Egypt. Poult. Sci. Vol. (44) (IV): (393-402)(2024) **(2411-1304)**

Egyptian Poultry Science Journal

http://www.epsj.journals.ekb.eg/

ISSN: 1110-5623 (Print) – 2090-0570 (Online)

A COMPARATIVE STUDY OF THE EFFECT OF WHITE AND BLUE-GREEN LED LIGHT WAVELENGTHS ON GROWTH PERFORMANCE, FEED EFFICIENCY, AND BEHAVIOURAL TRAITS IN COBB BROILER CHICKENS

Albert R Reyad [1], & Omar A. Mohamed*[1]

[1]Fac. of Desert and Enviro. Agric., Fuka, Matrouh Uni.Matrouh, Egypt.

[*]**Corresponding Author: Omar A. Mohamed** E-mail: Dr.Omar11@mau.edu.eg

Received: 05/11/2024 Accepted: 05 /12 /2024

ABSTRACT: This study was conducted to investigate the effects of white and blue-green LED lighting on growth performance, carcass traits, and some behavioral traits of Cobb broilers. The study utilized 248 chicks, which were randomly divided into two experimental groups. Each treatment was divided into four replicates. The first group was exposed to white lighting, while the second group was exposed to blue-green lighting. The experiment lasted for 35 days, feed and water were provided *ad libitum,* with uniform rearing conditions between the two groups to ensure the accuracy of the results. Birds raised under blue-green lighting showed significantly improved in growth performance compared to those exposed to white lighting. Significant differences in body weights started at the 7^{th} day of age and persisted to 35 days of age, with the blue-green lighting group achieving a final body weight of 2530.1 g, compared to 2169.4 g in the white lighting group ($p < 0.001$). The Feed conversion ratio was significantly improved ($p = 0.002$) by the blue-green lighting. Carcass characteristics results also showed positive results under blue-green lighting, with a significant improvement in carcass weight, dressing percentage, thigh weight, and breast weight. Behaviorally, blue-green lighting increased wing stretching, wing flapping, and immobility, while it decreased aggressive behaviors, including Pecking, Cocks fight, and Chase ($p < 0.001$). These results indicate that blue-green lighting positively affects growth, feed efficiency, carcass traits, and welfare behaviors in Cobb broiler chickens.

Key words: Light Wavelengths, Broiler chickens, Welfare behaviors.

INTRODUCTION

Vision plays an essential role in controlling poultry behavior, greatly affecting the welfare aspects of chickens (Prescott et al., 2003). Light colors and intensities directly control birds' vision, affecting behaviors and overall welfare, including aggression behaviors like feather pecking (Jones et al., 2004; Hesham et al., 2018; Pap et al., 2024). Avian species detect light through retinal and extra-retinal photoreceptors, with retinal cones responsive to blue, green, red, violet, and even ultraviolet wavelengths, providing a broader light perception range compared to humans (Dawson et al., 2001; Lewis et al., 2007). Previous studies showed that blue and green light can positively affect body weight in chickens, turkeys, ducks, geese, and quail, with each color being used separately in previous research, with no effect on mortality rates (Akyüz & Onbaşilar, 2018; Campbell et al., 2015; Chang et al., 2016; Foss et al., 1972; Halevy et al., 1998; Kim et al., 2014b; Lauber & McGinnis, 1961; Ookawa, 1970; Wabeck & Skoglund, 1974). The effects of monochromatic light on broiler growth were also influenced by age: green light improved growth in younger birds, whereas blue light is more effective in stimulating growth in older birds (Rozenboim et al., 1999).

The current study aims to compare the effects of white and blue-green LED light wavelengths on behavioral traits, growth performance, and feed efficiency in Cobb broiler chickens, thereby optimizing welfare and productivity in poultry.

MATERIALS AND METHODS

This study was approved by the Animal Care and Ethics Committee of Alexandria University (serial number: 0306969).

Location

The current study was carried out on a private farm located in the Matrouh Governorate.

Birds

The current study used 248 one-day-old Cobb breed chicks, averaging 42 g in weight, purchased from Al Watania Poultry Company.

