

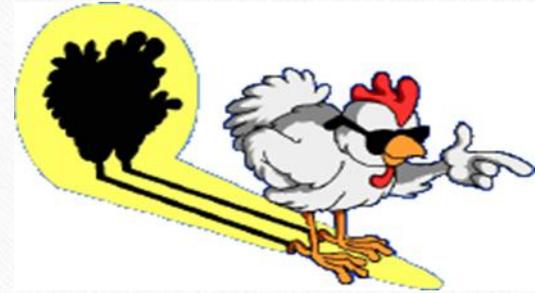
**The Effect of Photoperiodic Green  
and White Light During Incubation  
on Some Stress and Behavioral Traits  
of Layers**

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# Introduction



- Light is an important issue for poultry production because avian embryos have a light-sensitive pineal gland ([Zeman et al., 1992](#)) and respond to light as early as 3 d of development ([Erwin et al., 1971](#)).
- Light photoreceptors are active during embryogenesis and respond to environmental light/dark cycles through melatonin hormone production ([Zeman and Herichova, 2011](#); [Zeman et al., 2004](#); [Hill et al., 2004](#)).
- Avian embryos exposed to light with short pulse last week of natural incubation ([Archer and Mench., 2014](#)).

# Effect of lighted incubation on post hatch stress responses

- According to the earlier research, photoperiodic lighting during incubation has impact on embryo development, post hatch stress response and behaviour.
- Light incubated broilers:
  - (White fluorescent 16L:8D, 300 lux lighting during incubation) had lower CORT response to crating stress at hatching day (Özkan et al. , 2012a)
  - had lower basal CORT levels at day 6 under 16L:8D as compared with 24L:0D post-hatch lighting program and an improved post-hatch early growth (D 6) (Özkan et al., 2012b)
  - (White fluorescent, 12L:12D, 550 lux) had better immunity and lower CORT response to the crating stressor (Archer and Mench, 2013).
  - (LED- 12L:12D) during incubation can reduce the the stress susceptibility of broilers post-hatch (Archer and Huth, 2015).

# Effect of lighted incubation on post hatch behaviour

- Rogers (1982) reported that light during incubation caused the development of central nervous system asymmetries (laterilization) and probably this is the reason of differences behaviour in poultry at post hatch.

## Light during incubation

- affects post-hatch behavior (Rogers and Workman, 1989) and chicks from lighted incubation learns quickly to peck and discriminate non-food material (Rogers, 1996; Rogers et al. 2007).

## Lighted (White fluorescent) incubation (16L:8D) ;

- increased gentle feather pecking and ground pecking at early ages (5, 7 , and 24 days old) and reduced fearfulness in broilers (Dayıoğlu and Özkan, 2012, 2013).

A 12L:12D light stimulation during the incubation resulted in reduced fearfulness in broilers (Archer and Mench, 2014a, 2017).

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Light Incubated broilers had

- shorter latencies to right during TI
- less intensively wing flapped during inversion test
- shorter latencies to exit the dark box in emerge test
- less active, vocalized less and spent more time closer to the observer during approach test

than dark incubation group (Archer and Mench, 2014a).

## Hypothesis

and

## Aim



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If a photoperiodic lighting schedule using different color of lights during incubation could affect post-hatch behavior of layer chicks at early ages and feather pecking in pullets and layers.

The aim was to investigate the effects of a 16 h light 8 h dark (16L:8D) lighting schedule during the incubation on behavioral development of layer chicks;

using White (6500K) and monochromatic Green (520 nm, 8000K) LED light as compared with the Dark incubation.

# Materials & Methods: Incubation Design

16L:8D

16L:8D

0L:24D

White (6500K)

Green (8000 K)

Dark (Control)

White LED

n=196

(4 trays of 49 eggs)

Green LED

n=196

(4 trays of 49 eggs)

Dark

n=196

(4 trays of 49 eggs)

- Incubation stage was repeated twice (2 batches)
- Average light intensity: 300 lux at eggs level
- Temperature  $37.5 \pm 0.1^{\circ}\text{C}$  and Humidity 60 %

