THE EFFECT OF SOME LIGHT TREATMENTS (TYPE AND PROGRAM) ON PRODUCTIVE PERFORMANCE AND SOME MEAT CONSTITUTES OF FAYOUMI CHICKENS. 1. DURING PRE PRODUCTION PERIOD

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Abstract

This work was conceded to study, the effect of some light treatments (type and program) on productive performance and some meat constituents of Fayoumi chickens during summer season under hot climatic conditions of Upper Egypt. Three hundred and sixty chicks, fifteen weeks old; were randomly divided into six experimental groups (6 groups, each group was divided into three replicates/ 20 birds each).Group 1, the chicks were exposed to continuous common light program (12h light: 12h dark/day) (with intensity 10 luxes) and was considered as a control (C); Group 2 (T1), the chicks were exposed to intermittent common light program (6h light:6h dark) each 12h. of day; Group 3 (T2), the chicks were exposed to biomittent common light program (30 minutes light: 30minutes dark) of each hour of day; Group 4 (T3), the chicks were exposed to continuous flash light program (12h light: 12h dark/day); Group 5 (T4), the chicks were exposed to intermittent flash light program (6h light:6h dark) each 12h. of day; Group 6 (T5), the chicks were exposed to biomittent flash light program (30 minutes light: 30minutes dark) of each hour of day. Chicks were reared under the same managerial, feeding and hygienic conditions throughout the experimental period. During of the experiment body weight (BW), body weight gains (BWG), feed consumption (FC), feed conversion (FCR), carcass characteristics and meat analysis were estimated. Flashed light groups caused elevation of body weight, body weight gains and feed intake significantly compared to control, while there wasn't significant difference between groups for feed conversion ratio. Flash lighting programs improved carcass characteristics compared with those exposed on common lighting groups. Flash lighting program increased moisture percentage and reduced fat percentage in meat ($P<0.05$). It can be concluded that applying the flash light regime tend to improve all measurements studied without any side effect on Fayoumi chickens during growing period.

INTRODUCTION

Light is one of the most environmental factors which affects poultry performance, therefore the understanding light effects on poultry production allows producers to select the best lighting program and make decisions to optimize the combination of production characteristics that bring higher profits. Intermittent

lighting programs are characterized by repeated light and dark periods within 24 hours (Abreu *et al*., 2011). Biomittent lighting as a system providing 15 min light and 45 min darkness in each hour for 16 h).Birds introduced to Biomittent lighting at 18, 24, 30 or 36 weeks of age all gave the same egg output. Use of Biomittent lighting between 22 and 34 weeks of age reduced food intake by 5.3% compared with normal lighting during this period and it can be safely introduced at point of lay as a means of saving food consumption without loss of output provided that an adequate diet is fed. The response is interpreted as a saving in energy expenditure rather than a restriction of feeding opportunity. (Morris *et al.,* 1990).

Zheng *et al*., (2013) reported that there was no difference observed in the growth performance of broilers under light regimens of both constant lighting (24L:0D) and intermittent lightings (17L:3D:1L:3D) , (16L:2D:1L:2D:1L:2D). Abbas *et al*. (2008) found that intermittent light regimen (2L:2D) improved body weight by 10% of broiler chickens compared to control (23L:1D). Khalil *et al*. (2008) showed that body weight gain at 10-22 wk of age had increased significantly for local Mandarah males grown under the first lighting regimen (14L:14D) compared to those grown under the second lighting regimen (stepdown 0.5h/wk to reach 16h L/day). Brickett *et al*., (2007) showed that use intermittent lighting regimen (12L:12D) reduced feed intake and feed gain ratio compared with intermittent lighting regimen (20L:4D) of broilers raised to 35 d of age, however, the carcass weight, pectoralis muscle and total breast meat yield for broilers given intermittent lighting regimen (12L:12D) were lower than that of given intermittent lighting regimen (20L:4D). Ingram and Hatten (2000) showed that intermittent lighting schedule (12L:12D) significantly improved feed conversion but decreased body weight. Taha *et al*., (2011) showed that no significant effect on most slaughter traits by lighting programs. El-Fiky *et al*., (2008) showed that dressing percentage was significantly improved with decreasing photoperiod, and it was maximized when intermittent light (4L: 8D)was applied. Abbas *et al*., (2008) observed that intermittent lighting regimen (2L:2D) reduced mortality rate 3 times compared to control (23L:1D) of broiler chicks, but non-intermittent restricted lighting regimen (12L: 12D) had no effect on mortality rate. Campo *et al*., (2002) founded that a continuous light regimen (24L:0D) seriously negatively affects the welfare of birds. Ingram *et al*., (2000) showed that there was no effect of a intermittent lighting schedule (12L: 12D) on mortality.

The objective of the present experiment was to study the effect of some light treatments (type and program) on productive performance and some meat constitutes of Fayoumi chickens during pre production period.

MATERIALS AND METHODS

Chickens and Treatments

This study was carried out at the Poultry Research Farm, Animal and Poultry Production Dept., Faculty of Agriculture, Assiut University and Animal Production Research Institute. Therefore, A total number of 360 chicks at fifteen weeks old Fayoumi chicks were individually leg-banded, weighted to the nearest gram and randomly housed in 18 pens (6 treatments, each treatment was divided into three replicates / 20 birds each). All pens were provided with electrical heaters thermostatically controlled to provide the required temperature, they were also provided with adequate number of suitable capacity of exhaust fans to adjust ventilation according to the weight and age of chicks during summer season under hot climatic conditions of Upper Egypt. The windows were blackened out with double-layer black curtains. The sources of illumination unit were 400-watt incandescent bulbs to give suitable wave length (600-700 microns). The light dark cycles were obtained by using automatic timer for each pen to provide any combination of light plus dark totally 24hours. All pens had the same numbers and size of feeders and waterers. Chickens were housed in open room with covered windows by black cartons, rearing under management condition and consumption the same feeding.