Experimental Design and Management:

The chicks were numbered by metal wing numbers and randomly divided into two groups depended on the light color. Each group was also divided into four replicates, with 31 checks in each replicate. Each group was reared in a separate pen, the space of each replicate was 3.5 m^2. LED lamps with a power of 1000 lumens were used (650 nm for white light,430 nm for blue light, and 656 nm for green light).

The light intensity used was consistently 30 lux throughout the experiment, estimated using a lux meter. The lamps were cleaned of dust and the light intensity was monitored and measured every three days to ensure valid brightness. An irregular lighting program was used according to Reyad et al., (2023) as outlined in Table 1

Behavioral Study Method:

To study bird behavior, six birds were randomly selected from each replicate, and their backs and wings were painted with black spray paint. Starting from the third week, males were additionally painted blue on their backs to observation cock fighting behavior (force show), as they can be accurately distinguished from females at this age.

Behavioral observations were conducted using EZVIZ video smart cameras with the following specifications:

Image Sensor: 1/2.7" Progressive Scan CMOS
Shutter Speed: Self-adaptive shutter
Lens: 2.8 mm @ F2.0, view angle: 104° (Horizontal), 125° (Diagonal) 4 mm @ F2.0, view angle: 86° (Horizontal), 102° (Diagonal)
Lens Mount: M12
Video resolution: 1920×1080 pixels.
Video FPS: 30 fps (frames per second).
Night Vision: up to 30m (100 ft.).

Behavior recording was commenced on the sixth day of the experiment, capturing data as a count of behaviors per bird per hour for one hour each day between 8 PM to 9 PM. The recorded data was reviewed and discharged daily.

Experimental Diets:

The diets were formulated to meet or exceed the recommendations of the National Research Council (NRC, 1994). Chicks were initially fed a basal starter mash diet from 1 to 14 days of age, which had 23% protein and 2940 Kcal of metabolizable energy (ME) per kg of diet. Later, they received a grower pellets diet from 15 to 35 days of age, consisting of 21% protein and 2933 Kcal of ME per kg of diet. Feed and water were supplied ad libitum.

Studied Traits:

Growth traits

-Live body weight:

Birds were weighed at hatch, 7,14,21,28, and 35 days old at a set time of 8:00 AM to determine the live body weight and recorded to the nearest gram.

-Weight Gain

The body weight gain was calculated by subtracting the initial body weight at hatch from the final body weight at 35 days old.

- Growth rate % (0-35)

The growth rate (GR%) was calculated based on the initial and final weights of the chicks according to Broody 1945, using the formula: G.R (%) = W2-W1 /0.5 (W2+W1) * 100

-Feed Consumption

Feed consumption was calculated by measuring the total amount of feed consumed in grams for each replicate.

-Feed conversion (FCR)

Feed conversion was calculated by determining the total feed consumed in grams to the weight gain (0-35) in grams.

Carcass Traits:

At the end of the study, six birds from each replication were randomly chosen, weighed, and slaughtered. The carcass weight had been recorded after the feathers, viscera, and other inedible parts had been removed. The dressing % was calculated using the carcass weight divided by the live weight. The carcasses were then separated into four parts. The proportions of the breast (half of the total breast) and thigh (which includes the single thigh and femur) were measured individually and given as weights and percentages of the carcass weight.

Behavioral traits

Welfare behaviors

-Immobility:

This behavior is classified as moving from a state of movement to complete stability, and this behavior expresses welfare and comfort. (Kim *et al.*, 2014a; Hesham *et al.*, 2018).

-Wing stretching:

This behavior is classified as extends both or one of the wings out away from the body. May be accompanying by the extension of a leg. (Collins *et al.*, 2011; Sultana *et al.*, 2013).

-Wing flapping:

This behavior is classified as extending both wings out from the body simultaneously and flapping. (Hassan *et al.*, 2014; Hesham *et al.*, 2018).

Aggressive behaviors

-Pecking:

This behavior is classified as attacking other birds and pecking feathers, equipment, walls and floors. (Abu Tabeekh & Shawkat, 2015; Nie *et al.*, 2019; Lucena *et al.*, 2020).