## Experimental Design During Laying

**Batch 1**

**\*White  
\*Green  
\*Dark**

**2 floor pens  
20-22 birds/pen (4.8 m<sup>2</sup>)**

**Batch 2**

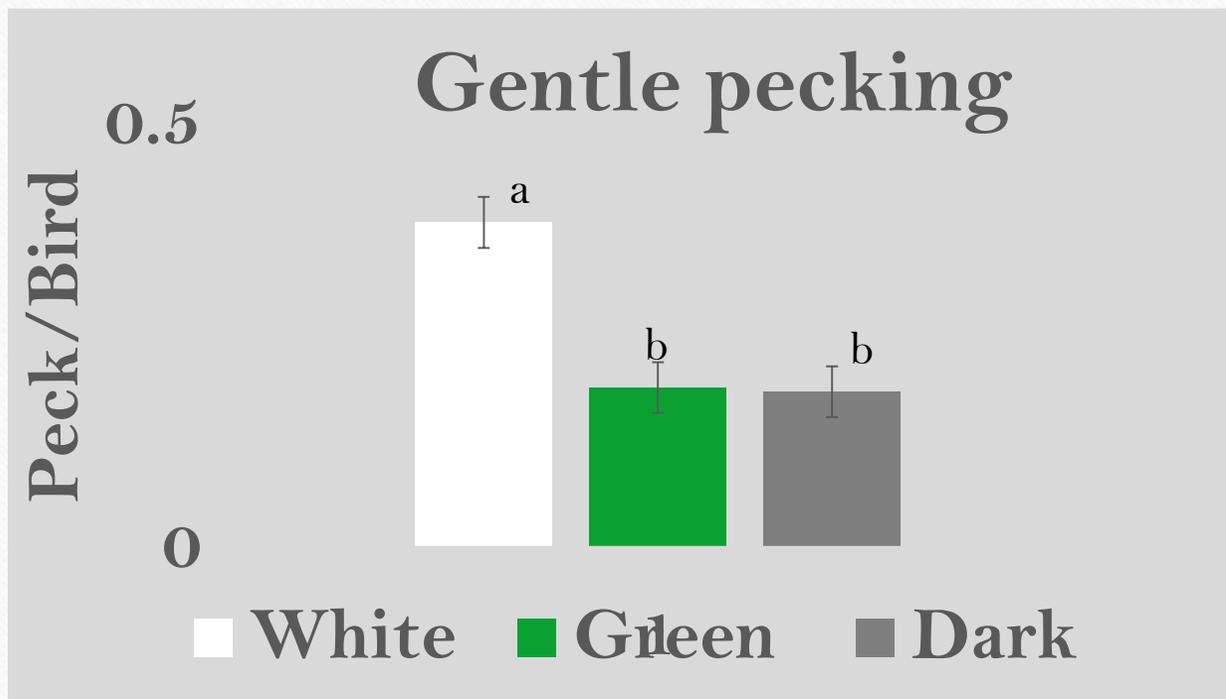
**\*White  
\*Green  
\*Dark**

**2 floor pens  
20-22 birds/pen (4.8 m<sup>2</sup>)**

# During the experiment

- Open Field Test
- Manuel Restrain Test
- Tonic Immobilite Tests
- Behavioral observations (feeding, drinking, foraging, comfort, etc. behaviour)
- Pecking (Gentle feather pecking, Severe feather pecking and Aggressive pecking behaviours)
- Feather scoring
- Egg production and egg weight records

Figure 1. The effect of incubation lighting on gentle feather pecking in pullets at 16 weeks old

