Assiut J. Agric. Sci., (46) No. (2) 2015 (135-147) *ISSN: 1110-0486*
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Impact of Some Light Sources on Growth Performance and Sexual Maturity of Female Japanese Quail

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Abstract:

This study aimed to compare economically between the impact of three light sources on the growth performance of Japanese quail.

The experiment of this study lasted 56 days and included 126 one day old chicks divided in 3 groups X 3 replicates each of 4 males and 10 females. They were raised in battery cages under similar managerial conditions, subjected to light from 60 watt incandescent, 40-watt fluorescent and 26 watt saving lamps for 8 light hours/ daily with intensity of 14-16 Lux during the first three days and 4-6 Lux during the rest of the experiment. They were individually weighed every week, while the body weight gain (BWG) was calculated biweekly. The averages of female body weight (BW) and age at sexual maturity were determined. Similarly, the averages of feed consumption (FC) and feed conversion ration (FCR) were also determined.

At the end of the experiment, 6-fasted females were slaughtered and 6 blood samples per group were taken to determine some blood components and to estimate the carcass quality. The lighting costs included both of the power cost (kw/LE) and the value of the lamp depreciation, (lighting hours / life span of the lamp X lamp price LE).

The results revealed that:

1-The average BW of females exposed to light from fluorescent (FLU,T1) was significantly lighter at 2, 4, 6 and 8 weeks than those of the control (INC) and the saving lamps (T2). 2- The average Total BWG (204.76 g) in T1 (flu) decreased significantly than those 214.61 and 216.85g of T2 and the control, respectively. 3- The least average FC (692.30 g) was recorded in T2 (saving) decreasing significantly than those 712.60 and 721.47 g of T1 and the control, respectively. 4- The best average FCR (3.12) was recorded in T2 improving significantly than that 3.42 of T1 and insignificantly than 3.22 of the control. 5- The least average of females BW at sexual maturity (204.48 g) was found in T1 decreasing significantly than those 212.42 and 220.04 g of T2 and the control, respectively. 6- The minimal age at sexual maturity was found in T2 (saving) decreasing significantly than that of the control and T1 (flu). 7- The use of the saving lamps minimized the lighting costs by 56.43% than that of control.

Taking in consideration the above mentioned advantages, it could be concluded that the use of saving lamp is highly recommended for raising Japanses Quail birds economically.

Keywords: Quail – Light Source – Lamps – Sexual Maturity – Female.

Received on: 9/4/2015 **Accepted for publication on:** 16/4/2015

Referees: Prof. Mohamed El-Sagheer Prof. Hossam H. M. Hassanein

Introduction:

Light is a crucial environmental factor that biologically affects mammalian and avian production and reproduction (Calssen *et al.,* 1991 and Hamdy *et al.,* 2014). It plays a pivotal role regarding sight, stimulating the internal organs and initiating the hormonal release (Scheideler, 1990 and Blair *et al,* 2000). Applying the adequate lighting regimen and using the most economical light source were found to improve not only the poultry production but also the carcass quality (Hamilton and Knnie, 1997 EL-Hammady *et al.,* 2014).

Many researchers (North and Bell, 1990), stated that it became important to chose the most adequate and economic lighting source, among incandescent, fluorescent, saving, metal halide and high pressure sodium lamps, for raising growing chicks, laying hens and breeder stocks.

The incandescent produces orange-red light by passing an electric current through a tungsten filament which leads it to incandescent. It provides light energy over the enter visible spectrum, however much of the electrical energy is converted to heat energy as infrared. The incandescent which has a life span of about 700-1000 hours is the current standard by which other are compared, (Pyrzak *et al.,*1987).

Pyrzak *et al.,*(1986) reported that the tungsten-halogen incandescent lamp has a life span of about 3000 hours with lighting efficiency of about 20 lumens per watt, while the fluorescent lamp produces white light which stimulates the growth of chicken (Pyrzak *et al.,*1987). Darre and Rock, (1991), reported that the saving lamp produces light by passing an electric current through a low- pressure vapor or gas contained within a glass tube. They added that the ultraviolet radiation given by the mercury–vapor stream, is absorbed by the inside coating phosphor material along the tube length causing it to fluorescent at wavelengths that are seen as visible light depending on the phosphor material used in coating the tube.