-Cocks fight (force show):

This behavior is classified as aggressively confronts another bird, Gaze is focused intently upon the other bird. May be accompanying by raised neck feathers, forward lunges. (Collias & Collias, 1996; Collins *et al*., 2011)

-Chase:

This behavior is classified as moves quickly about the pen following another bird. (Collias & Collias, 1996; Collins *et al*., 2011; Meyer *et al*., 2003).

3.7. Statistical analysis

An independent sample t-test was used to determine the effect of lighting colour (white versus blue-green) on growth performance, carcass traits, and behavioural traits. The analysis was performed using Jamovi software, with a level of significance of $P < 0.05$.

RESULTS AND DISCUSSION

1- Growth traits

Table 2 shows the results of live body weights (g) and (±SE) of Cobb broilers reared under white and blue-green lighting at different ages. Firstly, there were no significant differences between groups in initial body weight with a p-value of 0.520. However, significant differences were found at 7, 14, 21, 28, and 35 days of age. On the 7th day, broilers under blue-green lighting weighed significantly heavier than those under white lighting ($p < 0.001$). This trend continued at 14 days, with weights of 710.3 grams for blue-green versus 595.3 grams for white ($p < 0.001$). By 21 days, blue-green broilers averaged 1223.3 grams, significantly heavier than the white group ($p < 0.001$). At 28 days of age, body weights were 1976.1 grams for blue-green broilers compared to 1684.3 grams for those under white lighting ($p < 0.001$). Finally, there were significant differences in 35 days of age in live body weight where the group reared under the blue-green lighting outperformed the other group. ($P<0.001$).

The results of the current study inform that blue-green lighting promoted the growth in Cobb broilers, as evidenced by the significantly higher body weights observed at different ages compared to those raised under white lighting. Previous research supports that different light wavelengths can significantly influence poultry growth (Akyüz & Onbaşilar, 2018; Baxter et al., 2014; Campbell et al., 2015; Reyad, 2021; Wu et al., 2022). The absence of significant differences in initial body weight infers homogeneity among chicks and suggests that the observed improvements in growth resulted from the light color effect. One possible explanation for these significant differences is that Rozenboim et al. (2004), indicated that there were statistically significant differences in thyroid hormone levels between birds exposed to different wavelengths of light and that these hormones were directly related to growth.

The results in Table 3 show that there is a significant effect of light color on the weight gain in broiler chickens, as chickens exposed to blue-green lighting achieved a higher weight gain and growth rate in the period from 0 to 35 days of age than the white lighting group, with a significant difference ($P<0.001$). This result indicates that these lighting color may create a more suitable environment for growth, perhaps improving vision, as confirmed by the relative growth rate during the same period ($P< 0.001$). The results in Table 3 also showed an increase in feed consumption and a decrease in the feed conversion ratio in the group raised under blue-green lighting compared to the group raised under traditional white lighting ($P=0.001$) and ($P=0.002$), respectively. The present result of the effect is in conflict with the result obtained by Rozenboim et al. (2004), who indicated that there were no significant differences in feed consumption and feed conversion ratio between birds exposed to white, green, and blue light, but it should be noted that these lighting colors were used separately.

The results of the current study of the significant effect of lighting colour on the feed intake and the feed conversion ratio are consistent with the results obtained by Gharahveysi et al., (2020), as his results indicated that the yellow colour increased the feed consumed compared to the green and red colours, and the feed conversion ratio decreased in birds raised under green light. Several studies have indicated that wavelength may have a significant effect on feed consumption and feed conversion ratio. Firstly, Kasem (2017) recorded the lowest feed conversion for broiler Cobb chicks exposed to mixed green and blue light compared to the white light group. Also, Mohamed et al. (2017) showed that Avian 48 broiler chicks reread under green and blue lights have significantly higher feed consumption and a lower feed conversion ratio compared to those reread under white color light. Moreover, Mousa-Balabel et al. (2017) found a significant decrease in feed conversion ratio in birds exposed to blue and

green-blue light compared to white and green color. Abdel-Azeem and Borham (2018) indicated that Ross broilers reared under LED-blue light during 7 to 35 days of age have consumed more feed and exhibited a better feed conversion ratio compared to broilers reared under red, white, and green lights.