Conventional management procedures were used throughout the experimental period. Chicks were vaccinated for New-Castle disease at 4 months of age. They were fed-ad lib on the growing diet to 24 weeks of age and then fed laying diet to the end of the experiment from (15-23 wks of age). The composition of the grower and layer diets is shown in Table (1).

Light treatments

A total number of birds were 360 used in this Experiment. The birds were classified into six groups, 60 birds each in-group: Three for the photoperiod of common light treatments and three for photoperiod of Flashing light treatments.

Experimental Measurements:

Body weight (BW):

All birds were weighed individually to the nearest gram and recorded from 15 to 23 wks of age biweekly.

Body weight gain (BWG):

Body weight gains (BWG g/day) were calculated for the periods in the 15-17, 17-19, 19-21, 21-23 weeks of age. Daily BWG was calculated according to the following equation:

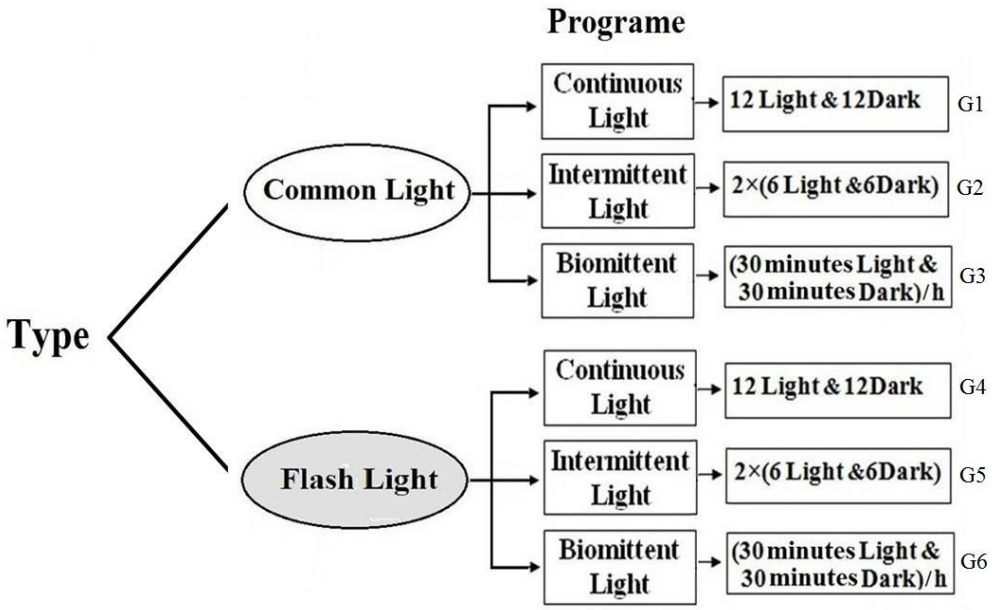
$$BWG = \frac{(BW2 - BW1)}{P} \qquad g / day$$

Where, **BW1** is the weight at the beginning of the period.

BW2 is the weight at the end of the same period.

P is the period in days (14 days).

Figure 1. Diagram represents the experimental design during the period (15- 23) wks of age.



Feed consumption (FC):

Feed consumption (FC) for each replicate was determined at weekly intervals per gram and calculated biweekly and per gram feed/ day in the periods of 15-17 , 17-19 , 19-21 , 21-23 weeks of age.

Feed conversion ratio (Feed : gain ratio)(FCR):

Feed to gain ratio (F: G ratio) was calculated for the period from 15-17 , 17-19 , 19-21 , 21-23 weeks of age,

$$\text{F:G ratio} = \frac{\text{FC}}{\text{BWG}}$$

Where, **FC** estimated Feed consumption as g feed/ day.

BWG estimated Body weight gain as g/ day.

Carcass quality:

At the end of the growing period, six birds were chosen randomly from each treatment (two birds from each replicate) and slaughtered. They were individually weighed and slaughtered by cutting the neck near the first cervical vertebra and then bleeded freely for 10 minutes. The birds were weighed after slaughtering to obtain

the blood weight and after plucking the feather to calculate feather weight by difference. The following measurements were recorded: dressed carcass weight, edible viscera weight (giblet = liver, heart and gizzard), blood percentage, feather percentage and carcass cut-up parts. Weights of such organs and carcass cut-up parts were expressed relatively to live body weight of the birds. Dressing percentage was calculated as follows:

$$\textbf{Carcass \%} = \frac{\text{carcass weight}}{\text{live body weight}} \textbf{ X 100}$$

$$\textbf{Dressed carcass \%} = \frac{(\text{ carcass weight + giblets weight })}{\text{live body weight}} \textbf{ X 100}$$

$$\textbf{Blood \%} = \frac{(\text{ live body weight – body weight after bleeded blood })}{\text{live body weight}} \textbf{ X 100}$$

$$\textbf{Feather \%} = \frac{(\text{ live body weight – body weight after plucking blood })}{\text{live body weight}} \textbf{ X 100}$$

Mortality rate:

Mortality rate was calculated throughout the experimental period and estimated as a number of dead pullets in relation to the number of living pullets till 24 wk of age.

Statistical analysis:

Data obtained from this experiment were tested for the significance of lighting treatments effect by ANOVA and GLM using the SAS Institute procedure (1996). Duncan's multiple range test was used to determine differences among means when treatment effects were significant. Significant differences were considered to exist when $p<0.05$.

The mathematical model used was:

$$\mathbf{Y_{ij} = \mu + R_e + P_i + T_j + (PT)_{ij} + e_{ijk}}$$

Where Y_{ijk} is any observation by light programs $\mathbf{P_i}$ for i = 1, 2 and 3 and light types T_j.

