

Original Research Article

<https://doi.org/10.20546/ijcmas.2019.807.052>

Behaviour of Broiler Birds Reared Under Coloured Light Emitting Diodes Vis-A-Vis Incandescent Light Supplemental Lighting Programme

Suresh Kumar^{1*}, Ravi Kant Gupta¹, Yashpal Singh¹,
Amit Sharma¹ and Neeraj Kashyap²

¹Department of Livestock Production Management, GADVASU, Punjab, India

²Department of Animal genetics and Breeding, GADVASU, Punjab, India

*Corresponding author

ABSTRACT

The present study was conducted to assess the behaviour of broiler birds in an open-sided house under supplemental lighting programme using light emitting diodes (LEDs) and incandescent light. To perform this study a total of 240 straight run commercial Vencobb broiler chicks were procured, distributed in four different light treatment groups i.e. T_w; white (650nm), T_g; green (565nm) and T_b; blue (430nm) light LED (3 Watt each) and incandescent light bulbs (60 Watt each) as control (T_c) in 12 pens (4x3 factorial design) and reared from day old to 6th week of age. The coloured curtains were placed according to the treatment groups requirement inside each pen of shed and each pen was completely enclosed to make it light proof. Light intensity was measured with the help of light intensity meter (Lutron® PLX-111 light meter with range 0-20000 LUX). Frequency and percent duration of feeding, drinking and dozing behaviour differ significantly among different treatment groups in different weeks of study whereas, other behavioural parameters like resting, preening, wing flapping, head and litter stretching, pecking, avoiding, pushing, dust bathing, leg stretching, neck stretching and threats didn't differ significantly among different treatment groups in different weeks of study. From the study, it can be concluded that birds under LED light treatment are having significant ($p \leq 0.05$) higher frequency and duration of feeding thus LED light bulbs could be a better alternative light source than incandescent light bulbs for commercial poultry facilities to reduce energy consumption and better economic gain without affecting the performance and welfare of broiler chickens.

Keywords

Broiler birds,
Incandescent bulb,
LEDs,
Supplemental light,
welfare

Article Info

Accepted:

07 June 2019

Available Online:

10 July 2019

Introduction

Poultry farming is an age old practice in India, livestock sector contributed about 4.11% to the total gross domestic product and poultry farming is one of the best options available with farmers. Nowadays, the major chunk of poultry production is occurring in intensively

managed open sided broiler houses under artificial lighting programme requiring a lot of artificial environmental factors which differ from natural environment in which they were evolved and one of the crucial factors is light management. It is essential for sight, including both visual perspicacity and color discrimination [1]. Being a major

environmental stimulus light affect bird behaviour significantly and it is well documented that broiler chicken showed 70% of their behaviour as resting in all LEDs (white, red, green and blue) used whereas time spent on standing was higher in green light ($13.43 \pm 2.30\%$), followed by white ($10.46 \pm 2.21\%$), red ($9.34 \pm 1.92\%$) and blue ($6.78 \pm 1.92\%$), and pecking activity was higher in blue followed by white, green and red [2]. Therefore, light management in broiler production involving aspects of light intensity, wavelength and energy efficiency can be effectively explored. In India, so far no research work has been conducted related to the effect of LEDs on the performance of broiler chickens and scanty literature is available. Thus, the present study was conducted in broiler chicken on coloured LEDs lights with the objective to assess the effect of coloured LEDs on behaviour of broiler birds.

Materials and Methods

This study was conducted on 240 commercial Vencobb broiler chicks procured from M/s Venkey's India (Ltd.) at the Poultry Research Farm of the Department of Livestock Production Management, Guru Angad Dev Veterinary and Animal Science University, Ludhiana (Latitude: $30^{\circ}54'$ North and Longitude : $75^{\circ}48'$ East).

