Influence of the light program on the growth process of broilers

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Abstract

The influence of light program on the growth process of broilers reared on the floor on permanent litter was investigated during a 49-day experiment. The broilers were assigned to four groups and they had free access to the feed (standard formulations). During the first 7 days all groups had a 23h light regimen. The following light regimens were used after the initial 7-day period: 23h light and 1h darkness for group C; 8 cycles of 2h light and 1h darkness each for group E1, 6 cycles of 2h light and 2h darkness each for group E2; 12h light and 12h darkness for group E3. The decrease of the light regimen resulted in a significant decrease of the body weight and compound feed intake particularly during the second stage of growth. Broiler liveability increased in the groups with longer periods of darkness (by 3%, 6% and 12% in groups E1, E2 and E3, respectively, as compared to the control group) mainly due to the lower incidence of the sudden death syndrome. The period of 12h light and 12h darkness provided the best welfare conditions for the proper feeding and rest according to broiler physiological requirements.

Keywords: broilers, light regimen, growth

Introduction

Poultry rearing (gallinaceans particularly) became more and more industrialized, which resulted in high stocking rates, the use of 2-3 tiers batteries (no natural light), automated feeding, watering, ventilation and illumination.

The ever more frequent incidence of dioxin intoxications, food poisoning and of diseases transmitted to humans (aviary flu) triggered the need to reassess the welfare conditions of poultry. Thus, the European Union issued several regulations that are about to change radically the technologies for gallinaceous production.

The technology of broiler production stipulates a 23h light regimen (with half an hour or an hour of darkness) in order to enhance feed intake and weight gain. The short period of darkness is intended to get the broilers used to the absence of light that may occur due to possible power supply failure. Recent studies (Scheele et al., 1992, Gordon, 1997) have shown that mortality and the incidence of feet diseases increase in the birds with longer light regimens.

It is an established fact that light influences the activity of the anterior hypophysis and of the hormonal factors of growth (Scheele et al., 1992). Nevertheless, broiler exposure to a 23h light regimen is an additional stress factor of the intensive poultry production. The paper shows the findings of the survey on different light regimens and their influence on broiler growth and liveability.
Material and methods

The experiment was conducted on 4000 day-old Cobb broilers, raised on the floor on permanent litter, assigned randomly to one control group and three experimental groups. The experimental period was of 49 days.

The broilers had free access to water and feed. The diets were standard formulations that supplied the nutrient requirement according to the acting norms.

During the first 7 days all groups had a 23h light regimen. The following light regimens were used after the initial 7-day period: 23h light and 1h darkness for group C; 8 cycles of 2h light and 1h darkness each for group E1, 6 cycles of 2h light and 2h darkness each for group E2; 12h light and 12h darkness for group E3. The light (10 luxes) regimens were provided automatically by timers connected to the power supply. The environmental conditions inside the house were controlled, being according to the technological recommendations (Technological guidebook, 2000).

The following parameters were monitored throughout the experimental period: the weight gain (weighing at 1, 21 and 49 days), the compound feed intake (daily record by group) and the liveability indicator. The data were processed statistically with the Student test.

Results and discussion

Body weight at 21 days (Table 1) was 690 g for group C, 662 g for group E1, 642 g for group E2 and 614 g for group E3. The shorter light hours (16 and 12 h respectively) resulted in a non-significant (p≥ 0.05) body weight decrease. However, the decrease was 12% (p≤ 0.05) in group E3 as compared to the control group.

As expected, at the age of 49 days, body weight decreased significantly in all experimental groups: 8% in E1, 10% in E2 (p≤ 0.05) and 13% in E3 (p≤ 0.05). The shorter light periods decreased the average daily gain and therefore, the body weight particularly during the second stage of growth. The alternation of light and darkness in short cycles allowed the broiler organism to adapt, considering that physiologically, the duration of the intestinal transit is about 3 hours (Burlacu, 1985, Stratulat and Marin, 1989).

Table 1. Broiler performance

<table>
<thead>
<tr>
<th>Item</th>
<th>MU</th>
<th>Control</th>
<th>E1</th>
<th>E2</th>
<th>E3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight at 21 days</td>
<td>g</td>
<td>690</td>
<td>662</td>
<td>642</td>
<td>614</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>100</td>
<td>96</td>
<td>93</td>
<td>90</td>
</tr>
<tr>
<td>Weight at 49 days</td>
<td>g</td>
<td>2410</td>
<td>2217</td>
<td>2170</td>
<td>2097</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>100</td>
<td>92</td>
<td>90</td>
<td>87</td>
</tr>
<tr>
<td>Compound feed intake</td>
<td>kg</td>
<td>3.34</td>
<td>2.94</td>
<td>2.90</td>
<td>2.20</td>
</tr>
<tr>
<td>Liveability</td>
<td>%</td>
<td>85</td>
<td>88</td>
<td>91</td>
<td>97</td>
</tr>
<tr>
<td>Total amount of meat</td>
<td>t</td>
<td>2024.4</td>
<td>1951.1</td>
<td>1952.1</td>
<td>2033.8</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>100</td>
<td>96.4</td>
<td>96.4</td>
<td>100.5</td>
</tr>
</tbody>
</table>
Feed intake was significantly affected by the shorter periods of light, being 12% and 13% lower in groups E1 and E2, respectively, as compared to the control group (p ≤ 0.01). The shorter light periods caused the birds to crowd at the feeder. The alternating regimens (groups 1 and 2) made the broilers eat the diet in a time as short as possible, which made them not to feel the satiety. Even though the feeding area was provided according to the rearing technology, the social (group) hierarchy increased, which generated conflicts between the dominant broilers. As a consequence, there was an increased heterogeneity within the groups.

The regimen with 12 hours light and 12 hours darkness (E3) provided for a long period of feeding and long enough period of rest, which corresponds to the physiological requirements of the broilers.

The liveability indicator (Table 1) increased from 85% (C) to 97% (E3). The total amount of delivered meat was 2024.4 to in group C, 1951.7 to in E1, 1952.1 in E2 and 2033.8 to in E3. (no significant differences).

Conclusions

The increased concern for the welfare and protection of the poultry reared in intensive systems triggered the quest for new light regimens that are to fit both the physiological and productive requirements of the broilers. The alternation of 2 hours light and 2 hours darkness starting with the second week of life did not have an adverse influence broiler performance. The short cycles (2h light + 1h darkness or 2h light + 2h darkness) stressed the broilers, which may cause behavioural disorders. The short cycles also induce management disorders in feed administration and in the other activities (productive and sanitary-veterinary) that take place in the poultry house.

The period of 12h light and 12h darkness provided the best welfare conditions for the broilers both as feeding and rest. That is why the liveability indicator increased (97%) and the total meat amount did not differ statistically from the control group.

References


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