



The Effect of Ultraviolet (UV-B) Light Addition on the Performance of Broilers

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ABSTRACT: Ultraviolet (UV) lamp produces ultraviolet (UV) light which is one of the rays with radiation power that is lethal to microorganisms. In addition to being lethal to microorganisms, ultraviolet light also has benefits for the growth of the bone skeleton of chickens and provides a sense of comfort for the chickens. This study aims to determine the effect of UV-B lighting on the performance of broilers reared in a cage system that does not get access to sunlight. This experiment used 60 chickens that were placed in individual cages on the basis of rice husks with a size of 35 × 45 cm, the cages were divided into 2 treatment groups with 30 replications for each treatment so that a total of 60 treatment units were used. The treatments in this study were untreated chickens (P1) and chickens that were given UV-B light for one hour at night (P2). The data collected included final body weight, body weight gain, feed consumption, feed conversion. The data obtained will be analyzed using independent statistical analysis T test (t-test) using microsoft excel. The results showed that giving UV-B light for 1 hour/day could increase feed consumption, final weight and body weight gain, but had no effect on feed conversion and broiler mortality. Based on these results, it can be concluded that the provision of UV-B light affects the performance of broilers.

KEYWORDS: Broilers, Final Weight, Feed Consumption, UV-B

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I. INTRODUCTION

Broilers are chickens that experience the fastest growth compared to other chickens due to the cultivation of advanced technology. The disadvantages of raising broilers are difficult environmental adaptation and high mortality risk. Broilers produce maximum at a temperature of 18°C-22°C. Environmental temperatures that are too high and followed by high humidity can cause a decrease in production (Renata et al., 2018).

Indonesia it self is a country with a tropical climate that has extreme changes in temperature and humidity so that currently most broiler cages are made with a closed model in order to reduce the influence of climate change from outside the cage. However, a closed model cage like this will limit access to sunlight for chickens. Sunlight has good benefits for chickens, including helping to stimulate vitamin D.

Sunlight has good benefits for livestock growth because UV light can help stimulate vitamin D which has a function in bone growth and antibodies. According to Fitria and Prabowo (2016) exposure to sunlight in the morning has benefits for bone health because it is a source of vitamin D. When ultraviolet rays hit the skin, these rays will be filtered in the skin, under the skin there are large amounts of cholesterol deposits. Ultraviolet light converts these cholesterol deposits into vitamin D. One way that can be used as a substitute for sunlight is the use of UV light, especially UV-B light. This UV-B light has a wavelength of 280–320 nm, so it is hoped that the UV light can replace the role of sunlight so that it can improve the performance of broilers.

There is ample evidence that domestic birds use UV radiation for visually mediated behaviors such as foraging, individual identification and mate selection. This can be a precise visualization of a fluorescent patch on the body that displays high UV reflectance, which allows birds to communicate and identify specific individuals in the flock. Layers and broilers reared under additional UV light showed increased preening and foraging behaviors such as ground pecking (House et al., 2020).

Research conducted by James et al. (2018) showed that the provision of UV wavelengths, especially UV-A, has the potential to improve the welfare of broilers kept in closed cages. The lighting environment designed with UV light can improve the quality of visual feedback and reduce the fear of chickens. Provision of UV-B light with a wavelength of 280-320 nm, provides benefits for chickens such as increasing foraging behavior, so that when feed consumption increases, it will result in body weight gain. Based on this, a research was conducted on how the effect of giving an ultraviolet light using UV-B on the performance of broilers.

II. MATERIAL AND METHODS

2.1. EXPERIMENTAL SITE

The Experiment was conducted in the Teaching and Poultry Research Farm, Faculty of Animal Science, Universitas Hasanuddin, Makassar, Indonesia.

2.2. EXPERIMENTAL DESIGN

This study used a postal cage which was covered with a tarp so as not to get access to sunlight inside the individual cage. Each treatment unit used individual cage on postal type the basis of rice husks with a size of 35 × 45 cm, then the cages were divided into 2 treatment groups with 30 replications for each treatment for a total of 60 treatment units. The first treatment consisted of 30 unsexed Cobb strain broilers without treatment (P1) and the second treatment consisted of 30 unsexed Cobb strain broilers which were irradiated with UV-B light for 1 hour (P2).

2.3. DATA COLLECTION

The data collection stage was carried out every week during the study which lasted for 4 weeks. Weighing of feed is done every day to calculate feed consumption. Weighing of chicken body weight was carried out every week, to determine body weight gain. Calculation of ration conversion is done by comparing feed consumption with body weight gain

Body weight was calculated every week during the study using a digital scale with units (g/e). Chickens are weighed individually each week.