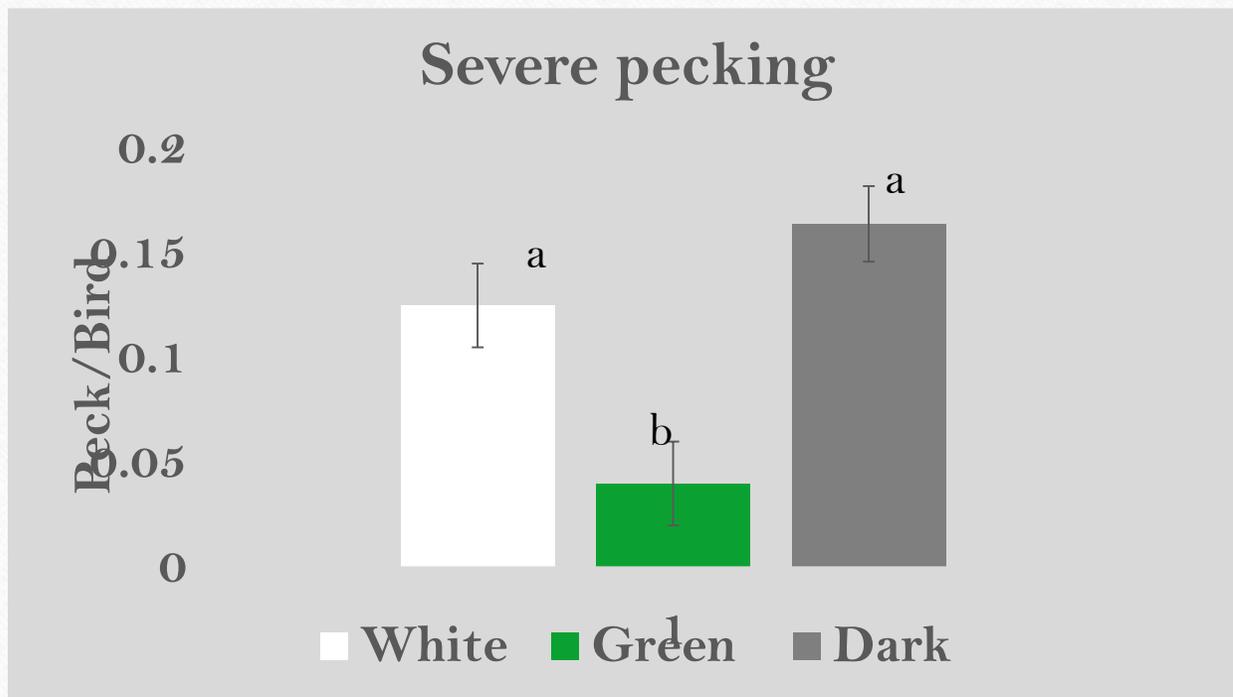


Gentle feather pecking frequencies differed with treatment ( $P \leq 0.05$ ).

Control and green-LI had similar values for gentle pecking.

However, white-LI chicks had significantly higher gentle pecking than green-LI and control.

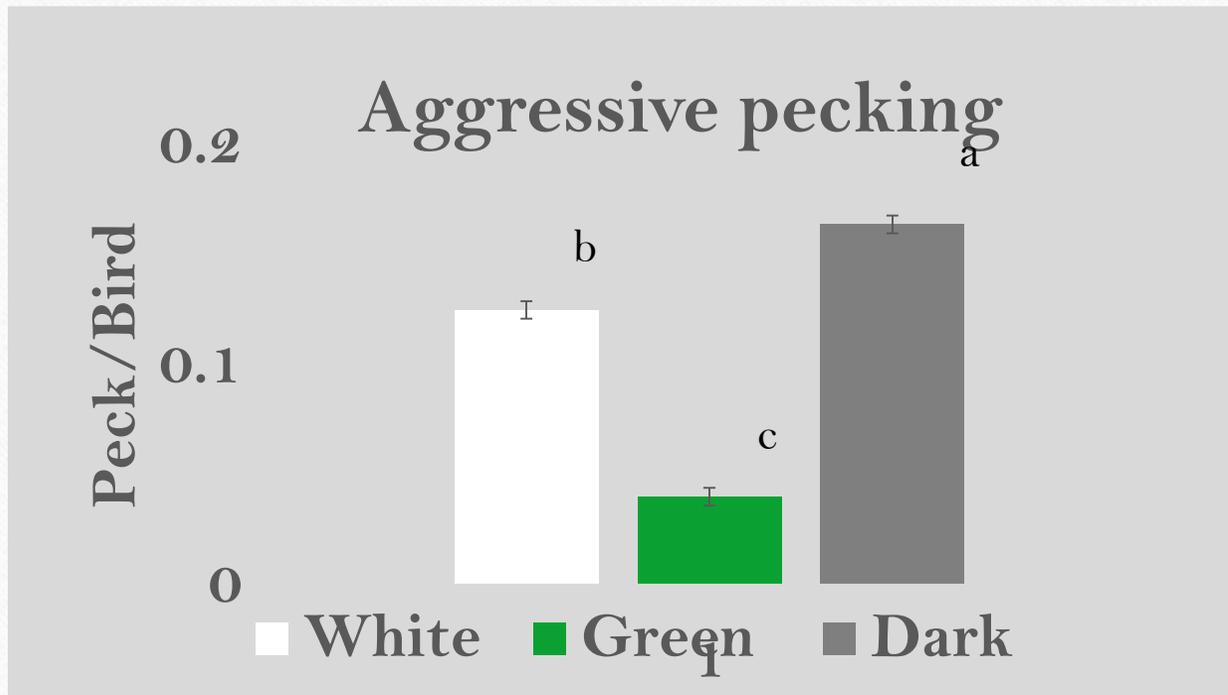
Figure 2. The effect of incubation lighting on severe feather pecking in pullets at 16 weeks old



Severe pecking differed with treatment ( $P \leq 0.05$ ).

Green-LI significantly reduced severe pecking as compared to White-LI and control.

Figure 3. The effect of incubation lighting on aggressive pecking in pullets at 16 weeks old



Aggressive pecking frequencies differed with treatment ( $P \leq 0.05$ ).

Green-LI significantly reduced aggressive pecking as compared to White-LI and control.

# Results

- may indicate that lighted incubation could modify pecking behaviour in layers.
- Monochromatic green LED seemed to be reduced severe and aggressive pecking in pullet age as compared to White light and dark incubation conditions.
- Increased gentle feather pecking in pullets received White light during incubation was in accordance with the previous findings (Riedstra and Groothuis, 2004). This could be a risk of injuries pecking .
- Green light seems to be promising in reducing severe and aggressive pecking. However, these findings need further investigation.



Thank You For Your Attention!