μ = the population mean.

$\mathbf{R_e}$ = Replicate effect.

P_i = Light program effect (i = 1,2 and 3).

T_j = Light type effect (j = 1 and 2).

$(PT)_{ij}$ = Interaction of light programs **×** light types.

e_{ijk} = Experimental error.

RESULTS AND DISCUSSION

Results presented in Table (2) show the effects of light type and light program on body weight (g) of pullets during the periods from 15 to 23 wks of age. It was found that BW was not significantly (P≤0.05) different among main effect of light type and the light program. Regarding the interaction effect between light type and program, there were significant effects on BW at 20 and 23 wk of age. At 20 week of age, birds in group 2 and 4 had significantly higher BW (P≤0.05) than those of birds in group 6, however birds in group 1, 3 and 5 had an intermediate body weight. At 23 week of age, birds in group 4 had significantly higher BW (P≤0.05) than those of birds in group 5 and 6, however birds in group 1,2 and 3 had an intermediate values of BW.

The present results in flash continuous light regimen are similar to those reported by Abbas *et al.*, (2008) they found that intermittent light regimen (2L:2D) improved body weight by 10% of broiler chickens compared to control (23L:1D). On other hand, they showed that non-intermittent restricted light regimen (12L:12D) suppressed body weight by 10% compared to control (23L:1D) of broilers. El-Fiky *et al.,* (2008) indicated that light regime significantly affected body weight and a cumulative growth, showing that intermittent light regime (4L: 8D) and continuous light regime (23L:1D) had similar cumulative growth and feed conversion ratio and both were better than light regime (15L: 9D) and it is possible to use the intermittent light regime (4L: 8D) in broiler rearing programs without negative effects on growth and feed conversion with expected considerable saving in energy (electricity) expense of continuous light (23L: 1D).

Results presented in Tables (3 and 4) show the effect of light type and light program on body weight gain (BWG) (g) of pullets during the periods from 15 to 23 wks of age. It was found that BWG was not significantly (P≤0.05) different among main effect of light type and the light program. Regarding the interaction effect between light type and program, there were significant effects on BWG. During the periods from 15-17 and 15 to 23 wks of age, birds of group 4 gained significantly higher BWG (P≤0.05) than those of birds in group 6, while birds in group 1,2 and 3 had an intermediate BWG.

The present results are in concert with those observed by Khalil *et al*. (2008) who showed that body weight gain at (10-22 wk of age) had increased significantly for local Mandarah males grown under the first lighting regimen (14L:14D) compared to those grown under the second lighting regimen (stepdown 0.5h/wk to reach 16h L/day). Lewis *and Morris* (1998) showed that when chicks are reared in lightproof rooms with short photoperiods their body weight gain might be reduced in comparison with long day.

Results presented in Table (5) show the effects of light type and light program on feed consumption(FC) (g /chick / day)) of birds during the period from 15 to 23 wks of age. It was found that FC of common light group significantly decreased ($P \leq 0.05$) than those exposed to flash light group, but there was not significantly different among the light programs. Also, there was a significant effect of interaction between light type and program on FC during 17-19, 19-21 and 15-23 wks of age in group 4 . Birds in group 1 and 3 had significant lower FC ($P \leq 0.05$) than those birds in group 4 on (17-19), (19-21) and (15-23) wks of age, while birds in group 2,5 and 6 had an intermediate FC.

Similarly with our results in light program treatment, Ohtani and Lesson (2000) reported that no significant difference in feed intake between intermittent lighting and continuous lighting broilers during the first 3 wks, however, feed intake was significantly higher in intermittent lighting *vs.* continuous lighting chickens during the subsequent period of 3 to 6 wks of age. Also, Morris and Butler (1995) reported that feed consumption for birds reared under 0.25L:0.75D for 16 h followed by 8D was similar to that for birds reared under 4(3L:3D) and it was 6% lower than that for birds raised under 24(0.25L:0.75D). On the other hand, Classen *et al.,* (1991) showed that broilers raised under continuous light consumed more feed than that raised under a lighting program where photoperiod gradually increased from 6 to 23 h between days 4 and 35 and that reared under an increasing lighting program with 1 h of light mid-way through the scotophase.

Results presented in Table (6) show the effect of light type and light program on feed conversion (FCR) of pullets during the period 15 to 23 wks of age. It was found that FCR was not significantly ($P \leq 0.05$) different among the light type and the light program. Regarding the interaction effect between light type and program, there were significant ($P \leq 0.05$) effects on FCR during 15-17 and 19-21 wk of age in group1, 2 and 3. Improvement in FCR for groups exposed to 1, 2 and 3 than those of 4, 5 and 6 However, there were no significant ($P \leq 0.05$) effects on FCR during 15-23.

Our results was in agreement with the results presented by Brickett *et al.,* (2007) who's reported that lighting regimen (12L:12D) reduced feed gain ratio compared with lighting regimen (20L:4D) of broilers raised to 35 d of age.

Results presented in Tables (7,8,9 and 10) show the effect of light type and programms on carcass characteristics and meat analysis of pullets during the period from 15 to 23 wks of age. It was found that carcass characteristics and meat analysis were not significantly (P≤0.05) different among the main effect of light type and programs, except the blood %, it had significantly (P≤0.05) different between the light type where the common light group had significant lower blood % (P≤0.05) than flash light group. Regarding the interaction effect between light type and program, there were significant effects on blood%, heart%, gizzard% and Giblets% during 15-23 wks of age.