Experiment details

The day old sexed chicks were randomly distributed to 4 treatment groups each having 3 replicates. The housing treatments were T₁; white (650nm), T₂; green (565nm) and T₃; blue (430nm) light LED (3 Watt each) and incandescent light bulbs (60 Watt each) as control (T_c) in 12 pens (4x 3 factorial designs). At the day time, open-sided house was open from 10.00 AM to 4.00 PM and rest of the time sides of the house was covered

with the black coloured tarpaulin sheet. Matching colour curtains were placed inside each pen of shed according to light treatment requirement and each pen was completely enclosed to make it light proof. Light intensity was measured by light intensity meter (Lutron[®] PLX-111 light meter with range 0-20000 LUX) and maintained at 25 Lux in first week and then reduces successively @ 5 Lux per week by increasing the height of bulbs from the bird eye level. The entire experimental period was divided into 3 phases namely starter (0-2 weeks), grower (3-4 weeks) and finisher (5-6 weeks). The starter, grower and finisher rations were formulated containing 22, 20 and 18 % crude protein and 2896, 2932 and 2979 Kcal ME/Kg of feed, respectively. The feed and water was available ad-libitum to chicks.

Observations recorded

The behavioural status of the birds was recorded using Sony[®] handy cam video recorder. For easy identification of birds various coloured inks was applied and instantaneous sampling technique was used for recording of behaviour of broiler chicks as continuous recording was not possible, usually because too much behaviour occurred too frequently. Daily 80 minutes behaviour recording between 06.00 and 07.40 (IST) was done, 20 minutes for each replicate of each light treatment starting from day one. The behaviour activities like preening, scratching, wing flapping, feeding, drinking, resting, pecking, avoiding, pushing, dust bathing, leg stretching, neck stretching and threats/flights of bird in response to various light sources were examined on nominal and ordinal scale. In nominal scale, data was recorded to determine the total birds expressed a particular behavioural activity in response to various light sources at a point of time. However, in ordinal scale average time spent by bird in a particular activity was assessed.

Data on various biochemical parameters and behavioural study in relation to different treatments were subjected to one way analysis of variance (ANOVA) utilizing GLM procedure of SAS (SAS[®] 9.3) software and the difference among various treatments were examined by tukey's test.

Results and Discussion

The frequency of feeding behaviour during 1st, 2nd and 4th week was not statistically similar among different treatment groups. However, in 3rd week frequency of feeding behaviour differ significantly ($p \leq 0.05$) in T₁ (1.81±0.12) over T_c (1.21±0.10) group and during 5th week feeding behavior differ significantly ($p \leq 0.05$) in T₁ (1.49±0.11), T₂ (1.41±0.10) and T₃ (1.45±0.10) group over T_c (1.02±0.07) group and in 6th week feeding behaviour differ significantly ($p \leq 0.05$) in T₁ (1.50±0.10) and T₂ (1.75±0.10) group over T_c (1.05±0.08) group.

The findings of present study was similar in agreement with the findings of [3] who found that under green coloured LED light birds spent less time in feeding (17.2%) compared with those under white (21%).

The % duration time spent on drinking behaviour was significantly ($p \leq 0.05$) higher in T₁ (2.15±0.32) and T_c (1.86±0.28) groups as compared to T₃ (1.01±0.20) in 2nd week whereas in 3rd week the % duration of time spent on drinking was significantly ($p \leq 0.05$) higher in T₃ (1.46±0.25) group as compared to other groups.

It was found that there was no significant ($p \leq 0.05$) difference on % duration time spent on drinking behaviour at 1st, 4th, 5th and 6th week. Within group the % duration time spent on drinking behaviour was non-significant ($p \leq 0.05$) in T_c, T₂, and T₃ groups whereas in T₁ (2.15±0.32) group the % duration time spent on drinking was significantly ($p \leq 0.05$)

higher in 2nd week as compare to 3rd and 4th week and no significant ($p \leq 0.05$) difference was found in 1st, 2nd, 5th and 6th week. No significant ($p \leq 0.05$) difference was found on frequency as well as % duration time spent on resting behaviour within groups in different weeks.

The present finds were statistically non-significant ($p \leq 0.05$) which were similar to the findings of [4] who found that birds spent 61% of their time resting in the litter at 6 weeks of age but resting was not significantly ($p \leq 0.05$) affected by light source and contrary to [2] and [5] who also found that there was no significant ($p \leq 0.05$) difference in time spent in resting under different coloured lights and broiler chickens preferred red followed by blue green and white.