2- Carcass traits

The results in Table 4 showed the means and standard errors of the results of some carcass traits. The results show that broilers raised under blue-green lighting had significantly higher live body weights ($p = 0.001$) compared to those exposed to white lighting (2564.58 g) and (2334.83 g), respectively. The results also indicate that carcass weight and dressing% were higher in the blue-green group, with significant differences ($p < 0.001$). In the same trend, the weight of both thigh and breast were significantly higher in the blue-green group ($p = 0.015$ and $p = 0.017$, respectively), while there were no significant differences in the percentages of thigh and breast. The current results about dressing percentage and edible parts are consistent with some previous results (Cao et al., 2008; De Santana et al., 2014; Nelson et al., 2020). Also, Yang et al. (2016) noticed that the birds reared under green and blue mixed light (Green × Blue) had a carcass percentage significantly higher than the birds exposed to blue or green only. The improvement in carcass percentage and edible parts weight under the effect of blue-green lighting can be explained by several interrelated factors. There may be an effect of light wavelengths on the appetite of chickens, which leads to increased feed consumption and improved growth, which was found in the results of the current study. In addition, colored lighting may improve the general behavior of birds, reducing stress. The wavelength of light may also have an effect on some physiological processes, improving the balance of hormones such as growth hormone, which may enhance overall growth and carcass percentage.

3- Behavioral traits

Table 4 show the means and standard errors of the behavioral traits studied in Cobb broiler chickens exposed to white and blue-green lighting. Firstly, welfare behaviors were generally more frequent in birds raised under blue-green lighting, where there were statistically significant differences in wing extension and wing flapping with P values of $p = 0.043$ and $p = 0.010$, respectively. Also, the immobility behavior that indicates welfare and comfort was significantly higher in birds raised under blue-dung lighting, with a significance value of $p < 0.001$.

Secondly, with regard to aggressive behaviors, the results of the current study indicated a significant decrease in pecking, cockfighting, and chasing behaviors in birds raised under blue-green lighting. This decrease may explain the increase in growth rates and feed consumption in this treatment, as energy and time wasted in fighting and competition between birds were saved. These results of the significant effect of wavelengths on bird behavior are consistent with the results of Mendes et al., (2010), (Parvin et al., 2014), Senaratna et al., (2016), Soliman & El-Sabrot, (2020).

The results of the increased frequency of welfare behavior in this study are consistent with what was indicated by Hesham et al. (2018). Also, the decrease in the frequency of aggressive behaviors under the influence of low wavelengths such as blue and green is consistent with the results obtained by Lewis & Morris, (2000) and Rozenboim et (2004).

These differences can be explained by the possibility of the effect of lighting color on some hormones that affect chicken behavior, as indicated by Nelson et al., (2020), where he found significant differences between birds in plasma corticosterone based on lighting color.

CONCLUSION

Blue-green light caused significant improvements in body weights, feed consumption, feed conversion ratio, and carcass dressing percentage. Moreover, it reduced aggressive behaviours, suggesting that welfare increased in Cobb broiler chickens exposed to blue-green light during the fattening period. We recommend conducting further studies on the physiological and hormonal changes in birds under this influence.

Table (1): Intermittent Lighting Protocols Used for Broiler Chicks at Various Developmental Stages

Age (days)	Periods
1-6	Continuous (24h Light)
7-9	23h Light: 1h dark
10-15	20h Light: 4h dark
16-25	16h Light: 8h dark
26-30	21h Light: 3h dark
31- 35	23h Light: 1h dark

Table (2): Average Live Body Weights (grams) and Standard Errors (μ±SE) of Cobb Broilers at Different Ages Under White and Blue-Green Lighting.

