EFFECT OF DIFFERENT LIGHT COLORS ON SOME REPRODUCTIVE HORMONES, BEHAVIOR, BODY WEIGHT, FERTILITY AND HATCHABILITY RATIO IN JAPANESE QUAIL

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ABSTRACT

Four groups of Japanese quail, 50 for each, were subjected to yellow, green, red, and blue light from 10-12 weeks of age to study the effect of different light regimes on; behavior performance, body weight, feed and water intake, egg production and weight. Each week five birds were killed to obtain serum samples (for estimation of FT_3, estrogen and progesterone) and to estimates carcass quality.

Exposure of quails to red and yellow light (long and medium wave length) resulted in high feeding, drinking, egg production and weight, but lower the growth rate. On the other hand, blue and green light (short and medium wave length) group exhibits a lowest feeding, drinking, egg production and weight, but higher in growth rate. Quails reared in a blue light had the highest serum FT_3, and lowest estradiol and progesterone, while yellow light group showed lowest FT_3 and highest estradiol and progesterone. The red group had the highest hatchability and fertility percentage.

INTRODUCTION

Jones et al (1982) found that hens reared on red light consumed the greatest amount of feed during the breeding period. Also, **Manser (1996)** and **Prayitno et al. (1997)** found that birds reared on red or white light were more active as expressed by greater walking activity in the white light treatment and by greater floor pecking, wing stretch and aggression in the red light while the activity levels in turkeys are reduced when exposed to blue light that is because of birds have better vision at bright intensities when given a choice, birds choose blue or green light. Whereas, **El-Daly (1987)** found in Japanese quail that light color had no significant effect on feed utilization.

The body weight of birds affected with color as reported by **Woodard et al.(1969)** in females

Japanese quail when kept under blue or green light had lower body weight than under red or white. Also the color affected the egg production and weight. Photo stimulation of reproductive functions by the longer wavelengths of the visible portion of the electromagnetic spectrum also occurs in quail **(Woodard et al 1969 and Oishi and Lamber 1973a)**. **Woodard et al.(1969)** found that Japanese quail hens under red light had significant higher rate of production than hens under blue or green light and maintained a higher rate of production to 6 months of age. The same results were recorded by **Roland et al. (1971)** who also added that the eggs under red light had significant higher egg mass than chickens reared under blue, green and white respectively, and hens reared under blue and red colors were less excitable. **Peterson and Espenshade (1971)** observed that the number of eggs under blue, green and white was significantly lower than in those reared under red light color in White Leghorn. They found that highest average egg weight for females under red light and the difference between red and blue was slight.

On studying the effects of narrow band light of equal energy levels on the reproductive development of cockerels, **Foss et al. (1972)** found that only red light stimulated reproductive development equivalent to that obtained by white light. **Jones et al.(1982)** stated that the photo stimulation of egg production in turkeys seems to occur equally with white or red but not with blue light. **Oishi and Lamber (1973b)** suggested that wavelength is the most important aspect of light for control of the photo sexual response in Japanese quail.

El-Daly (1987) reported that, egg number and weight were not significantly affected by different colors of light and there was negative correlation between egg weight and egg production. **Oishi and Lamber (1973b)** found that photo sexual response of quail is wavelength dependent and the far end of the visible spectrum (orange - red) is most stimulatory. **Siopes (1984)** found that no significant difference in the early season egg production (from 0 -10 weeks) or fertility, hatchability or egg weight due to light intensity. There are suggestions in the literature that high intensity light increases activity **(Newberry et al., 1985, 1988)** and feather pecking **(Appelby et al., 1992)** in chickens. **Harrison et al.(1989)** stated that chickens brooded and reared on red light maintained higher rate of egg production through the experiment. Light stimuli affect the activity, reproduction and growth of chickens **(Phillips, 1992)**. **Vehse and Ellendorff (2001)** reported that blue light delays sexual maturation of turkeys.

The fertility and hatchability % was affected by the color of light and walls. **Hutchinson (1960)** stated that red light has been found the most effective .As the color of light may affect on the testes weight and development and this was reflected on the fertility %.