The feed consumption was calculated every week from the initial week of the study to the final week with the difference between the amount of feed and the amount of feed remaining.

Calculation of feed conversion is the ratio between feed consumption and chicken body weight obtained over a certain period of time.

2.4. DATA ANALYSIS

The data obtained were analyzed using statistic analysis, t-test: Data analysis was calculated using Data Analysis of Microsoft Excel (Berk and Caray, 2010)

III. RESULT AND DISCUSSIONS

The performance data of broilers given UV-B light and without treatment can be seen in Table 1.

Table 1. The performance of broilers given UV-B light and without treatment for 28 days

Treatment	Parameter			
	Feed Consumption (g/bird/d)	Body weight (g/bird)	Average Daily Gain (g/bird/day)	Feed Conversion Ratio
Without UV-B	83,09±1,14 ^a	1551,2±87 ^a	55,50±2,77 ^a	1,50±0,09
UV-B (1 hour/day)	85,90±2,14 ^b	1658,6±116 ^b	59,25±3,37 ^b	1,45±0,10

**a-b different superscripts indicate statistical significant difference among the groups*

Based on the data in table 1, The results of the t-test analysis showed that the treatment with UV light significantly affected the parameters of feed consumption, final body weight and daily weight gain but not significant for parameter. The effect of giving UV-B light is because the chickens that are given UV-B light are in comfortable conditions for activities.

Research conducted by Rana and Chambell (2021) shows that UV light (UV-A and UV-B) is important in poultry production to improve behavior and health, such as through increasing desirable behaviors (eg foraging) and decreasing undesirable behaviors. . This indicates that chickens treated with UV light can increase their feed consumption.

In comfortable conditions, feed consumption in the addition of UV light has increased so that it gives the effect of higher body weight gain. This is in accordance with the opinion of James et al., (2018) which states that chickens given UV light, especially UV-B can have an impact on increasing walking and subsequently allowing chickens to forage more. Furthermore, Hayati et al. (2019) adds that high feed consumption is followed by high body weight growth and vice versa, this happens because the function of feed for chickens is for growth.

Research by Wei et al., (2020) showed that UV-B exposure increased bone mineral density, egg production, and vitamin D levels in laying hens eggs. This indicates that chickens treated with UV light have increased bone growth. Bone growth is related to the increase in meat attached to the bones, so that the final body weight and daily body weight gain are high.

IV. CONCLUSION

The results presented in the present giving UV-B light for 1 hour/day can increase feed consumption, final weight, and body weight gain, but has no effect on feed conversion.

REFERENCES

- [1]. Berk, K.N., Caray, P. 2010. Data Analysis with Microsoft® Excel: Updated for Office 2007®. Third Edition. Brooks/Cole, Cengage
- [2]. Fitria, C.N. and A. Prabowo. 2016. The effectiveness of UV exposure to sunlight on bone mass density and cholesterol levels in the elderly. *Profesi*. 14(1): 1-4.
- [3]. Hayati, R.N., Muryanto, and D. Prasetianti. 2019. Effect of closed cage with knockdown system and ultraviolet application on growth of 24-52 day old free-range chickens. *Proceedings of the National conference on Animal Husbandry and Veterinary Technology*. 2(1) : 711-716.
- [4]. House, G. M., E. B. Sobotik, J. R. Nelson, dan G. S. Archer. 2020. Effect of the addition of ultraviolet light on broiler growth, fear, and stress response. *J. Appl Poultry Science*. 1(1): 1-7.
- [5]. James, C., L. Asher, K. Herborn, dan J. Wiseman. 2018. The effect of supplementary ultraviolet wavelengths on broiler chicken welfare indicators. *Applied Animal Behaviour Science*. 20(2) :55-64.
- [6]. Rana, M. S dan D. L. M. Champbell. 2021. Application of ultraviolet light for poultry production: a review of impacts on behavior, physiology and production. *Animal Science*. 1 (2): 10-17.
- [7]. Renata, T. A., Sarjana, and S. Kismiati. 2018. Effect of zoning in closed house cages on ammonia levels and their impact on broiler meat quality in the rainy season. *Jurnal Ilmu- Ilmu Peternakan* 28(3):183- 191.
- [8]. Wei, Y., W. Zheng and Q. Tong. 2020. Effects of B- Wave ultraviolet supplementation using light-emitting diodes on caged laying hens during the later phase of the laying cycle. *Animals Science*. 1(3): 1-12.