The frequency of dozing behavior shown by the T₁ (1.81±0.12) group was significantly ($p \leq 0.05$) higher as compared to control, T_c (1.20±0.10) and T₂ (1.26±0.13) in 3rd week whereas frequency of dozing behaviour was significantly ($p \leq 0.05$) lower in control as compared to LED groups in 5th week and frequency was significantly ($p \leq 0.05$) higher in T₁ (1.50±0.10) and T₂ (1.75±0.10) group as compared to T₃ (1.42±0.11) and T_c (1.05±0.08) in 6th week of birds life.

Frequency wise and % duration time spent on different behavioural activities like preening, wing flapping, pecking, avoiding, pushing, dust bathing, leg stretching, neck stretching and threats were found to be statistically similar within groups in different weeks and between groups in different weeks.

The findings were similar and in accordance with the findings of [3], [6], [7] and [8] who found that there was no significant ($p \leq 0.05$) difference for different light treatments in the time birds spent on drinking, dust bathing, preening and fighting (Table 1 and 2).

Table.1 Frequency in showing different behavioral activities by birds under different treatments

Behavioural activities	Tts.	Age in weeks					
		1	2	3	4	5	6
Feeding	T _C	1.51 ^A ±0.10	1.33 ^{AB} ±0.10	1.21 ^{bcABC} ±0.10	0.93 ^{CDE} ±0.07	1.02 ^{dBCDE} ±0.07	1.05 ^{cBCD} ±0.08
	T ₁	1.37 ^{BCD} ±0.10	1.22 ^{BCDE} ±0.10	1.81 ^{aA} ±0.12	1.22 ^{BCDE} ±0.10	1.49 ^{aABC} ±0.11	1.50 ^{bAB} ±0.10
	T ₂	1.45 ^{AB} ±0.09	1.20 ^{BCDE} ±0.11	1.26 ^{bcBD} ±0.13	1.25 ^{BCDE} ±0.12	1.41 ^{acABC} ±0.10	1.75 ^{abA} ±0.10
	T ₃	1.47±0.09	1.42±0.12	1.53 ^{abc} ±0.12	1.15±0.11	1.45 ^{abc} ±0.10	1.42 ^{abc} ±0.11
Drinking	T _C	0.30±0.04	0.40±0.06	0.17±0.04	0.30±0.05	0.45±0.06	0.32±0.06
	T ₁	0.27±0.04	0.41±0.05	0.17±0.04	0.15±0.04	0.43±0.06	0.48±0.07
	T ₂	0.30±0.05	0.25±0.05	0.21±0.05	0.15±0.04	0.29±0.05	0.43±0.06
	T ₃	0.25±0.04	0.23±0.04	0.34±0.05	0.23±0.04	0.38±0.06	0.25±0.05
Resting	T _C	1.89±0.07	1.78±0.08	1.74±0.07	1.84±0.08	1.89±0.08	1.85±0.09
	T ₁	1.86±0.07	1.70±0.07	1.94±0.08	1.80±0.08	1.82±0.08	1.99±0.09
	T ₂	1.80±0.07	1.74±0.08	1.89±0.07	1.99±0.09	1.84±0.08	1.89±0.08
	T ₃	1.95±0.08	1.90±0.07	1.96±0.07	1.94±0.09	1.71±0.07	1.99±0.08
Dozing	T _C	1.51 ^A ±0.10	1.33 ^{AB} ±0.10	1.20 ^{bcABC} ±0.10	0.93 ^{CDE} ±0.07	1.02 ^{dBCDE} ±0.07	1.05 ^{cBCD} ±0.08
	T ₁	1.37 ^{BCD} ±0.10	1.22 ^{BCDE} ±0.10	1.81 ^{aA} ±0.12	1.22 ^{BCDE} ±0.10	1.50 ^{aAB} ±0.11	1.50 ^{bABC} ±0.10
	T ₂	1.45±0.09	1.20±0.11	1.26 ^b ±0.13	1.25±0.12	1.41 ^{ac} ±0.10	1.75 ^{ab} ±0.10
	T ₃	1.47±0.09	1.42±0.12	1.54 ^{abc} ±0.12	1.15±0.11	1.45 ^{ab} ±0.10	1.42 ^{abc} ±0.11
Preening	T _C	0.09±0.02	0.10±0.02	0.10±0.02	0.10±0.02	0.08±0.02	0.10±0.03
	T ₁	0.09±0.02	0.11±0.03	0.10±0.02	0.16±0.03	0.11±0.03	0.11±0.03
	T ₂	0.07±0.02	0.11±0.03	0.12±0.03	0.11±0.03	0.08±0.02	0.09±0.02
	T ₃	0.10±0.02	0.15±0.03	0.08±0.02	0.11±0.02	0.10±0.02	0.08±0.02
Wing flapping	T _C	0.12±0.02	0.18±0.03	0.10±0.02	0.21±0.03	0.16±0.03	0.16±0.03
	T ₁	0.10±0.02	0.16±0.03	0.10±0.02	0.20±0.03	0.11±0.03	0.23±0.04
	T ₂	0.11±0.02	0.22±0.03	0.10±0.02	0.16±0.03	0.12±0.03	0.21±0.03
	T ₃	0.11±0.02	0.23±0.03	0.11±0.02	0.17±0.03	0.07±0.02	0.15±0.03
Head and litter scratching	T _C	0.17±0.03	0.21±0.03	0.12±0.03	0.17±0.03	0.10±0.02	0.17±0.03
	T ₁	0.12±0.02	0.21±0.03	0.15±0.03	0.22±0.03	0.19±0.03	0.25±0.04
	T ₂	0.15±0.03	0.16±0.03	0.16±0.03	0.21±0.03	0.14±0.03	0.16±0.03