Items	Groups		SEM	p-value
	White	Blue*Green		
Initial body weight	42.0	41.6	0.323	0.520
BW7	163.9 [b]	196.4 [a]	3.43	< .001
BW14	595.3 [b]	710.3 [a]	11.3	< .001
BW21	1065.2 [b]	1223.3 [a]	16.9	< .001
BW28	1684.3 [b]	1976.1 [a]	28.6	< .001
Final Body weight	2169.4 [b]	2530.1 [a]	38.5	< .001

BW7: live body weight at 7 days of age; BW14: live body weight at 14 days of age; BW21: live body weight at 21 days of age; BW28: live body weight at 28 days of age.

[a,b] Means within the same row with different superscripts differ significantly ($P < 0.05$).

SEM: standard error of the mean

Table (3): Average Values and Standard Errors (μ±SE) of Growth Performance Traits of Cobb Broilers Under White and Blue-Green Lighting.

Items	Groups		SEM	p-value
	White	Blue*Green		
Weight gain (0-35)	2115 [b]	2430 [a]	38.5	< .001
Relative growth rate (0-35)	192.0 [b]	193.9 [a]	0.11	< .001
Feed Consumption 0-35	3335 [b]	3648 [a]	52.0	0.001
Feed Conversion 0-35	1.61 [a]	1.52 [b]	0.02	0.002

Table (4): Average Values and Standard Errors (μ±SE) of Carcass Traits of Cobb Broilers Under White and Blue-Green Lighting.

Items	Groups		SEM	p-value
	White	Blue*Green		
Live body weight	2334.83 [b]	2564.58 [a]	36.5	0.001
Carcass weight	1791.95 [b]	2018.54 [a]	30.4	< .001
Dressing %	76.72 [b]	78.75 [a]	0.28	< .001
Thigh weight	339.37 [b]	382.04 [a]	8.92	0.015
Thigh %	18.90	18.90	0.00	0.991
Breast weight	558.75 [b]	601.20 [a]	9.03	0.017
Breast %	31.20	30.00	0.00	0.195

[a,b] Means within the same row with different superscripts differ significantly (P < 0.05).SEM: standard error of the mean.

Table (4): Average Values and Standard Errors (μ±SE) of Some Behavioural Traits of Cobb Broilers Under White and Blue-Green Lighting.

Items	Groups		SEM	p-value
	White	Blue*Green		
Wing stretching	1.1	1.57 [a]	0.11	0.043
Wing flapping	0.83	1.37 [a]	0.10	0.010
Immobility	58.03	182.87 [a]	9.13	< .001
Pecking	737.24 [a]	374.47	53.3	< .001
Cocks fight (Force show)	80.53 [a]	43.50	2.96	< .001
Chase	32.26 [a]	28.77	0.52	< .001

[a,b] Means within the same row with different superscripts differ significantly (P < 0.05).SEM: standard error of the mean.

REFERENCES

Abdel-Azeem, A. F., & Borham, B. E. 2018. Productive and physiological response of broiler chickens exposed to different colored light-emitting diode and reared under different stocking densities. Egyptian Poultry Science Journal, 38(IV), 1243-1264.

Abu Tabeekh, M. A. S., & Shawkat, T. F. 2015. Effect of light color and stocking density on some behavioral traits of broilers and layers. Journal of Agricultural Science and Soil Science, 3(9), 122-130.

Akyüz, H. Ç., & Onbaşilar, E. 2018. Light wavelength on different poultry species. World's Poultry Science Journal, 74(1), 79–88. https://doi.org/10.1017/s0043933917001076.

Baxter, M., Joseph, N., Osborne, V. R., & Bédécarrats, G. Y. 2014. Red light is necessary to activate the reproductive axis in chickens independently of the retina of the eye. Poultry Science, 93(6), 1289–1297. https://doi.org/10.3382/ps.2013-03799.

Brody, S. 1945. Bioenergetics and Growth. Reinhold Pub. Corp., New Yourk.

Campbell, C. L., Colton, S., Haas, R., Rice, M., Porter, A., Schenk, A., Meelker, A., Fraley, S. M., & Fraley, G. S. 2015. Effects of different wavelengths of light on the biology, behavior, and production of grow-out Pekin ducks. Poultry Science, 94, 1751–1757. https://doi.org/10.3382/ps/pev197

Cao, J., Liu, W., Wang, Z., Xie, D., & Chen, Y. 2008. Green and blue monochromatic lights promote growth and

development of broilers via stimulating testosterone secretion and microfiber growth. Journal of Applied Poultry Research, 17(2), 211–218.