Due to the enormous shortage of the energy sources and their progressive increasing costs allover the world and especially in Egypt, it became essential to achieve the efficient lighting for the least costs by applying the efficient manipulations (Clarke *et al.,* 2006). Many researchers recommended the use of the saving lamps, which are characterized by the longer life and less power costs than the other types. Similar findings were obtained by El-Hammady *et al.,*2014. It is worth to mention that the available information in the literature regarding the effect of light sources on the poultry performance is very limited.

Therefore the present study aimed to evaluate the impact of light produced by incandescent, fluorescent and saving lamps on the growth performance, carcass quality, body weight and age at sexual maturity of Japanese quail during an experiment of 56 days.

Materials and Methods:

The experiment of the present study was performed at the Research Poultry Farm of Assiut University during the period from march, 10 to may, 6, 2014. It aimed to compare among the impact of light produced from incandescent, fluorescent and saving lamps on the growth performance, carcass traits, body weight and age at sexual maturity of Japanese quail birds during an experiment lasted 56 days.

Housing and Experimental design:

One hundred and twenty six, newly hatched Japanese quail chicks were used in the present experiment. They were wing banded and randomly assigned to three experimental groups, each including three equal replicates each of 14 chicks (10 females and 4 males). All experimental chicks were raised in three tiers battery cages, having the dimensions of (75 cm/length, 50 cm width and 45 cm height) and placed in a semi closed house under adequate and similar managerial and hygienic conditions. They were subjected to the same lighting regimen which consisted of 8 light hours and 16 Dark hours, by using three tested light sources.

Chicks in the first experimental group which was considered as the control, were exposed to light produced from 60 watt incandescent lamp, while those of the second and third groups (Treatments 1 and 2) were subjected to light emitted from 60 cm fluorescent and saving lamps having the efficiency of 40 and 26 watt, respectively.

All lighting sources were hanged at 2 meters height from the ground and adjusted to emit light with intensity of 14-15 Lux during the first three days, which thereafter decreased gradually to reach 4-5 Lux at the bottom level of the three tires till the end of the experiment. Feed and water were available all the time during the whole experiment.

The indoor temperature decreased weekly by 2°C from 32°C in the first week to reach 24°C at the fourth week, and then lasted to the end of the experiment, while the relative humidity (RH%) ranged from 50 to 60% during the experiment.

The temperature values and the relative humidity percentages were determined allover the day throughout the experiment by using a thermohygrograph. The temperature humidity indices (THI) values were also calculated and recorded. All experimental birds were fed on a starter ration, during the first 4 weeks of age and thereafter on a grower ration till the end of the experiment (Table 1). They were weekly weighed to the nearest gram on individual basis.

The studied criteria included:

A: Body weight (BW) and Body weight gain (BWG):

Birds per each replicate were individually weighed every week, while the daily average body weight gain (BWG) was biweekly calculated, as the difference between the final and initial body weight, taking in consideration the number of survived chicks.

B: Feed consumption(FC) and conversion ratio(FCR):

The average feed consumption (FC) per each replicate was weekly calculated as the difference between the offered and remained amounts of feed, divided by the number of survived chicks. The average feed conversion ratio (g, feed/g gain) per each replicate was calculated by dividing the total feed consumed on the total body weight gain of the survived chicks throughout each two successive weeks.

C: Age at sexual maturity:

The females per each replicate were considered sexually mature as the egg laying rate reached 20%. At this ratio (ELR), the averages of their body weight /g and age /day were determined for each female.

D: Mortality rate:

The number of dead birds per each replicate and group were dialy recorded and the total mortality percentages were calculated.

E: Carcass traits:

At the end of the experiment on 56 days of age, six females per each group (two females per replicate), which have been fasted for 8 hours, were randomly chosen and slaughtered. After complete bleeding, they were scalded, plucked, thereafter the edible organs (heart, liver, empty gizzard), spleen and the abdominal fat were gently removed, weighed and estimated as percentages of the live body weight. The dressing percentage was estimated by dividing the weights of the carcass and giblets on the pre-slaughter live body weight of birds.

F: Blood parameters:

At slaughter, six blood samples were taken from each group, representing all replicates and groups, placed in glass test- tubes with heparin and centrifuged at 3500 rpm for 15 min to get the serum.

