

## INFLUENCE OF THE LIGHT REGIMEN ON BROILER GROWTH

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### SUMMARY

The experiment monitored the influence of the light regimen on broilers reared on the floor on permanent litter. The experimental period was 49 days. Several light regimen schemes were experimented: 23 h light and 1 hour darkness (control group), 8 cycles of 2 h light and 1 h darkness (E1), 6 cycles of 2 h light and 2 h darkness (E2), 12 h light and 12 h darkness (E3). Light regimen shortening resulted in the depression of the daily weight gain and, implicitly, of the body weight, particularly during the second period of growth.

**Keywords:** broiler, light

### ORIGINAL ASPECTS OF THE RESEARCH

Poultry rearing systems (gallinaceous, particularly) evolved towards a marked industrialisation, being characterised by very high stocking rates, the use of two-three tier houses (no natural light), automation of feeding, watering, ventilation and lighting processes.

The increasingly frequent intoxications with dioxin, of food toxic infections and of diseases transmissible to humans (aviary flu) triggered reactions of reevaluating the poultry rearing conditions. Starting from these observations, the European Union developed several regulations that are about to change deeply the rearing and production technologies for gallinaceans.

The technology of broiler rearing stipulates a 23–23.5h light regimen (one or half hour of darkness) with the view of stimulating feed intake and the rate of growth. The short period of darkness is supposed to get the birds accustomed to the lack of light, which might occur due to power circuit failure. The literature (Scheele et al., 1992, Gordon, 1997) mentioned that the mortality rate and the incidence of locomotor apparatus diseases increase in the birds submitted to prolonged light regimens.

It is known that the light radiations influence, by their optical action, the activity of the anterior hypophysis and of the hormonal factors that influence the growth of birds (Scheele et al., 1992). However, broiler exposure to 23h light regimen is an additional factor of stress for the intensive rearing system.

The present paper shows the experimental results of different light regimens and their effect on broiler growth and percentage of viability.

## OBJECTIVE AND METHODS

The experiment used 4000 day-old Cobb broilers reared on the floor on permanent litter, assigned to 4 randomised groups (1 control group and 3 experimental groups). The experimental period was of 49 days.

The broilers had free access to the feed and water. They received standard feeds that provided the nutrient requirement according to the norms.

During the first 7 days all groups had a similar light regimen, i.e. 23 h light and 1-hour darkness. After that period, several light regimen schemes were experimented: 23 h light and 1 hour darkness for the control group (C), 8 cycles of 2 h light and 1 h darkness each for the experimental group 1 (a total of 16 h light and 8 h darkness), 6 cycles of 2 h light and 2 h darkness each for the experimental group 2 (a total of 12 h light and 12 h darkness), 12 h light and 12 h darkness for the experimental group 3. These light regimens were achieved automatically with timers. Light intensity was 10 lx.

The broiler house microclimate was controlled, the environmental parameters being in agreement with the technological recommendations (Technological guidebook, 2000).

The weight progress (weighing on days 1, 21 and 49), the compound feed intake (daily recording by group) and the liveability index were monitored used standard methods.

Broiler performance data were processed statistically with the Student test of significance.

## EXPERIMENTAL DATA AND RESULTS

Body weight at 21 days (Table) was 690 g in group C, 662 g in E1, 642 g in E2 and 614 g in E3. Light regimen shortening to 16 hours (by 8 cycles of 2 h light and 1 h darkness) and to 12 hours (6 cycles of 2 h light and 2 h darkness) caused a significant ( $p \geq 0.05$ ) depression of the body weight. Compared to the control group, body weight depression was 12% ( $p \leq 0.05$ ) in group E3.

As expected, at 49 days, body weight decreased significantly in all experimental groups: by 8% in E1, 10% in E2 and 13% in E3 ( $p \leq 0.05$ ). Light regimen shortening resulted in the depression of the daily weight gain and, implicitly, of the body weight, particularly during the second period of growth. The alternating short cycles of light and darkness periods determined the adaptation of the organism considering that, physiologically, the duration of the intestinal passage is about 3 hours (Burlacu 1985, Stratulat and Marin 1989, Dinu et al 2006).

**Table.** Broiler performance

Item	MU	C	E1	E2	E3
Weight at 21 days	g	690±25.3	662±71.8	642±87.1	614±46.6
	%	100	96	93	90
Weight at 49 days	g	2410±83.3	2217±216.9	2170±225.6	2097±103.8
	%	100	92	90	87
Compound feed intake	kg	3.34±0.24	2.94±0.21	2.90±0.19	2.20±0.22
	%	100	88	87	66
Viability percentage	%	85	88	91	97
Total amount of meat	t	2024.4±117.3	1951.1±126.5	1952.1±134.1	2033.8±105.8
	%	100	96.4	96.4	100.5

Feed intake was significantly influenced by the light regimen shortening, being 12%, 13% ( $p \leq 0.05$ ) and 34% ( $p \leq 0.01$ ) lower in groups E1, E2 and E3, respectively, than in the control group. The shorter light periods determined the birds to crowd at the feeding trough. The alternating light / darkness cycles (groups E1 and E2) caused the birds to fail reach the sensation of satiety because the broilers had to eat the diet in a period as short as possible. Even if the feeding front was provided according to the rearing technology, an accentuation of the social hierarchy (of group) was observed, which generated confrontations between the dominant birds. As a consequence, group heterogeneity increased. The 12 hours light, 12 hours darkness programme (group E3) provided sufficient time for feeding and rest, which met the physiological requirements of the broilers.

The viability percentage (Table) increased from 85% (control) to 97% group E3. As a consequence, the total amount of delivered meat was 2024.4 t in the control group; 1951.7 t in E1; 1952.1 t in E2 and 2033.8 t in E3. The means were statistically equal.

### CONCLUSIONS

1. Concomitantly with the increased concern for the welfare and protection of the poultry reared in intensive systems, new light regimen schemes are sought, which to meet both the physiological and the productive requirements of the birds.
2. The alternating cycles of 2 hours light and 2 hours darkness (E2), starting with the second week of life, did not influence adversely broiler performance.
3. The sudden switch on and off of the light in short cycles (2 h light and 1 h darkness each for the experimental group 1 and 2 h light and 2 h darkness each for the experimental group 2) caused psychic stress to the broilers that may result in behavioural disorders.
4. The 12 h light and 12 h darkness tested for the experimental group 3 provided the highest level of welfare for the broilers as to their physiological requirements of feeding and resting. As a consequence, the viability index increased to 97%, while the total amount of delivered meat was statistically similar to that of the control group.

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