Chang, S. C., Lin, M. J., Zhuang, Z. X., Huang, S. Y., Lin, T. Y., Jea, Y. S., Fan, Y. K., & Lee, T. T. 2016. Effect of monochromic light-emitting diode light with different colors on the growth and reproductive performances of breeder geese. Asian-Australasian Journal of Animal Sciences, 29, 830–837. https://doi.org/10.5713/ajas.15.0575

Collias, N. E., & Collias, E. C. 1996. Social organization of a red junglefowl, Gallus gallus, population related to evolution theory. Animal Behaviour, 51, 1337–1354.

Collins, S., Forkman, B., Kristensen, H. H., Sandøe, P., & Hocking, P. M. 2011. Investigating the importance of vision in poultry: Comparing the behaviour of blind and sighted chickens. Applied Animal Behaviour Science, 133(1–2), 60–69. https://doi.org/10.1016/j.applanim.2011.04.013

Dawson, A., King, V. M., Bentley, G. E., & Ball, G. F. 2001. Photoperiodic control of seasonality in birds. Journal of Biological Rhythms, 16(4), 365–380.

De Santana, M. R., Garcia, R. G., Naas, I. A., Paz, I. A., Caldara, F. R., & Barreto, B. 2014. Light emitting diode (LED) use in artificial lighting for broiler chicken production. Engenharia Agrícola, 34(3), 422–427.

Foss, C. D., Carew, L. B., & Arnold, E. L. 1972. Physiological development of cockerels as influenced by selected wavelengths of environmental light. Poultry Science, 51(6), 1922–1927.

Gharahveysi, S., Irani, M., Asadi Kenari, T., & Mahmud, K. I.2020. Effects of colour and intensity of artificial light produced by incandescent bulbs on the performance traits, thyroid hormones, and blood metabolites of broiler chickens. Italian Journal of Animal Science, 19(1), 1–7. https://doi.org/10.1080/1828051X.2019.1685916.

Halevy, O., Biran, I., & Rozenboim, I. 1998. Various light source treatments affect body and skeletal muscle growth by affecting skeletal muscle satellite cell proliferation in broilers. Comparative Physiology and Biochemistry, 120(2), 317–323.

Hassan, M. R., Sultana, S., Choe, H. S., & Ryu, K. S. 2014. Effect of combinations of monochromatic LED light color on the performance and behavior of laying hens. Egyptian Journal of Neurology, Psychiatry and Neurosurgery, 51(3), 321–326. https://doi.org/10.2141/jpsa.0130105

Hesham, M. H., El Shereen, A.-H., & Enas, S. N. 2018. Impact of different light colors on behavior, welfare parameters, and growth performance of Fayoumi broiler chickens strain. Journal of the Hellenic Veterinary Medical Society, 69(2), 951–958.

Jones, R. B., Blokhuis, H. J., de Jong, I. C., Keeling, L. J., McAdie, T. M., & Preisinger, R. 2004. Feather pecking in poultry: The application of science in a search for practical solutions. Animal Welfare, 13(Suppl.), 215–219.

Kasem, M. M. M. S. 2017. Impact of light management on broilers' behavior and performance (Master's thesis). Faculty of Veterinary Medicine, Kafr El-Sheikh University, Egypt.

Kim, M., Parvin, R., Mushtaq, M., Kim, J., Kim, D., Kang, H., Na, J., Hwangbo, J., Kim, C., Cho, K., Yang, C., & Cho, H. 2014a. Influence of colored light-emitting diode illumination on the growth performance and meat quality traits of Pekin ducks (Anas platyrhynchos). Bulgarian Journal of Agricultural Science, 20, 943–948.

Kim, N., Lee, S.-R., & Lee, S.-J. 2014b. Effect of light color on energy expenditure and growth in broiler chickens. Asian-Australasian Journal of Animal Sciences, 27(7), 1044–1049.