Woodard et al. (1969) reported that the testicular development of males under longer wave length (red) was the greatest, in contrast **Harrison et al. (1989)** found that red and gold illumi-

nation significantly suppressed sperm production in White Leghorn cockerels. **Harrison et al (1989)** found that Cockerels reared under blue and green filtered light showed the largest testicles and most rapid increase in testicular growth.

Siopes and Wilson (1980) stated that at low light intensity the penetrating power of light is reduced and therefore the amount of light reaching the photoreceptors especially the extra retinal receptors would be reduced in quail. **Thurston et al-(1982)** concluded that bright cool light (189 lux) is superior to bright commercial (173 lux), yellow fluorescent (140 lux) or low intensity incandescent white (10 lux) light for stimulation of semen production. **El-Daly (1987)** recorded that in males Japanese quail, pineal activity was enhanced by short wave length (blue and green) and the lowest pineal weight was for males under red and white light colors. **El-Daly (1987)** found that the largest 3 follicular weights is not significant affected by colored light. The organs associated with reproduction such as ovary and oviduct showed an apparent decrease in weight under blue light colored as compared to red, green and white. There was positive correlation between oviduct weight and length and the low weight of ovary and 3 follicles and oviduct was for females under blue light. No significant difference in egg number between different colors was observed, while highest average egg weight was obtained under white color.

The purpose of this study was to determine the effect of different colors during the laying period on feed and water consumption, egg weight and production, body weight of males and females and weight of different organs after slaughtering, and on fertility and hatchability as well as the effect on some reproductive hormones.

Material and Methods

Two hundred males and females Japanese quail aged 45 days were housed in separate rooms. They were divided into 4 groups; each group was (50) males and females by sex ratio (1: 3) and was subjected to different colors. First group was subjected to yellow, the second to green, the third to red and the fourth to blue color. A period of 3 weeks was given to the birds to accommodate themselves to the colors before collecting the data. Water and feed (broiler starter ration plus Soya bean, to rise the protein to 27%) were provided ad libitum during experimental period. The color of the light bulbs was the same as the color of walls. The light was continuously on.

After the period of accommodation we start collecting our data, the feed was weighted daily in the morning and then re weighted in the next morning to record the amount of feed consumed daily (g. /bird/day), also in the same way, water was measured daily (ml/bird/day). Eggs were collected 3 times daily to record the average daily egg production and egg weight in different

pens. Body weight of males and females was recorded at the beginning of the experiment then weekly. To detect the fertility and hatchability % eggs were incubated, after hatching, the % of hatched chicks, % of infertility, and % of dead embryo were calculated. The % of infertility and dead embryo was calculated by breaking the un- hatched eggs. The incubation was done 3 times.

Blood samples were collected weekly by slaughtering five birds from each group and sera were obtained for determination of free tri-iodothyrodin (FT_3) using kit (Bio Merina-France), radioimmunoassay (Diagnostic product crop. Los Angeles, California, USA). Estradiol 17-b and progesterone were measured according to **Burtis and Ashwood (1994).**

At the end of the experiment all birds were slaughtered and blood samples were taken. After plucking, the organs (heart, testes, ovary, oviduct weight and length, weight of large 3- follicles, and liver) were recorded.

The obtained data were statistically analyzed according to **Snedecor and Cochran 1999).**

Results

The present results table (1and 2) showed that there was an increase in the daily feed and water consumption per bird, and that the birds kept under red color consumed more feed than other groups followed by those under yellow and those on blue light had the lowest feed consumption. Feed and water intake under yellow color is not altered by week period, while under green color it decrease by the period. Food intake was not affected by period under red color while drinking deceased. Feed intake was more in 1st week then decreased after that under blue color, while drinking was not affected (table 1&2).