The blood components were analyzed using commercial kits according to the procedure outlined by the manufacturer. The plasma total protein, albumin, cholesterol, Aspartate aminotransferase (AST), alanine aminotransferase (ALT) , globulin evaluated by subtraction the plasma albumin from the total protein, and the glucose were determined in fresh plasma just after blood centrifugation.

G: The economical efficiency:

It was estimated according the following basis:

1- The lighting costs (LC) include the values of power cost (kw/LE) (A) and the lamp depreciation (B), estimated by dividing the number of lighting hours, on the life span of the lamp, which amounted 1000,6000 and 8000 light hours for the incandescent ,fluorescent and the saving lamps, respectively.

2- The price of 1 kw amounted 0.34 LE.

3- The price of the 60w incandescent lamp amounted 3.0 L.E versus 7.5 and 11.0 L.E for the 40w fluorescent and 26w saving lamps, respectively.

H: Statistical analysis:

The obtained data were statistically analyzed by ANOVA using the General Linear Model (GLM) Procedure of SAS software (SAS institute, version 9.2, 2008) Duncan's multiple range test (Duncan, 1955) was used to detect the differences among means of different groups.

Results and Discussions:

1. Body weight (BW) and body weight gain (BWG):

The results of body weight (BW) and body weight gain (BWG) presented in (Table 2), revealed that birds exposed to light produced from 40w fluorescent lamp had significantly ($p \leq 0.05$) lighter BW at 2, 4, 6 and 8 weeks than those of females subjected to light emitted from the incandescent lamp (control) and the saving lamps (T2). Similarly, the BWG had the same trend, but it decreased insignificantly during the same periods.

The findings listed in the same (Table 2) showed insignificant differences in BW and BWG of birds exposed to light produced from incandescent and saving lamps compared with the incandescent lamp. Many researchers reported that the light produced from different sources may have different effects on poultry growth and reproduction (Harrison *et al.,* 1969; Pyrzak *et al.,* 1986; Pyrzak *et al.,* 1987). They added that the blue-green light stimulated the growth, while the orange-red light stimulated the poultry reproduction. The achieved results are also in harmony with those of Stoianov *et al.,* (1978), Knisley, (1990), Tarihi (1996), Rozenboim *et al.,*(1999) and Rozenboim *et al.,* (2004). On the other hand, Rodenburg and Middelkoop (2003) and Kristensen *et al.,* (2006), reported that birds exposed to light produced from different sources did not exhibit statistical differences in BWG.

2. Feed consumption (FC) and feed conversion ratio (FCR):

The results presented in (Table 3), revealed that the average feed consumption (FC) for birds exposed to light emitted from 26 saving lamp (T2) decreased significantly ($p \leq 0.05$) than those of the fluorescent (T1) and the incandescent lamp (control) during the fourth week. The minimal average feed consumption (19.93 g) which was found by using the saving lamp (T2) in the eighth week decreased significantly ($p \leq 0.05$) than those (20.80 g) and (21.40 g) of the fluorescent (T1) and the incandescent lamps, respectively.

The average total feed consumption during the whole experiment amounted (692.3 g) by using the saving lamp, decreasing significantly than those (712.60 g) and (721.47 g) of the fluorescent and the incandescent groups, respectively.

Concerning the feed conversion ratio (FCR), it had the same trend of (FC) since it amounted (1.77) in the saving group, improving significantly ($p \leq 0.05$) than those (1.95) and (20.00) of the incandescent (control) the fluorescent (T1), respectively.

During the whole experiment period (0-8) weeks, the feed conversion ratio amounted (3.12) by using the saving lamp, improving relatively than that (3.22) of the incandescent lamp (control), but significantly ($p \leq 0.05$) than that (3.43) of the fluorescent(T1).These results agree with those of Choi *et al.,* (1986),; Cutlip *et al.,* (2008), Lemme *et al.,* (2006), Zang, *et al.,* (2009), Cerrate *et al.,* (2008), and Lilly *et al.,*(2011), who found that the average feed consumption and conversion ratio remarkably improved than that of the control group.

3. Body weight and the age at sexual maturity:

The results presented in (Table 4), the average of body weight as the female birds became mature (at 20%egg laying rate) amounted 212.42 gm decreasing significantly than those 204.48 gm and 220.04 gm of the fluorescent lamp (T1) and the incandescent lamp (control), respectively.

The average age at the sexual maturity tended the same trend as it amounted 47days decreasing significantly than those 49 and 50 days by using the fluorescent (T1) and incandescent lamps (control), respectively.