Lauber, J. K., & McGinnis, J. 1961. Spectral sensitivity of avian growth and reproduction processes. Federation Proceedings, 24, 701.

Lewis, P. D., & Morris, T. R. 2000. Poultry and colored light. World's Poultry Science Journal, 56(3), 189–207.

Lewis, P. D., Caston, L., & Leeson, S. 2007. Green light during rearing does not significantly affect the performance of egg-type pullets in the laying phase. Poultry Science, 86(4), 739–743.

Lucena, A. C., Pandorfi, H., Almeida, G. L. P., Guiselini, C., Araújo, J. E. M., & Rodrigues, T. P. S. 2020. Behavior of broilers subjected to different light spectra and illuminances. Revista Brasileira de Engenharia Agrícola e Ambiental, 24(6), 415–421.

Meyer, A., Cloete, S. W. P., & Brown, C. R. 2003. The influence of separate-sex rearing on ostrich behaviour and skin damage. South African Journal of Animal Science, 33(2), 95–104.

Mohamed, R. A., El-Kholya, S. Z., Shaky, M. S. E. K., & El Saidy, N. R. 2017. Manipulation of broiler growth performance, physiological and fear responses using three monochromatic LED lights. Alexandria Journal of Veterinary Science, 53, 57–62.

Mendes, A., Reffati, R., Restelatto, R., & Paixão, S. J. 2010. Vision and lighting in modern poultry farming. Brazilian Journal of Agroscience, Pelotas, 16(1-4), 5-13.

Mousa-Balabel, T. M., Radi Ali Mohamed, R. A., & Saleh, M. M. 2017. Using different light colors as a stress factor on broiler performance in Egypt. Australian Journal of Basic and Applied Sciences, 11(9), 165–170.

Nelson, J. R., Bray, J. L., Delabbio, J., & Archer, G. S. 2020. Light-emitting diode (LED) color and broiler growth: Effect of supplementing blue/green LED to white LED light on broiler growth, stress, and welfare. Poultry Science, 99, 3519–3524. https://doi.org/10.1016/j.psj.2020.04.020.

Nie, C., Ban, L., Ning, Z., & Qu, L. 2019. Feather colour affects the aggressive behaviour of chickens with the same genotype on the dominant white (I) locus. PLOS ONE, 14(5), 1-11. https://doi.org/10.1371/journal.pone.0215921.

National Research Council. 1994. Nutrient requirements of poultry. National Academy Press.

Ookawa, T. 1970. Effects of bilateral optic enucleation on body growth and gonad in young male chicks. Poultry Science, 49(2), 333–334.

Pap, T. I., Szabó, R. T., Bodnár, Á., Pajor, F., Egerszegi, I., Podmaniczky, B., Pacz, M., Mezőszentgyörgyi, D., & Kovács-Weber, M. 2024. Effect of lighting methods on the production, behavior, and meat quality parameters of broiler chickens. Animals, 14(12), 1827. https://doi.org/10.3390/ani14121827.

Parvin, R., Mushtaq, M. M. H., Kim, M. J., & Choi, H. C. 2014. Light emitting diode (LED) as a source of monochromatic light: A novel lighting approach for behaviour, physiology and welfare of poultry. World's Poultry Science Journal, 70, 543–556.

Prescott, N. B., Wathes, C. M., & Jarvis, J. R. 2003. Light, vision, and the welfare of poultry. Animal Welfare, 12, 269–288.

Reyad, A. R., Abou Khadiga, G., Elkomy, A. E., Abaza, I. M., & Soliman, F. N. K. 2023. Impact of LED lighting color on productive and behavioral characteristics of broiler chickens. Animal Review, 10(1), 1–11. https://doi.org/10.18488/92.v10i1.3360.

Reyad, A. R. N. 2021. Performance of broiler chickens exposed to different wavelengths of lighting. M.Sc. Thesis, Faculty of Desert and Environmental Agriculture, Matrouh University.

Rozenboim, I., Biran, I., Chaiseha, Y., Yahav, S., Rosenstrauch, A., Sklan, D., & Halevy, O. 2004. The effect of a green and blue monochromatic light combination

on broiler growth and development. Poultry Science, 83(5), 842–845.