Birds kept under yellow color drink water more than those on other colors. There was no significant difference in the amount of water drunk by birds on red and yellow colors, but the difference was significant in case of blue and green colors as those birds consumed less amount of water. On regarding the effect of color on egg production table (3&4), the results showed that the yellow color group produced more and heavier eggs than other groups followed by red color while birds on blue and green colors produced less number of eggs in comparison of egg production from hens subjected to red light and those on blue, white and green. The heaviest body weight table (5&6) was attained at green color followed by those on blue, while those on red color had the smallest body weight. The % of dead embryos table (7) was higher at green and blue colors (5.11 ± 2.11 and 3.33 ± 2.11) respectively, also the highest infertility % was obtained from birds on blue and green colors (31.88 ± 1.21 and 26.79 ± 3.18) and the lowest infertility was at red

color (10.12 ± 2.58). Quails reared in a blue light had the highest serum FT3, 3.309–0.20ng/dl especially at 4th week (taic 9), and lowest estradiol and progesterone, while yellow light group showed lowest FT_3 and highest estradiol, especially at 4th week163 77±3.11(ng/ml) and progesterone, especially at 4th week 1.159 ± 0.19 ng/ml (table 10&11)

Discussion

Light is perceived through photoreceptors that transducer energy contained in photons into a biological signal. In the eye, energy from photons is transuded by photosensitive pigments in rods and cones, and transmitted through neurons to the brain where the signal is integrated into an image. For the purposes of reproduction, however, the perception of light does not depend upon photoreceptors in the eye, but also in the hypothalamus are the biological transducers that convert photon' energy into neural impulses. These neural impulses are then amplified by endocrine system to control ovarian and testicular function **(Etches, 1993)**.

Light is perceived by hypothalamic photoreceptors that convert the electromagnetic signal into a hormonal message through their effect on the hypothalamic neurons that secrete. GnRH. The gonadotropes respond to stimulation by GnRH by producing the gonadotrophins luteinizing hormone (LH), pand follicle-stimulating hormone (FSH) and secreting them into blood. The gonadotrophins bind to receptors on theca and granulose cells of ovarian follicles, stimulating androgens and estrogen produetiou from the small follicles and progesterone production from the largest preovulatory follicles. In the male, the gonadtropin stimulate production of spermatozoa and several androgens, including testosterone **(Etches, 1993 and Praytino et al., 1997)**.

The present results showed that there was an increase in the daily feed and water consumed per bird. The birds kept under red color consumed more feed than others followed by those under yellow. Birds reared under blue light had the lowest feed consumption. This might be due to that red color increased the activity of the birds as reported by **(Newberry et al., 1985, 1988)** who found that high light intensity increased the activity of chickens. The same was found in turkeys, blue light has been found to reduce activity compared with white, green or red light **(Jones et al., 1982 & Levenick and Leighton, 1988)** Plasma testosterone was higher in birds reared under blue light and breast muscle weights were higher in birds reared under green light. This result indicates that both blue and green light stimulate growth **(Prayltno et al., 1997)**.

Birds kept under yellow colou drunk water more than those on other groups. There was no significant difference in the amount of water drunk by birds on red and yellow colors, but the

difference was significant in case of blue and green colors as those birds consumed less amount of water. On regarding the effect of color on egg production, the results showed that the yellow color group produced more and heavier eggs than other groups followed by red color while birds on blue and green colors produced less number of eggs. In comparison of egg production from hens subjected to red light and those on blue, white and green. **Roland et al. (1971)** found that chickens maintained under red light had a significant higher rate of egg production and egg mass than others. **Woodard et al. (1969)** found the same with Japanese quail hens. **Harrison et al. (1989)** Found the same with chickens. Eggs produced from birds kept on yellow and blue colors were heaviest but the difference was not significant. **Lewis and Morris (1999)** demonstrated small but significant effects of light intensity on egg size and feed intake.

