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EFFECT OF DIFFERENT LIGHT REGIMENS ON PERFORMANCE OF BROILERS

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ABSTRACT

In the present study the effect of different light regimen on the weight gain of broilers from 3rd to 6th week of age were studied (1) Continuous light (2) an intermittent system of 1 hr light and 2 hrs darkness at night with 11 hrs continuous light during the day (3) an intermittent system of 1 hr light and 3hrs darkness at night with 11 hrs continuous light during the day. All the birds were reared on continuous light until 2 weeks of age before the treatments were applied. Intermittent lighting system caused a significant ($P<0.05$) increase in the average weight gain as compared to continuous light. The weight gain in intermittent lighting of 1 hr light and 3hrs darkness was significantly ($P<0.01$) better than those of the continuous light and intermittent light of 1 hr light and 2 hrs darkness. Feed consumption of intermittent light of both group 2 and 3 was less than continuous light. The feed conversion ratio of intermittent light of groups 2 and 3 was significantly ($P<0.05$) better than continuous light.

Key words: Broiler, Light regimens, intermittent light, growth, Feed consumption.

INTRODUCTION

Numerous studies conducted in various countries have shown that among the other managemental practices, different regimes of light to which the broilers are subjected, have significant effect on the weight gain and disease control. Many light patterns have been applied so far, such as twenty four hours continuous light, light and dark periods, intermittent lighting programs and different colors of light to rear broilers. For many years, broiler chickens have usually been reared under continuous or near continuous (23L: 1D) photoperiods to maximize feed consumption and growth rate. However, several investigations showed that using continuous light programs induces sleep deprivation and causes severe physiological stress responses (Campo and Davila, 2002; Kliger *et al*., 2000). Therefore, most of the recent researches have focused on restricting light regimens to improve productivity of broiler chickens because the physical activity is very low during darkness and energy expenditure of activity is considerable (Rahimi *et al* ., 2005). As the broiler industry is increasing day by day, the factors hindering the growth are also taken in to account by the farmers as well as the scientists. Besides different diseases, poor management is one of the main problems which jeopardize the poultry production. Numerous studies conducted in various countries showed that among the other managmental problems, the different regimes of light to which the broilers are subjected, have significant effect on the weight gain and disease problems. Buckland *et al.* (1975) reported that lighting regime had a significant effect on body weight gain; they also reported that birds grown on continuous light had significantly more leg abnormalities than those grown on any of the intermittent regimes. Moreover, the incidence of cannibalism is another formidable problem, when light is given on continous basis. To avoid this, intermittent light will help to abate this problem, as bird will remain quiet and calm during dark hours of light regimen. In addition to it, the metabolic disorders which are very much rampant in broiler production could be subdued by providing intermittent lighting system. Deaton *et al*. (1978) indicated that total light intensity control is required with in the broiler house for the entire 24 hours period to obtain maximum feed saving when broilers are maintained reared under an intermittent lighting program. Green light stimulates growth at early age and blue light at market age (Rozenboim *et al*., 1999). An interaction effect was recently observed between intensities of 1 and 0.1 foot candle and photoperiods of 23L: 1D and 18L: 6D on broiler body weight and parts yields (Lien *et al*., 2007). Recent research has indicated that light source may affect body weight, immune response, livability and health status. Broiler behavior is strongly affected by light sources (Ghuffar *et al*., 2009).

MATERIALS AND METHODS

The present study was conducted on 200 day-old commercial broiler chicks. All the chicks were initially weighed and were brooded at temperature of 90 to 95°F and under continuous light up to 2 weeks of age. The feed and water were provided *ad-libitum*. At the start of 3rd week 180 healthy chicks were selected and were randomly divided into three groups of 60 chicks each.

Each group was further sub divided into 3 replicates of 20 chicks each. These three groups were maintained in three separate houses of the same building and were exposed to different lighting regimes i.e., Group A continuous light, (24L: 0D) as control, Group B as one hour light, 2 hours darkness (1L: 2D) with continuous day light and Group C as one hour light 3 hours darkness (1L: 3D) with continuous day light.