Rozenboim, I., Biran, I., Uni, Z., & Halevy, O. 1999. The involvement of monochromatic light in growth, development, and endocrine parameters of broilers. Poultry Science, 78(1), 135–138.

Senaratna, D., Samarakone, T. S., & Gunawardena, W. W. D. A. 2016. Red color light at different intensities affects the performance, behavioral activities and welfare of broilers. Asian-Australasian Journal of Animal Sciences (AJAS), 29(7), 1052–1059.

Soliman, F. N. K., & El-Sabrout, K. 2020. Light wavelengths/colors: Future prospects for broiler behavior and production. Journal of Veterinary Behavior, 36, 34–39.

Sultana, S., Hassan, M. R., Choe, H. S., & Ryu, K. S. 2013. The effect of monochromatic and mixed LED light colour on the behavior and fear responses of broiler chickens. Avian Biology Research, 6(3), 207–214.

Wabeck, C. J., & Skoglund, W. C. 1974. Influence of radiant energy from fluorescent light source on growth, mortality, and feed conversion of broilers. Poultry Science, 53(6), 2055–2059.

Wu, Y., Huang, J., Quan, S., & Yang, Y. 2022. Light regimen on health and growth of broilers: An update review. Poultry Science, 101, Article 101545. https://doi.org/10.1016/j.psj.2021.101545.

Yang, Y., Yu, Y., Pan, J., Ying, Y., & Zhou, H. 2016. A new method to manipulate broiler chicken growth and metabolism: Response to mixed LED light system. Scientific Reports, 6, Article number: 25972**.**

الملخص العربي

دراسة مقارنة لتأثير أطوال موجات الضوء الأبيض والأخضر-الأزرق على أداء النمو وكفاءة التغذية والسمات السلوكية في دجاج التسمينCoob

ألبرت روميل نصحي رياض - عمر أحمد محمد حسن

كلية الزراعة الصحراوية والبيئية جامعة مطروح- مطروح – مصر

أجريت هذه الدراسة للمقارنة بين تأثير الإضاءة البيضاء والزرقاء-الخضراء على أداء النمو وصفات الذبيحة وبعض الصفات السلوكية لدجاج التسمين من سلالة كوب.وتم تقسيم الطيور عشوائيا الى مجموعتين بناء على لون الإضاءة وكانت اهم النتائج المتحصل عليها كالتالي: اولا أظهرت الطيور التي تم رعايتها تحت الإضاءة الزرقاء-الخضراء تحسنًا ملحوظًا في أداء النمو مقارنة بتلك المعرضة للإضاءة البيضاء حيث ظهرت الفروق المعنوية في أوزان الجسم في اليوم السابع من العمر واستمرت حتى اليوم الخامس والثلاثين من العمر وحققت مجموعة الإضاءة الزرقاء الخضراء وزنًا نهائيًا للجسم يبلغ 2530.1 جرامًا، مقارنة بـ 2169.4 جرامًا في مجموعة الإضاءة البيضاء

ايضا تحسن معامل التحويل الغذائي بشكل معنوي في الطيور التي تعرضت للإضاءة الزرقاء الخضراء كما أظهرت نتائج صفات الذبيحة نتائج إيجابية تحت الإضاءة الزرقاء الخضراء، مع زيادة معنوية في وزن الذبيحة ونسبة التصافي ووزن الفخذ والصدر

من الناحية السلوكية، أدت الإضاءة الزرقاء الخضراء إلى زيادة تكرار سلوك تمدد الأجنحة ورفرفة الأجنحة والثبات والتي تشير جميعها الى الراحة والهدوء والرفاهية، في حين انخفض معدل تكرار الصفات السلوكية التي تشير للعدوانية وعدم الراحة بما في ذلك النقر، والصراع بين الديوك، والمطاردة

تشير هذه النتائج إلى أن الإضاءة الزرقاء الخضراء تؤثر بشكل إيجابي على النمو وكفاءة التغذية وسمات الذبيحة وسلوكيات الرفاهية في دجاج التسمين كوب