

# **EFFECT OF LIGHTING DURATION ON THE BEHAVIOUR, WELFARE, AND PERFORMANCE OF BROILER CHICKEN**

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Roll no: 0121/04

Registration no. 937

Session: 2021-22

**A Thesis Submitted in Partial Fulfillment of the Requirements for  
the Master of Science Degree in Poultry Science**



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**Chattogram Veterinary and Animal Sciences University  
Khulshi -4225, Chattogram, Bangladesh**

**July, 2023**

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## Acknowledgments

First of all, I like to remember Al-mighty Allah, and all my praise and admiration go to him. Without his mercy and profound kind, it would not be possible to complete the thesis work properly

Then, I am deeply grateful to my supervisor **Professor Dr. Mohammad Abul Hossain**, for his unwavering support and guidance throughout my master's program. His expertise and patience have been invaluable to me and have played a crucial role in the success of this thesis. Later, I am very thankful to **Associate Prof. Dr. Md. Saiful Bari** and former **Prof. Dr. Marjina Akter**, whose valuable support, advice, guidance, and assistance regarding thesis works are invaluable to me for completing my dissertation.

I am grateful to the **Advance Studies and Research (CSAR)**, CVASU, and **The Ministry of Science and Technology (MOST)** Bangladesh, for providing me with the funds to conduct my research and for all of the resources and support they provided. I would like to thank the **Head of the Department of Physiology, Pharmacology, and Biochemistry (CVASU)** and the **Head of the Department of Animal Science and Nutrition (CVASU)** who gave me permission to conduct valuable laboratory tests in their designated laboratories. I would like to extend a special thanks to the senior technical officers of both labs, who went above and beyond to help me with my work.

I also thank my Parents **Mr. Abdul Momen** and **Mrs. Rehena Begum** and my elder brother **MD. Imran Sayeam** and elder sister **Syeda Negath Sultana** who encouraged me and prayed for me throughout the time of my research. I am also thankful to my friends **Shuva Barua, Saikat Barua, Omar Faruque, Nahid Intiaz, Argha Paul Shuvo, and Imrul Kayes Sujan** for their motivation and assistance during this thesis work. Finally, I would like to thank my cousins **Ahmed Refay Hossain, Hamed Hossain, Arfan Hossain, Rakibul Isalm, Abdullah Al Maruf, and Kaiser Hamid Hridoy**, who greatly help me and invest their valuable time during my thesis.

May the Almighty Allah richly bless all of you.

**Author**

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## List of Abbreviations

DOC	- Day old chick	Sq.ft	- Square foot
L:D	- Lighting or darkness hours	mg/L	- Milligram per liter
FCR	- Feed conversion ratio	rpm	- Round per minute
ME	- Metabolic energy	%	- Percentage
CP	- Crude protein	Sec., s	- Second
EE	- Ether extract	cm	- Centimeter
GDP	- Gross domestic products	h/d	- Hours/ day
RMG	- Ready-made garments	ng/ml	- Nanogram per milliliter
SDS	- Sudden death syndrome		
AD	- Avoidance distance test		
VA	- Voluntary approach test		
NO	- Novel object test		
NE	- Novel environment test		
RO	- Response to observer test		
TI	- Tonic immobility test		
GS	- Gait score test		
HL	- Heterophil-lymphocyte ratio		
CORT	- Corticosteroid		
ILD	- Increasing long-dawn/dusk photoperiod		
ISD	- Intermittent short-dawn/dusk photoperiod		
ACTH	- Adreno-corticotropic hormone		
IBDV	- Infectious bursal disease vaccine		
BCRDV	- Baby chick raniketh disease vaccine		
LED	- Light emitting diode		
EDTA	- Ethylene diamine tetra-acetic acid		
RBC	- Red blood cell		
Hb	- Hemoglobin		
WBC	- White blood cell		
DLC	- Differential leukocyte count		
ANOVA	- Analysis of variance		
CBC	- Complete blood cell count		
SEM	- Standard error of the mean		
CRD	- Complete randomized design		
ELISA	- Enzyme-linked immunosorbent assay		
CVASU	- Chattogram Veterinary and Animal Sciences University		

## Abstract

The study was undertaken to investigate the effect of lighting duration on growth performance, behaviour, and welfare of broiler chickens from d1 to 30 days in the floor-rearing system. A total of 160 day-old broiler chicks of both sex (Lohmann Meat) was randomly housed into 4 lighting treatments including T<sub>1</sub> [24 hours light (L): 0 hour darkness (D)], T<sub>2</sub> (22L:2D), T<sub>3</sub> (20L:4D), and T<sub>4</sub> (18L:6D) with 4 replicates, each replication had 10 birds in a Completely Randomized Design (CRD). Chicks were exposed to different lighting regimes say 24L: 0D, 22L:2D, 20L:4D (2 x 2h darkness with a 1h lighting interval), and 18L:6D (3 x 2h darkness with 2 x 1h lighting interval) with 18-watt LED bulbs (22lux) for 30d. Data on live-weight gain (LWG), feed intake (FI), feed conversion ratio (FCR), and viability were recorded, where behavioural observation data were taken on 11d, 22d, and 29d. respectively. To evaluate the welfare, fearfulness tests including novel object (NO) test, novel environment (NE) test, response to observer (RO) test, and tonic immobility (TI) test were conducted at different periods with gait score (GS) test for leg health at 30d. At 27d, blood samples were taken to determine the heterophil-lymphocyte (HL) ratio and serum corticosteroid (CORT) level. The results showed that, LWG and FI in the 2<sup>nd</sup> week were found significantly higher ( $P < 0.05$ ) in T<sub>1</sub>(24L:0D) than that of 20L:4D and 18L:6D, which were reversed in the 4<sup>th</sup> week. But overall LWG, FI, FCR, and viability were nonsignificant ( $P > 0.05$ ) among the treatments. The results of behavioural activities of broiler showed that only inactive resting, feeding, preening, leg/wing stretching running/walking, and drinking activities were significantly influenced by lighting regimes. Broiler performed inactive resting activities significantly or more commonly in continuous lighting program than that of other treatment groups. This behaviour was less responsive when the birds were exposed to increased darkness period. Besides, increased activity of feeding and drinking time were found in reduced lighting periods. In behavioural observations, inactive resting frequencies were significantly lower in the T<sub>4</sub>(18L:6D) lighting compared to the T<sub>1</sub>(24L:0D) and T<sub>2</sub>(22L:2D) on 11d, 22d, and 29d. Feeding, preening and drinking frequencies seemed to improve in T<sub>4</sub> (18L:6D) and T<sub>3</sub>(20L:4D) compared to the T<sub>1</sub>(24L:0D) and T<sub>2</sub>(22L:2D) lighting. According to fear test results, welfare was significantly improved in T<sub>4</sub> (18L:6D) and T<sub>3</sub>(20L:4D) lighting compared to the T<sub>1</sub>(24L:0D) and T<sub>2</sub>(22L:2D) with lower RO value, higher NO time, better NE values, and lower TI time. The GS, HL ratio, and serum CORT were not influenced ( $P > 0.05$ ) by lighting treatments. It can be inferred that reduced lighting hours or providing increased darkness in the lighting regime of the broiler can improve broiler welfare and potentially boost broiler performances.

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**Keywords:** Boiler chicken, growth performance, lighting, photoperiod, behaviour, welfare, stress