Birds in group 1 had significant lower blood % (P≤0.05) than those of birds in group 5 and 6, however, birds in group 2,3 and 4 had an intermediate blood%. However, birds in group 5 had significant higher heart% (P≤0.05) than other groups. As well as, birds in group 5 had significant higher gizzard% and giblets% (P≤0.05) than those of birds in group 4 and 6, while birds in group1, 2 and 3 had an intermediate gizzard% and Giblets%.

Birds in group 1, 5 and 6 had significant higher moisture % in meat (P≤0.05) than those in group 4 (Table 10); however, birds in group 2 and 3 had an intermediate moisture % in meat birds. Birds in group 1 had significant higher fat % in meat (P≤0.05) than those of birds in group 6; however, birds in others groups had an intermediate fat%.

Our results are in agreement with Olanrewaju *et al.* (2012) who's reported that there was no main effect of photoperiod on tender yield, when broilers reared under the long/continuous (23L:1D) and regular/intermittent photoperiods(2L:2D) equally improved broiler carcass characteristics as compared with the short/non-intermittent photoperiod (8L:16D from d 8-d 48 and 23L:1D from d 49-d 56).Taha *et al.,*(2011) showed that no significant effect on most slaughter traits by lighting programs. Gornowicz and Lewko (2007) indicated that the intermittent light programme 4L:2D or 3L:1D used in growing broiler chickens significantly lower amount of peritoneal fat tissue in the carcase by about 1.39%.

Results presented in tables (11) show the effect of light type and light program on mortality rate of chickens during the period 15 to 23 wks of age. It was found that mortality rate were not significantly (P≤0.05) different among main effect of light type and the light program. Regarding the interaction effect between light

type and program, there were not significant (P≤0.05) effects on mortality rate of chickens during the period 15 to 23 wks of age.

Schwean-Lardner *et al.,* (2012) reported that many aspects of broiler health improve with decreasing day length and total mortality as well as mortality due to metabolic and skeletal disease, decreased linearly with increasing inclusion of darkness. Abbas *et al.,(*2008) observed that intermittent lighting regimen (2L:2D) reduced mortality rate 3 times compared to control (23L:1D) of broiler chicks. Abbas *et al., (*2008) observed that non-intermittent restricted lighting regimen (12L: 12D) had no effect on mortality rate. El-Fiky *et al.,* (2008) showed that viability percentage was not affected by light schedules (23L: 1D),(15L: 9D) and (4L: 8D). Lewis and Gous (2007) reported that lighting regimen (const. 8 h, const. 16 h, or 8 h to 21 d and 16 h from 22 to 42) had no significant effect on mortality of broilers.

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Table 1. Composition and calculated analysis of experimental diets.

Ingredient	Grower
Yellow corn	74.3
Soybean (44%)	18.9
Layer concentrate*	5
Bone mael	1.2
Limestone	—
Premix**	0.3
Salt	0.3
Mathionine	—
Calculated analysis*** Protein, %	16.7
M.E (kcal/kg)	3013
Calcium (%)	0.88
Phosphorus (%)	0.42
Methionine (%)	0.3
Lysine (%)	1.3

* Eache kilogram pf layer concanterate contains the following levels of vitamins and minerals: Vit. A 10,000 IU; vit D_3 2,500 IU; vit. E 100 mg; vit. K 25 mg; vit. B_1 2,00 mg; vit. B_2 40 mg; vit. B_6 15 mg; vit. B_{12} 200 mg; Pantothenic acid 100 mg; Niacin 400 mg; Biotin 500 mg; Folic acid 10 mg; Choline chloride 500 gm; Selenium 1 mg; Copper 5 mg; Iron 400 mg; Manganese 620 mg; Zinc 560 mg; Iodine 3 mg; Antioxidant 75 mg.

** Premix contain per 3 kg: vit. A 12,000,000 IU; vit D_3 3,000,000 IU; vit. E 50,000 mg; vit. K_3 3,000 mg; vit. B_1 2,000 mg; vit. B_2 7,500 mg; vit. B_6 3,500 mg; vit. B_{12} 15 mg; Pantothenic acid 12,000 mg; Niacin 30,000 mg; Biotin 150 mg; Folic acid 1,500 mg; Choline 300 gm; Selenium 300 mg; Copper 10,000 mg; Iron 40,000 mg; Manganese 80,000 mg; Zinc 80,000 mg; Iodine 2,000 mg; Cobalt 250 mg; CaCO3 3,000 mg.

*** Calculated according to NRC (1994).

Table 2. Effect of light type and program on body weight (g) of Fayoumi chickens during the period 15 to 23 wks of age.

Classification	15	16	17	18	19	20	21	22	23
Type :									
Common (C)	995.97± 16.47	1117.36±18.26	1138.90±19.33	1279.80±19.98	1267.13±19.80	1370.53±20.04	1391.71±20.63	1477.67±20.06	1506.97±19.99
Flash (F)	968.00±16.42	1068.92±19.55	1111.51±19.55	1226.04±21.75	1239.82±22.41	1331.77±23.00	1355.88±24.70	1431.67±23.58	1463.52±23.51
Programme:									
Continues (Cs)	994.54±19.31	1106.57±25.09	1139.45±25.23	1281.53±27.08	1271.70±26.02	1375.48±26.96	1394.68±27.04	1476.48±26.85	1514.72±26.43
Intermittent (I)	961.38±19.91	1084.42±21.91	1109.47±23.00	1246.08±25.73	1241.80±26.27	1354.78±26.01	1361.71±28.40	1432.04±26.85	1469.57±26.31
Biomittent (B)	990.04±21.23	1093.43±22.76	1129.51±23.42	1236.07±24.02	1249.70±25.15	1327.68±25.87	1368.72±27.59	1459.74±26.38	1476.20±26.96
Interactions:									
G1: C x Cs	985.67±26.09	1114.6±33.76	1118.7±33.13	1228.5±36.14	1242.1±30.80	1341.2±34.23[a b]	1366.3±32.38	1462.6±34.10	1487.9±32.78[a b]
G2:CxI	1002.2±28.62	1108.0±30.11	1142.2±32.69	1235.7±34.29	1275.3±35.81	1402.3±35.76 [a]	1399.1±38.07	1479.4±35.19	1513.6±32.87[a b]
G3:CxB	1000.1±31.06	1129.2±31.28	1156.3±34.95	1225.9±33.51	1284.7±36.53	1372.9±34.31[a b]	1410.4±37.19	1491.3±35.43	1519.7±37.97[a b]
G4:FxCs	1003.4±28.65	1096.6±37.84	1164.9±38.85	1235.5±41.37	1308.8±43.92	1421.8±42.77 [a]	1430.5±45.36	1494.3±43.23	1548.3±43.01 [a]
G5: F x I	920.6±26.89	1059.1±31.86	1075.6±32.00	1170.3±37.79	1209.6±38.13	1308.3±36.86[a b]	1325.8±41.72	1385.7±39.67	1426.5±40.29 [b]
G6: F x B	980.0±29.14	1054.5±32.67	1100.3±30.59	1142.9±33.68	1209.5±33.51	1277.5±38.14 [b]	1319.7±40.35	1424.0±39.17	1426.9±37.25 [b]