	T₃	0.12±0.02	0.22±0.03	0.13±0.03	0.22±0.03	0.11±0.03	0.19±0.03
Pecking	T_C	0.16±0.03	0.12±0.03	0.08±0.02	0.13±0.03	0.08±0.02	0.13±0.03
	T₁	0.10±0.02	0.09±0.02	0.13±0.03	0.09±0.02	0.13±0.03	0.09±0.02
	T₂	0.15±0.03	0.13±0.03	0.12±0.03	0.11±0.03	0.13±0.03	0.12±0.03
	T₃	0.10±0.02	0.09±0.02	0.12±0.02	0.10±0.02	0.10±0.02	0.08±0.02
Avoiding	T_C	0.06±0.02	0.09±0.02	0.07±0.02	0.07±0.02	0.08±0.02	0.06±0.02
	T₁	0.09±0.02	0.08±0.02	0.04±0.01	0.09±0.02	0.08±0.02	0.07±0.02
	T₂	0.05±0.01	0.08±0.02	0.08±0.02	0.08±0.02	0.08±0.02	0.08±0.02
	T₃	0.09±0.02	0.09±0.02	0.05±0.02	0.08±0.02	0.03±0.01	0.09±0.02
Pushing	T_C	0.04±0.01	0.14±0.03	0.05±0.02	0.13±0.03	0.05±0.02	0.10±0.03
	T₁	0.05±0.01	0.12±0.03	0.03±0.01	0.13±0.03	0.04±0.01	0.12±0.03
	T₂	0.05±0.01	0.10±0.02	0.05±0.02	0.13±0.03	0.04±0.01	0.11±0.03
	T₃	0.07±0.02	0.13±0.03	0.04±0.01	0.13±0.03	0.04±0.01	0.12±0.03
Dust bathing	T_C	0.10±0.02	0.21±0.04	0.10±0.02	0.21±0.04	0.08±0.02	0.17±0.04
	T₁	0.13±0.02	0.22±0.04	0.10±0.02	0.21±0.04	0.13±0.03	0.17±0.03
	T₂	0.07±0.02	0.20±0.04	0.10±0.02	0.21±0.04	0.09±0.02	0.20±0.04
	T₃	0.12±0.02	0.23±0.04	0.09±0.02	0.21±0.04	0.13±0.03	0.22±0.04
Leg stretching	T_C	0.05±0.01	0.05±0.02	0.09±0.02	0.06±0.05	0.09±0.02	0.08±0.02
	T₁	0.13±0.02	0.08±0.02	0.09±0.02	0.08±0.02	0.08±0.02	0.04±0.01
	T₂	0.05±0.01	0.08±0.02	0.08±0.02	0.05±0.02	0.08±0.02	0.08±0.02
	T₃	0.13±0.02	0.06±0.02	0.09±0.02	0.07±0.02	0.10±0.02	0.08±0.02
Neck stretching	T_C	0.14±0.02	0.21±0.03	0.13±0.03	0.22±0.03	0.14±0.03	0.23±0.04
	T₁	0.11±0.02	0.22±0.03	0.11±0.03	0.25±0.04	0.13±0.03	0.21±0.03
	T₂	0.12±0.02	0.21±0.03	0.15±0.03	0.20±0.03	0.12±0.03	0.20±0.03
	T₃	0.13±0.02	0.23±0.03	0.13±0.03	0.22±0.03	0.09±0.02	0.22±0.03
Threats or fights	T_C	0.06±0.02	0.05±0.02	0.08±0.02	0.05±0.02	0.08±0.02	0.04±0.02
	T₁	0.08±0.02	0.06±0.02	0.06±0.02	0.03±0.01	0.08±0.02	0.03±0.01
	T₂	0.05±0.01	0.07±0.02	0.04±0.01	0.05±0.02	0.07±0.02	0.04±0.01
	T₃	0.07±0.02	0.05±0.02	0.05±0.02	0.05±0.02	0.04±0.01	0.04±0.01