The experimental chicks were maintained during November and December up to 6 weeks of age when day length (Light period) was 10-11 hours. The feed and fresh water were provided *ad-libitum*. After 4 weeks the broiler finisher ration was used. The house was well ventilated and 1 Sq. ft. space was provided to each bird. Automatic timer switches were installed to control the period of different lighting regimes at night for groups B & C. Average body weight gain was recorded at the end of 2nd and 6th weeks of age. The mean of average body weight in each replicate in a group was calculated as a final figure for the group. The feed consumption by the chicks in each replicate in all the groups was recorded at the end of 2^{nd} and 6^{th} weeks. Utilizing the data of average body weight and average feed consumption by each replicate the FCR was calculated at the end of 6^{th} week of age. The data thus collected were analyzed statistically by applying one way analysis of variance. Least significant test was applied to compare the treatment means.

Table: 1 Composition of experimental rations

Ingredients %	Starter	Finisher
Corn	61.89	69.17
Soybean meal	31.10	22.93
Fish meal	4.00	3.00
Calcium carbonate	1.26	1.10
Monocalcium phosphate	1.14	0.95
DL-Methionine	0.21	0.10
L-lysine	0.13	0.08
Premix	0.50	0.50
Sodium chloride	0.20	0.20

RESULTS AND DISCUSSION

The average feed consumption by groups A, B and C was 2.371, 2.329, and 2.344 kg, respectively (Table-2). The results showed that the feed consumption by group B and C was less than group A, however the difference between group A & B was found to be non-significant. However the birds exposed to different intermittent light treatment programs consumed slightly less feed as compared with continuous light. This decrease in feed consumption of birds under intermittent light treatments might have contributed to better F.C.R in these birds. The further results showed that the feed consumption by the birds under intermittent light was not significantly different from continuous light regimes but the weight gain and FCR was significantly better than the group exposed to continuous light. The results of the present study in connection with feed consumption are in agreement with those of (Skoglund *et al*. (1964) and Bremski (1980). The similar results indicating lower feed intake under intermittent light than the continuous light groups in 3-6 weeks old chicken have been reported by (Ohtani and Leeson, 2000).

The average weight gain in groups A, B and C was 1245, 1295 and 1345 grams respectively (Table-2). The Groups B & C gained significantly ($P < 0.01$) more weight as compared to Group A. The weight gain by Group C was also significantly better ($p<0.01$) than group B. This reveals that light treatment of group C viz 1L: 3D was the best of three treatments and performance of chicks under this light regime was better than the other two groups. These finding are in agreement with those of Barrot and Pringle, (1951), Buckland and Hill, (1970), Buckland *et al*. (1971), Cain, (1973), Malone *et al*. (1980) who reported that the weight gained by the bird when kept an intermittent lighting program was significantly better than on continuous light.

The mean FCR for the groups A, B and C was 1.90, 1.80, and 1.74 respectively (Table-2). The feed conversion ratio of group B and C was significantly better ($p<0.01$) than group A, This showed that the chicks response to FCR by either light treatment was better as compared with the continuous light program. The above result are also in line with the finding of Barrot and Pringle, (1951), Bean *et al*. (1962), Buckland *et al*.(1971), Hooppaw and Goodman,(1972.), Quarles and kling. (1974) who observed that the FCR of the chick grown under various intermittent light schemes was significantly better than those grown under continuous light.

Table: 2 Average weight gain, feed intake and FCR of broilers (at 6 weeks of age) under different lighting regimes

Parameters	Experimental groups			Statistical results
	A	B	C	
Avg body weight gain (gm)	1245	1295	1345*	Significant
Avg feed intake (kg)	2.371	2.329	2.344	Non-Significant
Feed conversion ratio	1.90	1.80	1.74*	Significant

*=Significant ($P<0.01$) N=Non-significant

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