This means that the females which were subjected to light emitted from 26 watt saving lamps became sexually mature at significantly smaller age and lighter body weight.

4. Mortality rate:

The results of mortality rate, listed in (Table 4), showed no differences between the three light sources. These results are in agreement with those of Kristensen *et al.,*(2006), who found that exposing the broilers to light produced from (incandescent, saving and metal halide lamps) had no significant effect on the mortality rate during an experiment of 42 days.

5. Carcass traits:

The findings presented in (Tables 5), showed no significant differences in all studied criteria. These results are in harmony with those of Deep *et al.,* (2010), who reported that most of the carcass characteristics were not affected by the light color or source.

6: Effect of light sources on some plasma constituents:

The findings presented in (Table 6) showed the following results:

6.1: Total protein (g/dl):

The overall-means of plasma total protein (g/dl) in (T1) fluorescent and (T2) saving amounted 4.04 and 4.27 g/dl increasing than that of the control by 0.25 and 5.69%, respectively.

6.2: Albumin concentration (g/dl):

The overall-mean of albumin concentration in (T2)- saving lamp, amounted 2.11(g/dl) increasing than those 1.79 and 2.10 (g/dl) of the control and the fluorescent(T1), respectively

6.3: Globulin concentration (g/dl):

The results showed no significant differences in the Globulin concentration due to the light sources.

6.4: ALT and AST (U/L):

The average of ALT (U/L) amounted in (T2) saving lamp 16.35 increasing significantly ($P<0.05$) than those 9.67and 10.67 of the (control) incandescent and (T1)-fluorescent lamps, respectively. Regarding the AST (U/L), it had a similar trend to that of ALT, since it amounted 207.95 by using the saving lamp (T2), increasing insignificantly than those 197.64 and 194.26 of (T1)-fluorescent lamp and incandescent lamp (control), respectively.

6.5: Total cholesterol (mg/dl):

The average of total Cholesterol concentration by using the saving lamp amounted 182.07 (mg/dl), insignificantly decreasing than that 17.68(mg/dl) of the control group, while it decreased significantly than that 200.30(mg/dl) of the fluorescent lamp.

7. Economical efficiency of the light sources:

It is worth to mention, that the cost of any lighting program includes both of the power cost (kw/LE) and the value of the lamp depreciation, based on the number of lighting hours divided by its life span. The price of 1 Kw amounted 0.34 LE, while those of the lighting lamps amounted 3 , 7.5

and 11.0 L.E for the 60-watt incandescent, 40-watt fluorescent and 26-watt saving lamps, respectively.

From data presented in (Table 7), it could be easily noticed that the saving lamp minimized the lighting costs than that of the incandescent by about 56.43%, while the decrease amounted only 36.50% by using the fluorescent lamp.

Conclusion:

Although the slightly decrease of body weight and body weight gain of females exposed to light from emitted saving lamps than those of the incandescent lamp (control), but their pronounced advantages, concluding in the significant decreased feed consumption and the less lighting costs in addition to their earlier sexual maturity and the better efficiency of feed utilization than those of T1 (flu) and the control (Inc), makes the use of saving lamps for raising Japanese Quail highly recommended.

Table (1): Composition and calculated analysis of experimental diets.

Ingredients (%)	Starter (0-4 weeks)	Grower (5-8 weeks)
Yellow corn	54.5	65
Soybean meal (*44% CP*)	29	28
Concentrate[1] (*52% CP*)	8	3
Gluten (60*% CP*)	4	0.9
Fat/Oil	2	0.1
Limestone	0.85	0.85
Di- Calcium phosphate	1	1.5
Na CL	0.35	0.35
Vitmaines	0.15	0.15
Minerals	0.15	0.15
Total	100	100
Calculated Analysis[2]		
ME (*kcal/ kg*)	3021.73	2928.36
Crude Protein, %	24.196	20.158
Crude fat, %	4.9654	3.0274
Crude fiber, %	3.5176	3.5418
Ca, %	1.24105	1.00775
Phosphors, %	0.5179	0.44181
Na, %	0.266425	0.201805
Argenine, %	1.3009	1.26077
Lysine, %	1.2317	1.0646

Concentrate[1]: supplied per kilogram of diet: selenium, 0.15 mg; manganese, 100 mg; iron, 50 mg; iodine, 1.5 mg; zinc, 100 mg; retinyl acetate, 7,715 IU; cholecalciferol, 2,756 IU; α-tocopherol acetate, 17 IU; menadione sodium bisulfate, 0.8 mg; cyanocobalamin, 0.01 mg; thiamine mononitrate, 1.1 mg; riboflavin, 6.6 mg; pyridoxine hydrochloride, 1.4 mg; nicotinic acid amine, 28 mg; d-calcium pantothenate, 6.6 mg; folic acid, 0.69 mg; d-biotin, 0.044 mg; choline chloride, 386 mg,[2]Clculated to according to NRC, (1994).