The heaviest body weight of females table (5&6) was attained at green color followed by those on blue, while those on red color had the smallest body weight. This might be due to that the high light intensity (red) increased the activity of birds, as observed by **Prayitno et al. (1997)** who found that birds reared in red or white light were more active as expressed by greater walking activity in the white light treatment and by greater floor pecking, wing stretch and aggression in the red light. These results disagree with that found by **Woodard et al. (1969)** who obtained the heaviest body weight of females at red and white color and those with light body weight were kept on green and blue colors. **Denbow et al. (1990)** found that light intensity had no effect on body weight efficiency of feed utilization or behavior of female turkeys. There was no significant difference in male body weight among different colors and the heaviest males body weight was at red color.

Group reared under green light, a significant enhancement in weight gain was observed, while broiler reared under blue light had a later onset of growth enhancement and were significantly heavier than those reared under white and red light. The effect of color light on growth could be attributed to stimulation of long wavelength (red light) by penetrating the skull, resulting in increasing their activity, rather than being related to the direct effect of light on hypothalamic gonadotropin production. Moreover the activity of the bird increased in red light decreasing their feed conversion efficiency which may explain the adverse effect on growth **(North and Bell, 1993 and Praytino et al., 1997)** while green and blue light increase the time spent sitting and sleeping, resulting in increased weight gain **(Praytino et al., 1997)**. The present data were in agreement with **Karousa (1996)** who found that blue and red light gave the lowest pecking and the highest resting behavior. Most pecking and least resting occurred among quails reared under white or yellow light.

Regarding the effect of different colors on the body weight of females and males and on weight of different organs after slaughtering the results on (table 6) demonstrated that the heaviest fe-

males body weight was attained at green color (227.9 ± 5.46g.) followed by blue (224.1 ± 2.98 g.), then yellow (216.11 ± 3.81 g.) and the lightest female body weight was at red color (214.31 ± 2.86g.). This results were in agreement with **Sarica (1998)** who exposed Japanese quail to different light and found that, the heaver body weight was in quail reared under green light, feed conversion was significantly higher for red and lowest for green, dressing percentage was significantly higher in green and lowest for red. These results are disagree with what reported by **Woodard et al. (1969)** who obtained the heaviest female body weight at red color.

Females subjected to yellow color had the heaviest ovary (1.43 ± 0.14 g.) and oviduct weight (8.11 ± 0.46 g.), and those reared on green color had the highest oviduct length (29.02 ± 0.45g.) followed by yellow color (27.8 ± 0.41 g.) and those on red color had the smallest oviduct length (23.57 ± 0.28 g.). The present finding agrees with **El-Daly (1987)** who stated that, the weight and length of ovary and oviduct was affected by color. In contrast, he found the level of estradiol hormone was higher in females under green light might be associated with increase in weight and length of magnum. The weight and length of ovary and oviduct may be affected with color as reported by **El-Daly (1987)** who stated that the level of estradiol hormone was higher in females under green light might be associated with increase in weight and length of magnum. Some aspect of reproductive physiology, such as enlargement of the cloacal diameter and growth of the oviduct seems to be controlled primarily by estrogen **(Delville and Balthazort, 1987).** The weight of large 3- follicles was obtained from females subjected to red color was 8.41 ± 1.45g. The present result agreed with that reported by **El-Daly (1987)** who found that the highest weights of the largest 3 follicles were found in females under red or white light while the lowest weight was obtained in blue or green light, also birds on red color had the heaviest liver weight (7.33 – 0.09g.), the birds reared on red color had the lowest heart weight (1.68 ± 0.28 g.). The results of **El-Daly (1987)** indicated that neither light color nor sex had significant effect on the relative weight of pineal gland and hypophysis gland.

Results on table (7) demonstrated that the fertility and hatchability % was higher at red and yellow colors, the fertilty % was (89.88 ± 2.58 and 87.43 ± 0.53) and the hatchability % was (88.45 ± 1.18 and 88.73 ± 1.11) at red and yellow colors respectively and the lowest was at blue color (68.12 ± 1.31and 64.79 ± 1.58) for fertility and hatchability % respectively these are in agreement with **Woodard et al. (1969)** who found that in Japanese quail, the fertility of eggs under blue light was significant lower than that under green, red or white light, **Gildersleeve and Johnson (1981)** lower intensity may have resulted in reduced tissue penetration and testicular growth in Japanese quail. The red light affect bird behavior, performance and physiology that manifested by higher and heavier comb, testes with higher gonadotrophic hormones levels **(Osol et al., 1980)**.