Means with different superscripts differ significantly (P<0.05)

Table.2 Percent duration of time spent in showing different behavioral activities by birds under different treatments

Behavioural activities	Tts.	Age in weeks					
		1	2	3	4	5	6
Feeding	T _C	23.26 ^A ±1.37	21.62 ^{AB} ±1.49	18.12 ^{cBC} ±1.30	14.03 ^{cCDE} ±1.01	15.66 ^{cCDE} ±1.09	16.34 ^{cCD} ±1.16
	T ₁	21.77±1.52	21.27±1.56	30.37 ^a ±1.71	22.08 ^a ±1.65	24.32 ^{ab} ±1.57	26.02 ^{ab} ±1.50
	T ₂	22.67±1.34	18.72±1.62	20.11 ^{bc} ±1.96	19.78 ^{ab} ±1.79	25.96 ^a ±1.64	28.48 ^a ±1.39
	T ₃	22.78±1.25	20.77±1.63	24.78 ^{ab} ±1.71	18.82 ^{abc} ±1.67	24.86 ^{ab} ±1.48	23.69 ^{ab} ±1.63
Drinking	T _C	1.48±0.24	1.86 ^{ab} ±0.28	0.65 ^b ±0.17	1.43±0.27	1.83±0.27	1.04±0.20
	T ₁	1.26 ^{ABCD} ±0.21	2.15 ^A ±0.32	0.66 ^{bcBCDE} ±0.18	0.65 ^{DE} ±0.17	1.76 ^{AB} ±0.26	1.76 ^{ABC} ±0.27
	T ₂	1.42±0.25	0.86 ^c ±0.18	0.70 ^b ±0.17	0.66±0.19	1.23±0.23	1.58±0.26
	T ₃	1.12±0.20	1.01 ^{bc} ±0.20	1.46 ^a ±0.25	1.10±0.22	1.63±0.26	0.87±0.19
Resting	T _C	60.44±1.66	59.38±1.59	63.65 ^{ab} ±1.63	65.38±1.70	60.50±1.80	60.39±1.78
	T ₁	62.55±1.69	61.12±1.67	53.54 ^c ±1.69	63.95±1.79	58.89±1.77	57.41±1.70
	T ₂	58.13±1.61	64.62±1.77	64.77 ^{ab} ±2.07	64.88±1.83	58.93±1.88	53.48±1.56
	T ₃	58.46±1.50	63.13±1.69	60.02 ^{bc} ±1.73	67.00±1.84	56.80±1.65	58.14±1.85
Dozing	T _C	13.48 ^{abc} ±0.76	14.93±0.91	16.66 ^a ±0.93	17.04 ^a ±1.06	21.16 ^a ±1.22	20.24 ^a ±1.00
	T ₁	13.45 ^c ±0.90	13.44±0.95	14.44 ^{abc} ±0.76	10.99 ^{bd} ±0.76	13.64 ^{bc} ±0.89	12.40 ^{bc} ±0.66
	T ₂	16.59 ^{ab} ±0.95	13.54±1.00	13.27 ^{bc} ±0.97	12.89 ^{bc} ±1.09	12.84 ^{bc} ±0.81	14.30 ^{bc} ±0.81
	T ₃	16.57 ^b ±0.76	12.18±0.88	12.78 ^b ±0.72	11.07 ^{bcd} ±0.66	15.86 ^b ±0.96	15.21 ^b ±0.94
Preening	T _C	0.13±0.04	0.31±0.09	0.13±0.04	0.28±0.08	0.12±0.04	0.25±0.07
	T ₁	0.18±0.06	0.28±0.07	0.17±0.06	0.51±0.12	0.24±0.08	0.29±0.09
	T ₂	0.07±0.03	0.34±0.10	0.17±0.05	0.31±0.09	0.07±0.03	0.29±0.10
	T ₃	0.22±0.07	0.48±0.11	0.16±0.06	0.29±0.07	0.20±0.07	0.29±0.09
Wing flapping	T _C	0.17±0.04	0.59±0.11	0.10±0.03	0.70±0.12	0.11±0.03	0.53±0.12
	T ₁	0.13±0.04	0.48±0.11	0.14±0.04	0.69±0.12	0.14±0.05	0.79±0.13
	T ₂	0.16±0.04	0.64±0.12	0.14±0.04	0.54±0.11	0.14±0.04	0.70±0.12
	T ₃	0.13±0.04	0.74±0.13	0.17±0.05	0.54±0.11	0.07±0.03	0.50±0.11
Head and litter scratching	T _C	0.75 ^a ±0.15	0.64±0.13	0.38±0.11	0.54±0.12	0.31±0.10	0.41±0.10
	T ₁	0.21 ^c ±0.06	0.67±0.13	0.49±0.13	0.64±0.13	0.61±0.14	0.79±0.15
	T ₂	0.65 ^{ab} ±0.14	0.50±0.12	0.50±0.12	0.70±0.15	0.46±0.12	0.57±0.14