Table (2): Averages ±SE of body weight (BW) and body weight gain (BWG) of female Japanese quail affected

Age (weeks) \ L.S		Incandescent Lamp (Control)		Fluorescent lamp (T1)		Saving lamp (T2)	
BW (g)	BWG (g)	B W	BWG	B W	B WG	B W	B WG
0		7.12±0.055	--	7.14±0.055	--	7.20±0.055	--
Dif.		--	--	+0.28	--	+1.12	--
2	0-2	73.06±0.52^{a}	65.93±0.50^{a}	71.44±0.052^{b}	64.31±0.50^{b}	73.74±0.052^{a}	66.54±0.50^{a}
Dif.	3-4			-2.22	-2.46	+0.93	0.93+
4	5-6	142.64±1.18^{b}	69.90±1.13^{a}	138.05±1.15^{c}	66.61±1.10^{b}	145.90±1.17^{a}	72.06±1.11^{a}
Dif.				-3.22	-4.71	+2.29	+3.09
6	7-8	196.80±1.71^{a}	53.93±1.91^{a}	186.04±1.66^{b}	47.99±1.86^{b}	196.94±1.64^{a}	51.06±1.83a^{b}
Dif.				-5.47	-11.01	+0.07	+5.32
8	0-8	223.90±2.26^{a}	26.72±1.99	211.90±2.26^{b}	25.54±1.99	221.80±2.18^{a}	25.39±193
Dif.				-5.36	-4.42	-0.36	-4.98
TBWG			216.85±2.25^{a}	--	204.76±2.25^{b}	--	214.61±2.19^{a}
Dif.				--	-5.38	--	-1.03

by light source from hatch to 8 weeks of age.

[a,b and c] Means within each row with different superscripts, are insignificantly different (P≤0.05).
Dif. = Difference LS = light source.

Table (3): Averages ±SE of daily feed consumption (FC) g and biweekly feed conversion ratio (FCR) of female Japanese quail affected by light source from hatch to 8 weeks of age.

(weeks) \ L.S		Incandescent Lamp (Control)		Fluorescent lamp (T1)		Saving lamp (T2)	
FC (g)	FCR (g feed/ g gain)	FC	FCR	FC	FCR	FC	FCR
1		4.67±0.12		4.53±0.12	--	4.43±0.12	--
Dif.		--	--	-3	--	-5.14	--
2	2-0	6.87±0.26	1.23±0.01	6.87±0.26	1.23±0.01	6.93±0.26	1.20±0.01
Dif.		--	--	0	0	+0.87	-2.44
3		8.30±0.19	--	8.50±0.19	--	7.97±0.19	--
Dif.			--	+2.41	--	-3.98	--
4	4-2	11.17±0.98^{a}	1.95±0.04^{a}	10.90±0.98^{a}	2.00±0.04^{a}	10.47±0.98^{b}	1.77±0.03^{b}
Dif.		--	--	-2.42	+2.56	-3.94	-9.23
5		13.90±0.20^{a}	--	13.13±0.20^{b}	--	13.30±0.20a^{b}	--
Dif.			--	-5.54	--	-4.32	--
6	6-4	17.16±0.12a^{b}	4.06±0.30^{b}	17.43±0.12^{a}	5.04±0.30^{a}	16.80±0.12^{b}	4.02±0.27^{b}
Dif.		--	--	+1.60	+24.14	-2.10	-0.9
7		19.60±0.22	--	19.63±0.22	--	19.07±0.22	--
Dif.			--	+0.15	--	-2.70	--
8	8-6	21.40±0.23^{a}	9.53±0.57	20.80±0.23^{a}	8.84±0.64	19.93±0.23^{b}	7.86±0.58
Dif.				-2.80	-7.24	-6.17	-17.52
T.F.C.	8-0	721.47±3.85^{a}	3.22±0.78^{b}	712.60±3.85^{a}	3.43±0.78^{a}	692.30±3.85^{b}	3.12±0.07^{b}
Dif.		--	--	-1.23	+6.52	-4.04	-3.10

[a,b and c] Means within each row with different superscripts, are insignificantly different (P≤0.05).
Dif. = Difference LS = light source
Control = Incandescent Lamp T1 = Fluorescent lamp T2 = Saving lamp

Table (4): Averages ±SE body Wight (g) and age at sexual maturity/day and mortality rate of female Japanese quail as affected by light source.