a – b Means in the same rows with different superscript are significantly different (P≤0.05)

Table 3. Effect of light type and program on body weight gain (g) of Fayoumi chickens during the period 15 to 23 wks of age.

Classification	15-17	17-19	19-21	21-23	15-23
Type:					
Common (C)	142.65±3.65	128.66±5.26	120.58±6.19	115.41±5.73	462.96±12.60
Flash (F)	149.03±8.75	127.46±6.54	114.46±5.99	109.38±5.95	453.24±14.29
Programme:					
Continues (Cs)	149.62±5.88	131.02±7.19	115.41±6.83	121.19±8.11	479.06±14.68
Intermittent (I)	150.05±11.13	134.03±8.22	120.93±8.02	107.17±6.68	456.83±18.99
Biomittent (B)	137.39±4.95	119.39±6.06	116.46±7.45	108.83±6.45	440.32±15.01
Interactions:					
G1: C x Cs	133.19±6.19^{bc}	123.67±9.69	111.67±9.74	122.94±11.48	467.50±18.40^{ab}
G2:CxI	139.13±6.25^{abc}	134.20±9.50	125.31±11.23	113.08±9.84	454.57±25.58^{ab}
G3:CxB	155.73±6.19^{ab}	128.66±8.08	123.88±11.05	110.14±8.29	466.08±21.87^{ab}
G4:FxCs	167.16±9.59^{a}	140.26±10.67	119.71±9.58	119.14±11.56	493.50±23.78^{a}
G5: F x I	161.63±21.97^{c}	133.86±13.53	116.55±11.54	101.48±9.10	459.04±28.29^{ab}
G6: F x B	118.26±6.75^{c}	110.11±8.92	106.62±9.16	107.63±9.87	410.45±19.48^{b}

$^{a-b}$ Means in the same rows with different superscript are significantly different (P≤0.05)

Table 4. Effect of light type and program on daily body weight gain (g) of Fayoumi chickens during the period 15 to 23 wks of age.

Classification	15-17	17-19	19-21	21-23	15-23
Type:					
Common (C)	10.19±0.26	9.19±0.38	8.88±0.44	8.24±0.41	8.27±0.23
Flash (F)	10.76±0.63	9.10±0.47	8.18±0.43	7.81±0.43	8.09±0.26
Programme:					
Continues (Cs)	10.69±0.42	9.36±0.51	8.70±0.48	8.66±0.58	8.55±0.26
Intermittent (I)	10.72±0.79	9.57±0.59	8.64±0.57	7.66±0.48	8.16±0.34
Biomittent (B)	9.96±0.35	8.53±0.43	8.32±0.53	7.77±0.46	7.86±0.27
Interactions:					
G1: C x Cs	9.51±0.44^{ab}	8.83±0.69	8.84±0.67	8.78±0.82	8.35±0.33^{ab}
G2:CxI	9.94±0.45^{ab}	9.59±0.68	8.95±0.80	8.08±0.70	8.12±0.46^{ab}
G3:CxB	11.12±0.44^{ab}	9.19±0.58	8.85±0.79	7.87±0.59	8.32±0.39^{ab}
G4:FxCs	11.94±0.69^{a}	10.02±0.76	8.55±0.69	8.51±0.83	8.81±0.42^{a}
G5: F x I	11.55±1.57^{a}	9.56±0.97	8.32±0.82	7.25±0.65	8.20±0.51^{ab}
G6: F x B	8.70±0.47^{b}	7.87±0.64	7.62±0.65	7.69±0.70	7.33±0.35^{b}

$^{a-b}$ Means in the same rows with different superscript are significantly different (P≤0.05)

Table 5. Effect of light type and program on Feed Consumption (g/chick/day) of Fayoumi chickens during the period 15 to 23 wks of age.