Thyroid hormone was found to be highly significant in quails reared under blue light. **Gudadhe (2001)** reported that no significant variations in thyroid weight and histology of rain quail throughout the year except during breeding season, where the weight and cellular activities significantly increased. This observation provides strong evidence of the involvement of thyroid gland in the gonadal cycle of the birds. In turkeys, the neuroendocrine reflex controlling reproduction exhibits maximum sensitivity to orange-red light **(Scott and Payne, 1937)**. Somatotrophic and thyroid hormones were determined around the onset of reproduction in broiler breeders reared in two different housing systems [dark, close-sided house (CH) and conventional, open-sided house (OH)]. In both groups age-related changes were obvious for thyroxin (T_4), growth hormone (GH) and insulin-like growth factor (IGF-1); levels of T_4 decreased, especially between 24 and 28 weeks in both groups; concomitantly GH sharply increased over the same period. A transient peak in triiodothyronine (T_3) occurred between 25 and 27 weeks. The effect of housing was only present after the onset of lay. Between weeks 27-28 and the end of the period studied, the CH group showed higher levels of T_3 but lower T_4 levels as compared to the OH group. no significant rise in T3 could point to a relative insensitivity to bigh plasma GH levels. The relatively decrease in T_4 without changes in T_3, may point to a decrease in the activity of the thyrotropic axis **(Malheiros et al., 2002)**.

It could be concluded that the exposure of birds to different colors during laying period has an effects on feed and water consumption, egg weight and production, body weight of males and females and weight of different organs after slaughtering, and on fertility and hatchability as well as the effect on some reproductive hormones. We must choose the suitable light color in accordance with the desired purpose wanted from birds.

Table (1): Effect of different colors on daily food intake in Japanese quails through four weeks.

	Yellow	Green	Red	Blue
1st week	35.3±1.40 a1	26.51±3.32 b2	36.38±2.48 a1	21.95±1.09 c2
2nd week	37.18±2.30 a1	33.23±3.15 a1	39.28±1.90 a1	25.35±2.01 b2
3rd week	37.96±1.14 a1	31.81±1.38 b1	39.90±1.95 a1	29.90±2.11 b1
4th week	37.90±3.15 a1	33.94±2.18 a1	40.82±2.31 a1	29.18±2.18 b1

Means±SE
Means within the same row having the same letter are not significantly different
Means within the same column having the same number are not significantly different

Table (2): Effect of different colors on water intake in Japanese quails through four weeks.

	Yellow	Green	Red	Blue
1st week	97.22±2.93 a1	60.53±1.15 b2	89.18±1.72 a2	68.88±3.27 c1
2nd week	99.30±2.51 a1	61.25±3.11 b2	92.15±1.68 a2	69.11±3.11 b1
3rd week	93.12±2.12 a1	73.70±1.13 b1	95.21±2.52 a1	73.25±1.80 b1
4th week	105.2±3.22 a1	76.21±2.78 b1	101±1.89 a1	75.93±3.11 b1

Means±SE
Means within the same row having the same letter are not significantly different
Means within the same column having the same number are not significantly different

Table (3): Effect of different colors on egg production in Japanese quails through four weeks.

	Yellow	Green	Red	Blue
1st week	0.92±0.01 a2	0.72±0.05 b1	0.73±0.02 b2	0.64±0.07 c1
2nd week	0.95±0.03 a1	0.71±0.01 b1	0.74±0.13 b2	0.73±0.11 b1
3rd week	0.95±0.02 a1	0.73±0.81 b1	0.77±0.26 b1	0.75±0.18 b1
4th week	0.96±0.05 a1	0.73±0.28 b1	0.78±0.15 b1	0.75±0.11 b1

Means±SE
Means within the same row having the same letter are not significantly different.
Means within the same column having the same number are not significantly different

Table (4): Effect of different colors on egg weight in Japanese quails through four weeks.

