bird during growing & laying phases (Rs.)	--	13.54	21.54

FF = Full feeding (*ad libitum*); RF = restricted feeding

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