Classification	15-17	17-19	19-21	21-23	15-23
Type :					
Common (C)	72.68±0.98	89.05±1.67	96.32±1.57	103.26±1.31	90.33±1.16^{b}
Flash (F)	72.64±0.96	92.68±2.08	101.43±1.53	105.52±0.60	93.07±0.95^{a}
Programme:					
Continues (Cs)	72.94±1.08	93.63±3.44	100.52±2.90	104.51±1.68	92.90±2.01
Intermittent (I)	74.18±1.23	91.69±1.28	98.98±1.70	104.45±0.66	92.33±0.84
Biomittent (B)	70.87±0.84	87.27±1.16	97.13±1.72	104.20±1.57	89.87±0.89
Interactions:					
G1: C x Cs	72.9±1.71	87.3±3.45^{b}	95.4±3.67^{b}	102.8±3.12	89.60±2.71^{b}
G2:CxI	74.2±1.99	93.1±2.41^{ab}	98.5±3.11^{ab}	104.4±0.35	92.57±1.84^{ab}
G3:CxB	70.9±1.32	86.7±1.81^{b}	95.1±1.64^{b}	102.6±3.10	88.81±1.24^{b}
G4:FxCs	72.9±1.71	99.9±2.65^{a}	105.8±1.45^{a}	106.2±1.15	96.20±1.37^{a}
G5: F x I	74.1±1.89	90.3±0.69^{b}	99.4±2.16^{ab}	104.5±1.44	92.08±0.22^{ab}
G6: F x B	70.9±1.32	87.8±1.79^{b}	99.2±2.78^{ab}	105.8±0.39	90.92±1.14^{b}

$^{a-b}$ Means in the same rows with different superscript are significantly different (P≤0.05)

Table 6. Effect of light type and program on feed conversion of Fayoumi chickens during the period 15 to 23 wks of age.

Classification	15-17	17-19	19-21	21-23	15-23
Type :					
Common (C)	7.20±0.25	9.78±0.40	10.85±0.10^{b}	12.63±0.60	11.00±0.34
Flash (F)	6.90±0.35	10.23±0.36	12.62±0.45^{a}	13.54±0.41	11.57±0.35
Programme:					
Continues (Cs)	6.89±0.39	9.97±0.34	11.65±0.54	12.05±0.39	10.90±0.43
Intermittent (I)	6.96±0.29	9.75±0.62	11.55±0.42	13.61±0.50	11.40±0.45
Biomittent (B)	7.30 ±0.45	10.30±0.45	12.02±0.69	13.59±0.81	11.56±0.43
Interactions:					
G1: C x Cs	7.67±0.27^{a}	9.89±0.39	10.79±0.05^{b}	11.71±0.63	10.74±0.35
G2:CxI	7.47±0.31^{a}	9.71±1.24	11.01±0.20^{b}	12.92±0.12	11.58±0.98
G3:CxB	6.37±0.21^{b}	9.44±0.43	10.74±0.20^{b}	13.03±1.75	10.69±0.28
G4:FxCs	6.11±0.19^{b}	9.98±0.64	12.36±0.87^{ab}	12.48±0.44	11.05±0.88
G5: F x I	6.42±0.14^{b}	9.44±0.56	11.95±0.77^{ab}	14.41±0.83	11.23±0.15
G6: F x B	8.15±0.34^{a}	11.16±0.33	13.02±0.81^{a}	13.76±0.48	12.43±0.28

$^{a-b}$ Means in the same rows with different superscript are significantly different (P≤0.05)

Table 7. Effect of light type and program on carcass characteristics of Fayoumi chickens at 23 wks of age.

Classification	Live Body weight (g)	Blood weight (g)	Feather weight (g)	Liver weight (g)	Heart weight (g)	Gizzard weight (g)	Giblets weight (g)	Carcass weight (g)	Dressed Carcass weight (g)
Type :									
Common (C)	1573.89±44.97	50.83±3.62	130.83±5.07	28.76±0.15	7.51±0.11	21.23±0.12	57.50±0.25	1046.39±36.04	1103.89±36.06
Flash (F)	1608.61±78.79	62.22±4.87	140.00±11.38	28.64±0.29	7.58±0.19	21.14±0.38	57.37±0.80	1064.72±61.20	1122.09±61.23
Programme:									
Continues (Cs)	1560.83±59.22	49.58±4.50	136.25±13.80	28.25±0.32^{b}	6.95±0.13^{b}	20.10±0.28^{b}	55.30±0.66^{b}	1020.83±39.40	1076.13±39.43
Intermittent (I)	1521.25±88.71	55.42±5.69	130.00±11.03	28.84±0.26^{ab}	7.83±0.18^{a}	21.86±0.35^{a}	58.53±0.70^{a}	1025.00±70.56	1083.53±70.49
Biomittent (B)	1691.67±79.63	64.58±5.59	140.00±6.96	29.01±0.23^{a}	7.86±0.10^{a}	21.61±0.12^{a}	58.48±0.24^{a}	1120.83±67.85	1179.31±67.85
Interactions:									
G1: C x Cs	1516.67±99.11	41.67±3.57^{b}	125.83±9.44	29.18±0.24^{a}	7.24±0.13^{c}	20.85±0.12^{c}	57.27±0.38^{bc}	996.67±63.95	1053.94±64.26
G2:CxI	1570.00±66.53	51.67±7.26^{ab}	132.50±11.53	28.42±0.18^{a}	7.27±0.06^{c}	21.10±0.21^{bc}	56.78±0.36^{c}	1049.17±72.10	1105.95±71.92
G3:CxB	1635.00±70.49	59.17±6.11^{ab}	134.17±5.69	28.67±0.25^{a}	8.03±0.10^{ab}	21.74±0.10^{b}	58.44±0.23^{b}	1093.33±54.96	1151.78±54.82
G4:FxCs	1605.00±69.47	57.50±7.16^{ab}	146.67±26.57	27.32±0.21^{b}	6.67±0.14^{d}	19.34±0.31^{d}	53.33±0.45^{d}	1045.00±50.08	1098.33±50.14
G5: F x I	1472.50±171.02	59.17±9.17^{ab}	127.50±19.99	29.27±0.43^{a}	8.39±0.14^{a}	22.63±0.50^{a}	60.28±0.91^{a}	1000.83±128.36	1061.12±128.40
G6: F x B	1748.33±147.13	70.00±9.40^{a}	145.83±12.94	29.35±0.35^{a}	7.69±0.15^{b}	21.47±0.22^{b}	58.51±0.45^{b}	1148.33±130.12	1206.84±130.19

a – b Means in the same rows with different superscript are significantly different (P≤0.05)

Table 8. Effect of light type and program on carcass characteristics relative to live body weight of Fayoumi chickens at 23 wks of age.