L.S / Traits	Incandescent Lamp (Control)	Fluorescent lamp (T1)	Saving lamp (T2)
Age at sexual maturi-ty,days	50±0.51^{a}	49±0.51^{a}	47±0.51^{b}
Dif.		-3.30	-7.24
Body Weight at sexual maturity, g	220.04±1.37^{a}	204.48±1.37^{c}	212.24±1.37^{b}
Dif.		-7.07	-3.64
Mortality rate, %	1.67±0.33	1.33±0.33	1.33±0.33
Dif.		-20.36	-20.36

$^{a,b \text{ and } c}$ Means within each row with different superscripts, are insignificantly different (P≤0.05).
Dif. = Difference, L.S= Light source.

Table (5): Averages ±SE of some carcass traits in female Japanese quail as affected by light source from hatch to 8 week of age.

L.S / Traits	Incandescent Lamp (Control)	Fluorescent lamp (T1)	Saving lamp (T2)
Body weight, g	232.00±10.42	222.25±10.42	238.50±10.42
Dif.		-4.20	+2.80
Carcass, %	75.54±3.40	74.38±3.40	76.39±3.40
Dif.		-1.53	+1.12
Gizzard, %	1.30±0.08	1.28±0.08	1.26±0.08
Dif.		-1.53	-3.07
Liver, %	2.21±0.31	1.88±0.31	2.29±0.31
Dif.		-14.9	+3.61
Heart, %	0.85±0.08	0.87±0.08	0.83±0.08
Dif.		+2.35	2.35
Dressing, %	79.90±3.78	78.40±3.78	80.77±3.78
Dif.		-1.87	+1.08

Dif. = Difference, L.S= Light source.

Table (6): Averages ±SE of some blood parameters of female Japanese quail as affected by light source.

L.S / Traits	Incandescent Lamp (Control)	Fluorescent lamp (T1)	Saving lamp (T2)
Total protein (g/dl)	4.03±0.21	4.04±0.21	4.27±0.21
Dif.		+0.25	+5.69
Albumin (g/dl)	1.79±0.13	2.10±0.13	2.11±0.13
Dif.		+17.33	+17.88
Globulin (g/dl)	2.24±0.23	1.94±0.23	2.16±0.23
Dif.		-13.40	-3.57
Glucose (m mol/l)	11.82±0.33[b]	12.03±0.33[b]	13.51±0.33[a]
Dif.		+1.78	+14.30
Cholesterol (mg/dl)	197.68±4.89a[b]	200.30±4.89[a]	182.07±4.89[b]
Dif.		+1.33	-7.90
ALT(U/L)	9.79±1.17[b]	10.97±1.17[b]	16.35±1.17[a]
Dif.		+12.05	+67
AST(U/L)	194.26±6.07	197.64±6.07	207.95±6.07
Dif.		+1.74	+7.05

[a and b] Means within each row with different superscripts, are insignificantly different (P≤0.05).
Dif. = Difference, L.S= Light source.

Table (7): The economical efficiency of the tested light sources

Items / Light Source	(A).Power costs LE = Lighting hours*lamp Power/wh *Price /Kw	(B). Value of lamp depreciation	(A+B)	Relative%
Incandescent, 60W	598h*60w=35.880kw *0.34LE=12.20 LE	(598/1000)*3.00= 1.8 LE	14.00 LE	100
Fluorescent, 40W	598h*40w=23.920kw *0.34LE=8.15 LE	(598/6000)*7.50= 0.74 LE	8.89 LE	63.5% -36.5%
Saving, 26W	598h*26w=15.548kw *0.34 LE=5.28 LE	(598/8000)*11.00= 0.82 LE	6.10 LE	43.57% -56.43%

