APRI FACTS

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ADAPTATION TO THE PULLET-REARING ENVIRONMENT BY PROVIDING LIGHTING DURING EMBRYO DEVELOPMENT

Introduction

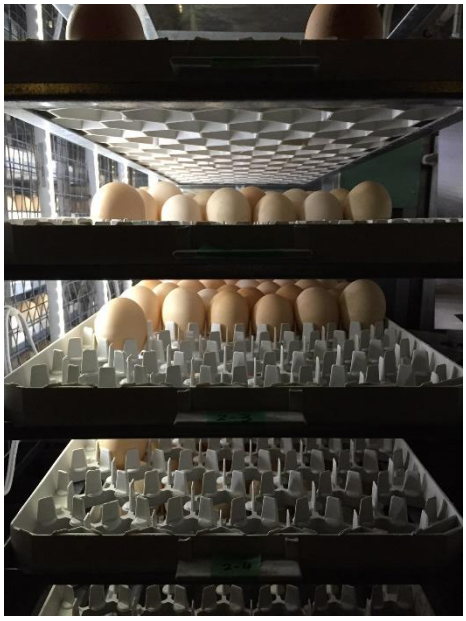
Environmental conditions in which an egg is incubated influences the production performance of the laying hen. The common practice in commercial hatcheries today is to incubate in complete darkness. Recently, some hatcheries have introduced light in the last three days of incubation as well as water and feed during the hatching phase. Under natural conditions, a mother hen turns her eggs, and leaves the nest thus exposing the shell to day light. Visible light is defined as having wavelengths which appear as color. Studies have shown that the chicken is sensitive to this range of light from infrared to ultra-violet and various physiological functions of the bird are influenced differently depending on the wavelength of the light source. Light received during incubation can potentially improve a chick's ability to adapt more readily to their post-hatch environment.

Objective

To determine if providing light during incubation will positively affect the hatch, post-hatch and egg production performance of laying hens, and to determine if reducing day length during the early stages of the post-hatch period will impact production, growth and egg quality.

Trial

Two incubation experiments were conducted using hatching eggs from two layer hen lines - Lohmann Brown Lite and Lohmann LSL Lite. In Trial 1, a total of 2400 hatching eggs were incubated; 300 of each line incubated using 4 treatments for 21 days. Treatment 1 (the control) - 24 h of dark; Treatment 2 - 12 h of white LED light and 12 h dark; Treatment 3 - 12 h red LED light and 12 h dark; and Treatment 4 - 12 h of red LED light and 12 h of dark for the first 18 days, followed by 24 h of dark for the remaining 3 days.



In Trial 2, 1280 hatching eggs were incubated with 4 treatments for 21 days. The same two lines of birds were used with 80 eggs/line/incubator. Treatments included, the control, 24 h dark (Treatment 1), and 12 h light and 12 h dark using red LED (Treatment 2), blue LED (Treatment 3) and white LED light (Treatment 4).

Birds of the same hen line and treatment were randomly assigned to a cage with 8 birds per cage for Trial 1 and 6 birds per cage for Trial 2, using traditional pullet rearing cages. Two

post hatch lighting treatments were evaluated. The first treatment was 23L:1D from day 1-3 and 20L:4D from day 4-14. The second treatment had shorter first days with 18L:6D including two 30-minute phases of light during the dark period in the first 3 days followed by 17 h of continuous light with two 30 min phases of light for days 4-14. For both regimes, day length was reduced over time to the point of 9L:15D at 7-16 weeks of age. Day length was increased at 17 weeks by 1h of light/week to 14L:10D by 21 weeks of age. During this study hatch and post-hatch growth and feed consumption were monitored and egg production and quality were measured.

Results

The chicks incubated in Trial 1 under Treatment 4 (18 days red LED; 3 days dark) had a reduced body weight compared to the control chicks hatched in the dark at placement. However, after 6 h with access to feed and water, their body weight increased to more than all other treatments except those chicks under Treatment 3 (Red LED for 21 days). Chicks from Treatment 3 had a higher weight gain as a percentage of their original weight during this post hatch period when compared to the control. This same response was shown in Trial 2. The difference in weight between treatments for both trials disappeared over time, with the only difference being between hen lines.

The chicks from the red LED lighting treatment in Trial 2 also had a significantly shorter hatch window (490 hrs) of all treatments (control & blue = 496 hrs; white = 494 hrs) and they had superior navel scores than chicks from the blue LED lighting treatment. The superior navel scores are important as it reduces the chick's susceptibility to infections during this crucial early life phase.

In Trial 1, hens from the red LED lighting for 21 days produced significantly more eggs (27.6 eggs/hen) than the white LED lighting treatment (25.1 eggs/hen) during the first 47 days. In Trial 2, the combined effect of the red lighting treatment and the long day post-hatch significantly reduced the age to lay the first egg (132.7 days vs 140.2 days) and resulted in a higher egg production (111 eggs/hen vs 105 eggs/hen) when compared to the combination of short early days and blue LED hatchery lighting treatment.

There was no significant difference in Trial 1 or Trial 2 on egg quality between lighting treatments or post-hatch day length treatments.

Industry Impact

The results of this research indicate that the use of red LED light during incubation can improve overall chick health and production performance without negatively affecting egg quality.

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