Classification	Live Body weight (g)	Blood %	Feather %	Liver %	Heart %	Gizzard %	Giblets %	Carcass %	Dressed Carcass %
Type :									
Common (C)	1573.89±44.97	3.23±0.21^{b}	8.33±0.25	1.85±0.06	0.48±0.01	1.37±0.04	3.70±0.11	66.43±1.09	70.14±1.09
Flash (F)	1608.61±78.79	3.85±0.18^{a}	8.57±0.39	1.86±0.10	0.49±0.03	1.38±0.09	3.74±0.23	65.88±1.13	69.61±1.12
Programme:									
Continues (Cs)	1560.83±59.22	3.17±0.24	8.62±0.61	1.84±0.08	0.45±0.02	1.31±0.05	3.60±0.15	65.46±0.96	69.06±0.99
Intermittent (I)	1521.25±88.71	3.63±0.25	8.44±0.31	1.98±0.14	0.54±0.05	1.51±0.12	4.03±0.29	67.05±1.32	71.08±1.27
Biomittent (B)	1691.67±79.63	3.82±0.24	8.28±0.16	1.75±0.08	0.48±0.02	1.31±0.06	3.53±0.15	65.96±1.74	69.49±1.68
Interactions:									
G1: C x Cs	1516.67±99.11	2.78±0.25^{b}	8.35±0.50	1.96±0.12	0.49±0.03^{b}	1.40±0.09^{ab}	3.85±0.23^{ab}	65.79±1.11	69.65±1.19
G2:CxI	1570.00±66.53	3.24±0.35^{ab}	8.38±0.50	1.83±0.08	0.47±0.02^{b}	1.36±0.07^{ab}	3.65±0.17^{ab}	66.49±2.13	70.15±2.01
G3:CxB	1635.00±70.49	3.66±0.40^{ab}	8.24±0.33	1.77±0.08	0.49±0.03^{b}	1.34±0.06^{ab}	3.61±0.17^{ab}	67.01±2.53	70.62±2.56
G4:FxCs	1605.00±69.47	3.55±0.37^{ab}	8.89±1.15	1.72±0.07	0.42±0.02^{b}	1.21±0.04^{b}	3.35±0.14^{b}	65.13±1.67	68.48±1.68
G5: F x I	1472.50±171.02	4.02±0.31^{a}	8.51±0.41	2.13±0.25	0.61±0.08^{a}	1.66±0.22^{a}	4.40±0.55^{a}	67.59±1.72	72.00±1.67
G6: F x B	1748.33±147.13	3.98±0.29^{a}	8.33±0.08	1.73±0.14	0.45±0.03^{b}	1.27±0.09^{b}	3.45±0.26^{b}	64.91±2.54	68.36±2.32

$^{a-b}$ Means in the same rows with different superscript are significantly different (P≤0.05)

Table 9. Effect of light type and program on carcass cut-up parts relative to live body weight of Fayoumi chickens at 23 wks of age.

Classification	Chest %	Drum sticks %	Thigh %	Back %	Neck %	Wing %
Type :						
Common (C)	16.07±0.29	4.74±0.19	5.87±0.17	15.84±0.26	4.83±0.22	3.76±0.10
Flash (F)	15.66±0.57	4.75±0.21	5.81±0.21	15.41±0.36	4.62±0.18	3.79±0.07
Programme:						
Continues (Cs)	15.71±0.89	4.78±0.22	5.84±0.19	15.53±0.50	4.93±0.21	3.84±0.09
Intermittent (I)	15.78±0.32	4.94±0.23	6.03±0.25	15.57±0.25	4.79±0.22	3.75±0.10
Biomittent (B)	16.11±0.23	4.52±0.28	5.66±0.27	15.77±0.39	4.47±0.29	3.73±0.12
Interactions:						
G1: C x Cs	16.70±0.61	4.94±0.29	5.91±0.21	15.64±0.46	4.93±0.28	3.96±0.15
G2:CxI	15.43±0.39	4.89±0.35	6.14±0.39	15.75±0.31	4.94±0.34	3.58±0.13
G3:CxB	16.09±0.41	4.40±0.34	5.55±0.29	16.14±0.60	4.63±0.53	3.74±0.22
G4:FxCs	14.73±1.65	4.62±0.35	5.77±0.36	15.43±0.95	4.92±0.35	3.72±0.13
G5: F x I	16.13±0.51	4.99±0.33	5.91±0.33	15.38±0.40	4.63±0.29	3.92±0.12
G6: F x B	16.12±0.26	4.65±0.47	5.77±0.48	15.40±0.49	4.30±0.27	3.72±0.13

Table 10. Effect of light type and program on meat analysis of Fayoumi chickens at 23 wks of age.

