

# Effect of Light Intensity and Low-Level Intermittent Lighting on Broiler Performance During a High Density Limited-Area Brooding Period

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**ABSTRACT** In an attempt to determine the amount of light needed during the brooding period (0 to 3 weeks) under a limited-area brooding density equivalent to one-half house brooding for commercial broilers, three trials were conducted. Results showed that broilers which received a continuous lighting regimen at an intensity of 75 lx had significantly less mortality than those brooded under a continuous lighting regimen of 5 lx. Three-week body weight was not significantly affected by lighting regimens used. The best 3-week feed conversion was obtained by those brooded under an intermittent lighting regimen (5 lx for 15 min, followed by 105 min of no measurable light, repeated continuously). However, the mortality of the broilers brooded under the intermittent lighting regimen was significantly higher than that of those brooded under the continuous lighting regimen.

(Key words: light, intensity, brooding, broiler performance, intermittent)

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## INTRODUCTION

Reduced light intensity and intermittent lighting during the production period for broilers saves on electrical energy requirements. Reduced light intensity also improves broiler performance (Beane *et al.*, 1962; Cherry *et al.*, 1980; Deaton *et al.*, 1976, 1978, 1980; Hoop-paw and Goodman, 1972; Quarles and Kling, 1974).

It is thought that young broiler chicks, when first placed in a broiler house, need a bright light to assist them in finding feed and water, particularly under limited-area brooding conditions. The objective of this study was to determine if young broiler chicks need a bright, continuous light during brooding (0 to 3 weeks) for optimum performance as measured by mortality, growth, and feed conversion.

## EXPERIMENTAL PROCEDURE

The experimental treatments consisted of commercial broilers brought directly from a commercial hatchery and exposed to 1) 151 lx continuous light, 2) 75 lx continuous, 3) 38 lx continuous, 4) 5 lx continuous, and 5) intermittent - 5 lx for 15 min, followed by 105 min of no measurable light, repeated continuously. Light was supplied by incandescent bulbs. Light intensity was measured at feeder level. A starter diet calculated to contain 22% protein and a

metabolizable energy value of 3200 kcal/kg of diet was fed.

The work was conducted in climatic chambers as described by Reece and Deaton (1969). Three trials were conducted. For each trial, 99 males and 99 females were placed on pine shavings in each chamber. The broiler density was 300 cm<sup>2</sup> per chick, which is equivalent density for half house limited-area brooding, according to Reece (1978). The experimental period was 21 days, which was the time indicated for the density used (Reece, 1978).

The feeders and waterers consisted of two 22-cm in diameter water jugs and two 39.3 × 54.6-cm feeder lids for the first 5 days. One 2.44m-long automatic waterer was used in each chamber during the 21-day experimental period. The waterer was located along the chamber wall so that only one side was available to the broilers. After the first 5 days, the broilers in each chamber were allowed two 38.1-cm in diameter tube feeders. A chamber temperature of 29.4, 26.7, and 23.9 C was maintained for the 1st, 2nd, and 3rd weeks of age, respectively.

Data were collected on individual body weight and group feed consumption at 21 days of age. Mortality was recorded as it occurred. The statistical evaluation consisted of chi-square for mortality and analysis of variance for body weight and feed conversion.

TABLE 1. Effect of light intensity and regimen on broiler chick mortality (0 to 3 weeks of age)

Treatment	Trial			Total	%
	1	2	3		
151 lx continuous	6/198	8/198	11/198	25/594ab	4.21
75 lx continuous	9/198	4/198	4/198	17/594a	2.86
38 lx continuous	5/198	11/198	9/198	25/594ab	4.21
5 lx continuous	15/198	5/198	12/198	32/594b	5.39
Intermittent <sup>1</sup>	33/198	15/198	20/198	68/594c	11.45

a,b,c Differing letters denote significant difference ( $P \leq .05$ ).

<sup>1</sup> Five lux for 15 min followed by 105 min of no measurable light repeated continuously.

TABLE 2. Effect of light intensity and regimen on broiler chick body weight and feed conversion (3 weeks of age)

Treatment	Trial (g)						Feed conversion (3-trial avg)
	1		2		3		
	M	F	M	F	M	F	
151 lx continuous	511	467	473	419	528	468	451a
75 lx continuous	496	463	481	447	493	437	449a
38 lx continuous	510	475	463	430	516	464	456a
5 lx continuous	519	473	487	424	499	457	451a
Intermittent <sup>1</sup>	433	414	445	411	499	448	424a

a,b Within each column, differing letters denote significant difference ( $P \leq .05$ ).

<sup>1</sup> Five lux for 15 min followed by 105 min of no measurable light repeated continuously.

## RESULTS AND DISCUSSION

Light is very important to the survival and well-being of the young broiler chick. The results of these tests show that an intermittent lighting regimen (5 lx for 15 min, followed by 105 min of no measurable light repeated continuously) under limited-area brooding conditions produced significantly more mortality than where broilers were brooded under continuous lighting regimens (Table 1). The least mortality was noted for the broilers brooded under a 75 lx continuous light regimen; however, the mortality did not differ significantly from that of those brooded under a 151 lx continuous-light or 38 lx continuous-light regimen (Table 1).

When 3-week broiler body weight and feed conversion were considered, the broilers brooded under the continuous light regimens weighed almost the same and had similar feed conversion ratios (Table 2). The broilers brooded under the intermittent light regimen weighed less than the broilers brooded under the continuous light regimens; however, variation between trials was such that when body weights were averaged over trials, no significant differences were observed due to treatments (Table 2). The best feed conversion was noted for the group brooded under the intermittent light regimen (5 lx for 15 min, followed by 105 min of no measurable light, repeated

continuously). A possible reason for the reduced feed conversion, in addition to a smaller bird at 3 weeks, could be reduced broiler activity (Deaton *et al.*, 1976).

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