	T₃	0.25 ^{bc} ±0.07	0.76±0.14	0.45±0.12	0.67±0.13	0.36±0.11	0.65±0.14
Pecking	T_C	0.08±0.01	0.15±0.05	0.04±0.01	0.21±0.07	0.04±0.01	0.30±0.09
	T₁	0.05±0.01	0.17±0.07	0.06±0.01	0.17±0.07	0.07±0.02	0.11±0.05
	T₂	0.07±0.01	0.25±0.08	0.06±0.01	0.12±0.05	0.06±0.01	0.12±0.05
	T₃	0.05±0.01	0.24±0.14	0.06±0.01	0.20±0.07	0.05±0.01	0.20±0.07
Avoiding	T_C	0.02±0.00	0.07±0.02	0.02±0.00	0.06±0.02	0.03±0.01	0.05±0.02
	T₁	0.03±0.01	0.05±0.01	0.01±0.00	0.08±0.02	0.05±0.02	0.04±0.01
	T₂	0.01±0.00	0.06±0.02	0.03±0.01	0.07±0.02	0.03±0.01	0.05±0.02
	T₃	0.03±0.01	0.12±0.05	0.01±0.00	0.06±0.02	0.00±0.00	0.08±0.02
Pushing	T_C	0.01±0.00	0.07±0.01	0.01±0.00	0.06±0.01	0.02±0.00	0.05±0.01
	T₁	0.01±0.00	0.06±0.01	0.01±0.00	0.06±0.01	0.01±0.00	0.06±0.01
	T₂	0.02±0.00	0.05±0.01	0.01±0.00	0.06±0.01	0.01±0.00	0.05±0.01
	T₃	0.02±0.00	0.08±0.02	0.01±0.00	0.06±0.01	0.01±0.00	0.06±0.01
Dust bathing	T_C	0.07±0.02	0.15±0.06	0.09±0.02	0.11±0.03	0.05±0.02	0.09±0.02
	T₁	0.12±0.03	0.08±0.02	0.08±0.02	0.11±0.03	0.12±0.03	0.08±0.02
	T₂	0.06±0.02	0.11±0.03	0.10±0.03	0.08±0.01	0.07±0.02	0.10±0.03
	T₃	0.13±0.03	0.14±0.04	0.09±0.03	0.08±0.02	0.11±0.03	0.11±0.02
Leg stretching	T_C	0.03±0.01	0.05±0.01	0.04±0.01	0.06±0.02	0.04±0.01	0.06±0.02
	T₁	0.05±0.01	0.07±0.02	0.04±0.01	0.08±0.02	0.03±0.01	0.04±0.01
	T₂	0.03±0.01	0.07±0.02	0.03±0.01	0.04±0.01	0.04±0.01	0.05±0.02
	T₃	0.06±0.01	0.05±0.02	0.04±0.01	0.06±0.02	0.05±0.01	0.07±0.02
Neck stretching	T_C	0.08±0.01	0.14±0.02	0.07±0.01	0.15±0.02	0.07±0.01	0.16±0.03
	T₁	0.06±0.01	0.15±0.02	0.06±0.01	0.16±0.03	0.07±0.01	0.16±0.03
	T₂	0.07±0.01	0.15±0.02	0.08±0.01	0.14±0.02	0.06±0.01	0.14±0.02
	T₃	0.07±0.01	0.18±0.03	0.07±0.01	0.15±0.02	0.05±0.01	0.14±0.02
Threats or fights	T_C	0.06±0.02	0.04±0.01	0.07±0.02	0.05±0.01	0.07±0.02	0.03±0.01
	T₁	0.06±0.02	0.04±0.02	0.04±0.02	0.02±0.01	0.08±0.03	0.02±0.01
	T₂	0.05±0.02	0.06±0.02	0.04±0.02	0.04±0.01	0.06±0.02	0.02±0.01
	T₃	0.05±0.02	0.05±0.02	0.04±0.01	0.04±0.01	0.03±0.01	0.03±0.01