	Yellow	Green	Red	Blue
1st week	9.81±0.12	9.45±0.15	9.39±1.10	9.58±0.18
2nd week	10.53±0.17	9.89±0.30	9.85±0.18	10.31±0.16
3rd week	10.88±0.20	10.30±0.51	10.33±0.16	10.48±0.71
4th week	10.91±0.13	10.52±0.18	10.61±0.33	10.71±0.18

Means±SE

Means within the same row having the same letter are not significantly different

Means within the same column having the same number are not significantly different

Table (5): Effect of different colors on male body weight in Japanese quails through four weeks.

	Yellow	Green	Red	Blue
1st week	208±1.43 b2	218.75±1.31 a1	119.38±1.55 b2	212.87±1.54 a1
2nd week	206.85±1.68 b2	222.1±2.80 a1	211.10±1.54 a1	216.90±2.17 a2
3rd week	213.51±1.96 b1	225.20±2.11 a1	213.20±2.11 b1	220.71±3.48 a
4th week	216.11±3.81 a2	227.96±5.46 b1	214.31±2.26 a2	224.1±2.98 b1

Means±SE

Means within the same row having the same letter are not significantly different

Means within the same column having the same number are not significantly different

Table (6): Effect of different colors on female body weight in Japanese quails through four weeks.

	Yellow	Green	Red	Blue
1st week	163.12±0.92 c1	168.75±2.63 b1	152.4±1.05 c1	174.9±2.19 a1
2nd week	162.18±0.09 a1	168.25±1.46 a1	153.1±1.40 c1	175.18±1.35 a1
3rd week	162.90±1.30 a1	167.5±1.59 a1	153.3±1.15 b1	175.21±2.19 a1
4th week	163.9±2.29 b1	164.75±1.61 b1	152.11±1.61 c1	175.61±2.30 a1

Means±SE

Means within the same row having the same letter are not significantly different

Means within the same column having the same number are not significantly different

Table (7): Effect of different colors on fertility %, hatchability %, dead embryo and infertility in Japanese quails.

	Yellow	Green	Red	Blue
Fertility %	87.43±0.53 a	73.21±3.18 b	89.88±2.58 a	68.21±1.31 c
Hatchability %	87.30±1.11 a	68.10±2.15 b	88.45±1.18 a	64.79±1.58 b
Dead embryo	0.13±1.18 c	5.11±1.11 a	1.43±1.14 b	3.33±2.11 a
Infertility	12.57±3.41 b	26.79±3.18 a	10.12±2.58 c	31.88±1.21 a

Means±SE

Means within the same row having the same letter are not significantly different

Table (8): Effect of different colors on body weight, ovary and oviduct weight, large 3 follicle and weight of liver, heart and testes of Japanese quails.

	Yellow	Green	Red	Blue
Male B.Wt.	216.11±3.81 [b]	227.9±5.46 [a]	214.31±2.86 [b]	242.80±2.98 [a]
Female B.Wt.	163.90±2.29 [b]	169.75±1.61 [b]	163.11±1.61 [b]	175.61±2.30 [a]
Ovary Wt.	1.43±0.14 [a]	1.32±0.15	1.08±0.11 [b]	1.24±0.93
Oviduct Wt.	8.71±0.64 [a]	7.83±0.28 [b]	7.22±0.89 [b]	7.23±0.89 [b]
Oviduct length.	27.8±0.11 [c]	29.02±0.45 [a]	23.57±0.28 [d]	25.42±0.84 [b]
Large 3 follicle	5.97±0.45 [b]	4.07±0.30 [c]	8.41±0.54 [a]	5.89±0.70 [b]
Testes	4.27±0.43 [b]	5.19±0.26 [a]	4.74±0.10 [b]	4.71±0.62 [b]

Means±SE

Means within the same row having the same letter are not significantly different

Table (9): Effect of different colors on free triiodothyronine (pg/dl) (FT3) in Japanese quails.