Classification	Moisture(%)	Protein(%)	Ash(%)	Fat(%)
Type:				
Common (C)	73.42±0.19	22.53±0.26	3.92±0.26	2.44±0.35
Flash (F)	72.95±0.64	22.93±0.41	4.65±0.42	1.82±0.12
Programme:				
Continues (Cs)	72.43±0.88	23.40±0.53	4.23±0.42	2.59±0.49
Intermittent (I)	73.43±0.41	22.44±0.33	4.56±0.59	1.91±0.24
Biomittent (B)	73.70± 0.19	22.35±0.33	4.06±0.27	1.89±0.16
Interactions:				
G1: C x Cs	73.85±0.40^{a}	22.61±0.37	3.70±0.34	3.28±0.92^{a}
G2:CxI	73.13±0.27^{ab}	22.58±0.44	4.28±0.60	1.98±0.41^{ab}
G3:CxB	73.29±0.28^{ab}	22.40±0.58	3.77±0.38	2.07±0.20^{ab}
G4:FxCs	71.01±1.56^{b}	24.19±0.92	4.76±0.73	1.90±0.13^{ab}
G5: F x I	73.73±0.79^{a}	22.30±0.54	4.84±1.07	1.85±0.28^{ab}
G6: F x B	74.10±0.15^{a}	22.30±0.38	4.34±0.36	1.70±0.24^{b}

$^{a-b-c}$ Means in the same rows with different superscript are significantly different (P≤0.05)

Table 11. Effect of light type and program on mortality rate of Fayoumi chickens at 23 wks of age.

Age Treatment	Mortality (%)
Light Type:	
Common (C)	2.87±1.26
Flash (F)	6.52±1.53
Light Program:	
Continues (Cs)	3.06±1.39
Intermittent (I)	4.50±1.77
Biomittent (B)	6.52±2.26
Interactions:	
G1: C x Cs	1.67±1.67
G2: CxI	3.42±1.71
G3: CxB	3.51±3.51
G4: FxCs	4.44±2.22
G5: F x I	5.59±3.41
G6: F x B	9.53±2.07

تأثير بعض المامالات الضوئية (البرنامج والنوع) على الاداء الانتاجى وبعض مكونات اللحم للدجاج الفيومى ١- أثناء فترة النمو

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أجريت هذه الدراسه بهدف دراسة تأثير بعض المعاملات الضوئية (البرنامج والنوع) على االاداء الانتاجى وبعض مكونات اللحم لكتاكيت الدجاج الفيومى خلال فصل الصيف فى ظل الظروف المناخية الحارة فى صعيد مصر ، تم استخدام عدد ٣٦٠ كتكوت فيومى اعمار من عمر ١٥ اسوع حتى عمر ٢٣ اسبوع (قبل انتاج البيض) وتم اختيارهم و تقسيمهم عشوائيا الى ست مجاميع (معاملات) كل مجموعة قسمت الى ثلاث مكررات كل مكرر مكون من عدد ٢٠ كتكوت و كانت المجاميع كالاتى:-

١- المجموعة الاولى (كنترول) تم تعريضها لعدد ساعات اضاءة مستمرة البرنامج الشائع (١٢ ساعة اضاءة + ١٢ ساعة اظلام) وكانت شدة الاضاءة ١٠ لوكس .

٢- المجموعة الثانية (المعاملة الاولى) تم تعريض الكتاكيت لبرنامج اضاءة متقطع (٦ ساعات اضاءة + ٦ ساعات اظلام) لمدة ١٢ ساعة وتم تكرار ذلك على ١٢ ساعة الاخرى من اليوم .

٣- المجموعة الثالثة (المعاملة الثانية) تم تعريض الكتاكيت لبرنامج الضوء المتقطع (٣٠ دقيقة ضوء + ٣٠ دقيقة اظلام) من كل ساعة وتم اجراء ذلك خلال ٢٤ ساعة اليوم الكامل .

٤- المجموعة الرابعة (المعاملة الثالثة) تم تعريض الكتاكيت لبرنامج ضوء فلاش مستمر (١٢ ساعة اضاءة + ١٢ ساعة اظلام)

٥- المجموعة الخامسة (المعاملة الرابعة) تم تعريض الكتاكيت لبرنامج ضوء فلاش متقطع (٦ ساعات اضاءة + ٦ ساعات اظلام) لمدة ١٢ ساعة وتم تكرار ذلك على ١٢ ساعة الاخرى من اليوم .

٦- المجموعة السادسة (المعاملة الخامسة) تم تعريض الكتاكيت لبرنامج ضوء فلاش متقطع (٣٠ دقيقة ضوء + ٣٠ دقيقة اظلام) من كل ساعة وتم اجراء ذلك خلال ٢٤ ساعة اليوم الكامل .

تم تربية الكتاكيت خلال فترة التجربة تحت نفس ظروف الرعاية والتربية ونفس التغذية ، وخلال فترة التجربة تم أخذ نسبة النفوق ووزن الجسم وحساب وزن الجسم المكتسب و العلف المستهلك وحساب معامل التحويل الغذائى وفى نهاية فترة التجربة تم ذبح ٥ كتاكيت من كل معاملة واخذ مواصفات الذبيحة الداخلية والخارجية وتم اخذ عينات من اللحم وتحليل مواصفات اللحم .

وأوضحت أهم النتائج المتحصل عليها :ان المجاميع التى اخذت الكتاكيت فيها الاضاءة الفلاش سواء اضاءة مستمرة او متقطعة ادت الى ارتفاع معنوى فى وزن الجسم ووزن الجسم المكتسب و العلف المستهلك مقارنة بمجموعة الكنترول والمجاميع الاخرى ، بينما لم يكن هناك فروق معنوية بين المجاميع فى معامل التحويل الغذائى وحدث تحسن فى صفات وخصائص الذبيحة فى المجاميع التى أخذت برامج الاضاءة الفلاش بالمقارنة بالمجموعة الكنترول وباقى المجاميع التى اخذت برامج الاضاءة الشائعة غير الفلاش . وأدى استخدام برنامج الاضاءة الفلاش الى زيادة نسبة الرطوبة وانخفاض نسبة الدهون فى اللحم .

ويمكن التوصية بتطبيق نظام الاضاءة الفلاش حيث ادى الى تحسين جميع القياسات الانتاجية ومكونات اللحم المدروسة دون اى اثار جانبية على كتاكيت دجاج الفيومى أثناء فترة النمو.