(A) = lighting hours = Exp. period X light/day 56 days * 8 L h/day, (B) = Price/Kw / LE
Depreciation = lighting h/ Life span/h, price of lamp /LE. L.S. = Life span of the lamp/ h
Total Costs =A+B / LE

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Assiut J. Agric. Sci., (46) No. (2) 2015 (135-147) *ISSN: 1110-0486*
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تأثير بعض المصادر الضوئية على أداء النمو والنضج الجنسى فى إناث السمان اليابانى

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الملخص:

استهدفت هذه الدراسة المقارنة اقتصادياً بين تاثيرات ثلاث مصادر ضوئية علي اداء النمو في السمان الياباني. ولقد استمرت تجربة هذة الدراسة ٥٦ يوماً كما اشتملت علي ١٢٦ كتكوت سمان ياباني عمر يوم،تم توزيعها بالتساوي في ثلاث مجاميع بكل منها ثلاث مكرارات بها (٤ذكور +١٠ اناث). ولقد تم رعايتها في بطاريات ثلاثية الطوابق تحت ظروف رعائية متماثلة ، كما تم تعريضها لضوء منبعث من لمبات بقدرة ٦٠ وات (كمثرية) ، ٤٠ وات (فلورسنت) ، ٢٦وات (لمبات موفرة)، وذلك لمدة ٨ ساعات ضوئية يومياً وبشدة ضوئية ١٤-١٦ لوكس خلال الثلاث ايام الاولي من العمر ، ثم ٤-٦ لوكس بقية التجربة. تم وزن الكتاكيت علي اساس فردي كل اسبوع ، بينما تم حساب الزيادة في وزن الجسم كل اسبوعين ، ولقد تم تحديد متوسط وزن الاناث وعمرها عند النضج الجنسي. وبالمثل تم تحديد استهلاك العلف وتقدير كفائة تحويل الغذاء.

وفي نهاية التجربة ، تم ذبح ٦ إناث لكل مجموعة لتقدير جودة الذبيحة كما تم اخذ٦عينات دم لتقدير بعض مكونات الدم.

ولقد اشتملت تكلفة الاضاءة علي كل من تكلفة قوة المصدر الضوئي (كيلو وات /جنية) وكذلك قيمة استهلاك المصدر الضوئي (جملة ساعات الاضاءة /عمر اللمبة بالساعات مضروبا في ثمن اللمبة/الجنية).

ولقد اوضحت النتائج ما يلي:

١. قل معنوياً متوسط وزن الاناث المعرضة (للفلورسنت) عند اعمار ٢، ٤، ٦ ثم ٨ اسابيع عنة في مجموعتي المقارنة والموفرة (T2).

٢. قل معنوياً متوسط الزيادة الكلي في الجسم ٢٠٤.٧٦ جرام في مجموعة الفلورسنت (T1) عنها ٢١٤.٦١ جرام و ٢١٦.٨٥ جرام في المجموعتين الموفرة (T2) والكنترول علي التوالي.

٣. وجد ان اقل استهلاك للعلف الكلى (٦٩٢.٣) جرام في المجموعة الموفرة (T2) وبما يقل معنوياً عن مثيلاتها (٧٠١٢.٦جرام) و(٧٢١.٤٧جرام) في المجموعتين (T1) والكنترول علي التوالي.

٤. كانت افضل كفائة تحويل غذاء (FCR) ٣.١٢ في المجموعة الموفرة (T2) بم يزيد معنوياً عنها ٣.٤٢ في (T1) وبصورة غير معنوية ٣.٢٢ في المقارنة.

٥. كان اقل متوسط لوزن جسم الاناث عند النضج الجنسي ٢٠٤.٤٨جرام في مجموعة (T1) بما قل معنوياً عنه ٢١٢.٤٢جرام و٢٢٠.٠٤ جرام في المجموعتين (T2) والكنترول علي التوالي.

٦. كان اقل عمرللاناث عند النضج الجنسي في المعاملة (T2) وبما يقل معنوياً عنها في مجموعة المقارنة والمعاملة (T1).

٧. قلل استخدام اللمبات الموفرة تكلفة الاضاءة بحوالي ٥٦.٤٣%عنها في الكنترول.

وعند الاخذ في الاعتبار للمزايا السابقة ، يمكن ان نوصي باستخدام اللمبات الموفرة في رعاية السمان الياباني وبصورة اقتصادية.