	Yellow	Green	Red	Blue
1st week	2.237±0.25 [b1]	2.630±0.25 [b2]	2.415±0.17 [b1]	3.068±0.33 [a1]
2nd week	2.092±0.17 [c2]	2.906±0.25 [b1]	2.516±0.16 [c1]	3.296±0.22 [a1]
3rd week	1.813±0.28 [b1]	2.901±0.20 [b1]	2.158±0.15 [c2]	3.142±0.22 [a1]
4th week	2.051±0.13 [c2]	2.969±0.19 [b1]	2.172±0.13 [c2]	3.309±0.20 [a1]

Means±SE

Means within the same row having the same letter are not significantly different

Means within the same column having the same number are not significantly different

Table (10): Effect of different colors on progesterone (*ng/ml*) in Japanese quails.

	Yellow	Green	Red	Blue
1st week	0.707±0.08 [b1]	0.672±0.09 [b1]	1.023±0.14 [a1]	0.564±0.86 [b1]
2nd week	0.915±0.17 [a2]	0.673±0.07 [b1]	1.107±0.11 [a2]	0.71±0.04 [c1]
3rd week	1.047±0.13 [a1]	0.815±0.05 [b2]	1.178±0.18 [a1]	0.757±0.04 [b1]
4th week	1.159±0.19 [a1]	0.913±0.11 [b1]	1.084±0.07 [a1]	0.734±0.08 [b1]

Means±SE

Means within the same row having the same letter are not significantly different.

Means within the same column having the same number are not significantly different

Table (11): Effect of different colors on estradiol 17-β(*ng/ml*) in Japanese quails.

	Yellow	Green	Red	Blue
1st week	153.460±5.03 [a1]	110.301±5.13 [b2]	160.22±5.57 [a1]	102.13±4.29 [c1]
2nd week	125.605±1.42 [a2]	114.076±6.01 [b1]	139.20±2.42 [a2]	115.35±3.02 [b2]
3rd week	158.49±2.81 [a1]	116.081±1.41 [c1]	149.88±3.36 [a2]	123.19±3.26 [b1]
4th week	163.77±3.11 [a1]	119.71±2.35 [c1]	161.35±4.13 [a1]	130.36±3.53 [b1]

Means±SE

Means within the same row having the same letter are not significantly different

Means within the same column having the same number are not significantly different

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الملخص العربى

تأثير الأطياف المختلفة للضوء على بعض هرمونات التناسل وعلى الطبائع ووزن الجسم والتناسل ونسبة الفقس فى السمان اليابانى

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تم تعريض أربعة مجموعات (٥٠ طائر لكل مجموعة) من السمان اليابانى إلى الضوء الأصفر والأحمر والأخضر والأزرق إبتداء من الإسبوع العاشر إلى الرابع عشر وذلك بهدف دراسة تأثير الأطياف المختلفة للضوء على طبائع ووزن الجسم ومعدل الأكل والشرب وكذلك إنتاج ووزن البيض ونسبة الفقس.

تم ذبح خمس سمانات كل إسبوع لتجميع سيرم وقياس هرمون الثيروكسين والأستراديول والبروجستيرون. تم تجميع البيض وتم حساب نسبة الفقس. أظهرت النتائج أن تعرض السمان للون الأحمر والأصفر نتج عنه زيادة فى معدل الأكل والشرب وكمية البيض ووزنه، بينما وجد أن التعريض للون الأزرق والأخضر نتج عنه نقصان فى معدل الأكل والشرب وكمية البيض ووزنه ولكن وجد زيادة فى وزن الجسم.

وجد أن مستوى هرمون الثروكسين كان عالى فى الطيور المعرضة للضوء الأزرق مع نقصان فى مستوى هرمون الأستراديول والبروجستيرون. لوحظ نقصان فى مستوى هرمون الثيروكسين مع زيادة فى مستوى هرمون الأستراديول والبروجستيرون فى الطيور المعرضة للضوء الأصفر، كما وجد أن نسبة الفقس كانت عالية فى السمان المعرض للضوء الأحمر.