



## Research summary

# Impact of lighting during incubation on chick development

## About the study

The conditions in which an egg is incubated begin to shape a hen's eventual laying production before it even hatches. Research has shown hens are sensitive to a range of light, with various light wavelengths affecting a hen's functions differently. For example, it is possible that light received during incubation establishes circadian rhythms, which determine when the hen wakes up and goes to sleep. Previous studies show this effect occurs during incubation, improving the chick's ability to adjust to its post-hatch environment.

For this study, researchers at Dalhousie University and at the University of Saskatchewan collaborated to explore how providing lighting during incubation positively affects the hatch, post-hatch and egg production performance of laying hens.



## Methods

The study consisted of two incubation experiments, with the eggs incubated under different lighting colours and conditions for 21 days. The first trial included 2,400 eggs under four conditions, and the second trial included 1,280 eggs under four conditions:

### First trial

1 <sup>st</sup> condition	24 hours darkness
2 <sup>nd</sup> condition	12 hours darkness, 12 hours white LED
3 <sup>rd</sup> condition	12 hours darkness, 12 hours red LED
4 <sup>th</sup> condition	First 18 days: 12 hours darkness, 12 hours red LED Final 3 days: 24 hours darkness

### Second trial

1 <sup>st</sup> condition	24 hours darkness
2 <sup>nd</sup> condition	12 hours darkness, 12 hours red LED
3 <sup>rd</sup> condition	12 hours darkness, 12 hours blue LED
4 <sup>th</sup> condition	12 hours darkness, 12 hours white LED

Once the eggs hatched, the chicks were placed in conventional housing containing eight birds per cage in the first trial and six birds per cage in the second.



## Findings

The chicks incubated with red light in the second trial took significantly less time to hatch, averaging 490 hours, compared to those under white light, 494 hours, and darkness and blue light, 496 hours. The chicks incubated in red light also had the healthiest navels, making them less susceptible to infection that can cause poor post-hatch performance.

The chicks incubated under the fourth condition of trial one (first 18 days: 12 hours of red light; last three days: 24 hours of darkness) hatched with a lower body weight than those in complete darkness. After just six hours with feed, their body weight increased to more than all the other conditions except those with 12 hours of red light for all 21 days. The chicks with 12 hours of red light for 21 days gained more weight as a percentage of their original weight than any of the other lighting treatments. These differences in weight disappeared by 2 weeks of age.

Hens incubated with red light for 21 days in the first trial produced an average of 27.6 eggs in their first 47 days of laying, while those incubated with white light produced 25.1 eggs. In the second trial, the hens incubated with red lighting took 132.7 days to lay their first eggs and produced 111 eggs overall, compared to hens incubated with blue lighting that took 140.2 days to lay their first egg and produced only 105 eggs overall.

The lighting conditions of the different trials did not have any noticeable impacts on the quality of the eggs laid by the hens.

## Conclusions

The different lighting conditions during incubation had clear impacts on the hatching, post-hatch and egg production performance of the laying hens. Chicks incubated with red LED lighting had improved navel health, early body weight gain, and egg production, without any consequences to the quality of the eggs they laid. These results suggest there are potential benefits in using red light during incubation in commercial hatcheries compared to the industry-standard of complete darkness.

These conclusions open doors for further research to confirm these benefits and determine the viability of using such lighting practices in commercial hatcheries.

## About the researchers

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