Means with different superscripts differ significantly (P<0.05)

From this study, it can be concluded that birds under coloured light emitting diode (LED) bulbs treatment groups were having significant ($p \leq 0.05$) higher frequency and duration of feeding without affecting the overall welfare of broiler birds. The use of LED in broiler industry will definitely saves a lot of electricity and increases the return from poultry sector.

Acknowledgement

The authors are thankful to the worthy Vice-Chancellor, GADVASU, Ludhiana for extending necessary support to carry out this research work.

References

1. C.E. Manser, Effects of lighting on the welfare of domestic poultry: A review, *Animal Welfare* 5, 1996, 341-360.
2. N. Kim, S.R. Lee and S.J. Lee, Effects of light color on energy expenditure and behaviour in broiler chickens. *Asian-Australian Journal of Animal Science* 27(7), 2014, 1044-1049.
3. H.B. Eicher and A. Suter, Effects of colored light-emitting diode illumination on behavior and performance of laying hens. *Poultry science* 92, 2013, 869-73.
4. H.H. Kristensen, N.B. Prescott, G.C. Perry, The behaviour of broiler chickens in different light sources and illuminances. *Applied animal behaviour science* 103, 2007, 75-89
5. D.S. Prayitno, C.J.C. Phillips and H. Omed, The Effects of Color of Lighting on the Behavior and Production of Meat Chickens. *Poultry Science* 76, 1997, 452-57.
6. I. Rozenboim, I. Biran, Z. Uni, B. Robinzon and O. Halevy, The effect of monochromatic light on broiler growth and development. *Poultry Science* 78, 1998, 135-38.
7. P.D. Lewis and T.R. Morris, Responses of domestic poultry to various light sources. *World's Poultry Science Journal* 56, 1998, 189-207.
8. S. Firouzi, H. Nazarpak, H. Habibi and M. Marzban, Effects of color lights on performance, immune response and hematological indices of broilers. *Journal of World's Poultry Research* 4(2), 2014, 52-55.

How to cite this article:

Suresh Kumar, Ravi Kant Gupta, Yashpal Singh, Amit Sharma and Neeraj Kashyap. 2019. Behaviour of Broiler Birds Reared Under Coloured Light Emitting Diodes Vis-A-Vis Incandescent Light Supplemental Lighting Programme. *Int.J.Curr.Microbiol.App.Sci.* 8(07): 423-430. doi: <https://doi.org/10.20546/ijcmas.2019.807.052>