The Bioproductive Effect of Broiler Lighting Program

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Abstract
The aim of the study was to evaluate the productive performances of the ROSS 308 broiler exposed to the alternative lighting program, starting from the third week: the control group C with nearly continuous program (23L:1D), the experimental group E1 with intermittent program of 16 h light (2L:1D) and the experimental group E2 with combined program of 16 h light (6L and six period 2L:1D). Three groups of 35000 chickens – one day old were experimented on. The chickens were raised in intensive system. The experimental period was 35 days. Compared with the control group, at the experimental groups the daily gain was less up to 4.6%, but the differences were not significant; the feed intake was significantly less up to 7% ($p \leq 0.05$), as a consequence of reducing the time of feeding. The viability was 95.8% at E1, 96.6% at E2 and 93.2% at the control group, the differences being insignificant. At the experimental group E2, the incidence of leg problems was significantly less. By applying the combined lighting program, the chickens have manifested the natural behaviour of feeding, resting and physical activity; they have allowed a higher capitalization of the nutrients and have ensured a better uniformity.

Keywords: broiler, lighting program

1. Introduction

The lighting duration is a major factor in the broiler performance. To maximize the broiler performances, chickens have usually been kept on a continuous or nearly continuous lighting schedule [1]. In order to improve the broiler welfare, over the years, different intermittent programmers have been tested, like an alternative to conventional near-continuous lighting [2]. Broiler lighting schedules can be characterized in a number of ways, including the number of h of darkness and how many periods of darkness are included in each 24 h cycle [3].

2. Materials and methods

The aim of the study was to evaluate the productive performances of the broiler exposed to different lighting schedules (nearly continuous program versus intermittent and combined programs.

The experiment used 35000 one day-old ROSS 308 broilers reared in intensive system, on the floor, assigned to 3 randomised groups (1 control group and 2 experimental groups). Starting from the three weeks of age, the lighting schedules were the following: a nearly continuous program (23L:1D) to the control group C; an intermittent program of 16 h light (2L:1D) to the experimental group E1 and a combined program of 16 h light (6L and six period 2L:1D) to the experimental group E2. The lighting lamps were green and blue. During the first 14 days all groups had a similar light regimen, i.e. 23 h light and 1 hour darkness. The experimental period was of 35 days.

Using the standard methods, the following parameters were monitored: feed intake, daily gain, viability, incidence of leg problems. The gait score was determinate in the house, at 35 days of age, by choosing random birds, applying the walking method. It was used the gait score system developed by Dawkins et al., 2004, when: 0 (the bird walks ten steps normally); 1 (average bird

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walks ten steps with some degree of difficulty and presents some unbalance during walking); and 2 (the bird walks with great difficulty and sit after 1 to 4 steps) [4]. The performance data were processed statistically by ANOVA and Tukey test.

3. Results and discussion

The data concerning the dynamic of bodyweight are present in Table 1.

Table 1. Weight dynamics (g)

Age, days	C Average weight ± SD	E1 Average weight ± SD	E2 Average weight ± SD
1	48 ± 1.23	48 ± 1.37	48 ± 1.51
7	197 ± 16.04	193±16.75	200±17.37
14	520 ± 33.16	522 ±36.28	530±38.82
21	995±50.68	890±48.95*	910±48.50*
28	1570 ± 71.28	1503± 78.45	1538± 45.83
35	2180± 88.68	2082± 105.81	2162± 42.75
Daily gain, g	60.91	58.11	60.37

*p≤0.05, compared to C

Until 14 days to age, the differences between the three groups are insignificantly. By the 21 days of age, on the experimental groups, the bodyweight decreased with 10.5% at E1 and 8.5% at E2 (p≤0.05). These results can be explained by the adaptation of broiler to the new lighting programs, which ensure a higher dark period.

Through the final weight was less at the experimental groups, the results were not significant (p≥0.05). The results were in consistent with those given in literature [5].

The daily gain was 60.91 g at the control group; 58.11 g at E1 (less with 4.6%) and 60.37 g at E2 (less with 0.9%); the differences were not significant (p≥0.05).

Data concerning the coefficient of variation are show in Table 2.

Table 2. Coefficient of variation (CV%)

Age, days	C	E1	E2
1	2.56	2.85	3.15
7	8.14	8.67	8.69
14	6.38	6.95	7.32
21	5.09	5.50	5.33
28	4.54	5.22	2.98
35	4.06	5.08	1.98

By 21 days of age, the coefficient of variation was not significantly influenced by the lighting programs. After this age, the lower variation was obtained at the group E2 (combined program 6L and six period 2L:1D). The higher variation was observed at group E1 (intermittent program 2L:1D). The results can be explained by the reducing the time of feeding on E1, which it had caused a hierarchy of group. The conditions of E2 group were closer to the natural behaviour, determining a lower variation on the weight.

The results concerning the feed intake are present in Table 3.

Table 3. Feed intake (g/day)

Age, days	C	E1	E2
1-7	25.62	25.78	25.81
1-14	57.99	57.47	57.94
1-21	100.34	93.76	95,32
1-28	134.73	125.38	128.61
1-35	163.12	151.70	156.86

At the experimental groups, the feed intake was lower with 7% and 3.8%, respectively. The differences between the control group and the experimental group E1 were significantly (p≤0.05). Classen *et al.* say that the longer periods of darkness reduce feed intake and limit growth [6]. Our results had shown that the short photoperiods reduced feed intake and limit growth as a consequence of reducing the time of feeding. Data are in concordance with the report of Classen *et al.* 1991 [7].

The viability was 93.2% at the control group; 95.8% at E1 and 96.6% at E2, the differences being insignificant (p≥0.05).

The gait score data are present in Figure 1.

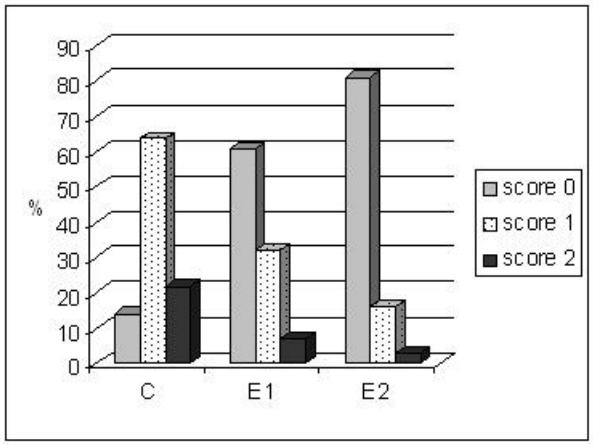

Figure 1. Gait score (%)

The score 0 was 14% at control group; 61% at E1 and 81% at E2. The score 1 was 64% at control group; 32% at E1 and 16% at E2. The score 2 was 22% at control group; 7% at E1 and 3% at E2. The results obtained at experimental groups ensured the welfare of broiler, with score between 0 and 2. The literature lays those longer dark periods were associated with lower mortality and improved gait scores [2].

4. Conclusions

The weight and daily gain were not influenced significantly by the lighting programs, although the results obtained at the alternative schedules were less than the nearly continuous program.
The uniformity of broilers was significantly influenced by the alternative lighting programs, the coefficient of variation being less at the combined schedule.
The feed intake was lower.
On the basis of the original researches, pointing the main conclusion of the work.

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