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EFFECT OF SOME ENVIRONMENTAL FACTORS ON SOME CHEMICAL BLOOD TRAITS IN TWO LOCAL STRAINS OF CHICKENS

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ABSTRACT: *The present study was carried out at the Poultry Research Farm, Department of Poultry Production, Faculty of Agriculture Minufiya University at Shibin El-Kom, This experiment was designed to study the effect of different light colors (Incandescent, Fluorescent and Infrared light) and vitamin E supplementation on some blood characteristics.*

The first group was exposed to incandescent light (control), the second was exposed to fluorescent light, and the third one was exposed to infrared light. All birds under light treatments were exposed to lighting period for 14 hours / day. Each group was divided into two subgroups, the first: vitamin E 1ml (20.000IU) added to one liter of their drinking water for 5 day/wk, whereas the second one consumes drink water without vitamin E. The numbers of treatments were 12 (6 treatments for each strain).

The obtained results were summarized as follows:-

Results indicated that fluorescent light without vitamin E recorded the best blood characters of males meanwhile, in female birds provided under infrared light with vitamin E had the highest of most blood traits in Sinai strain. However, without vitamin E supplementation, males under infrared light were better blood characters in Norfa strain. While, birds recorded fluorescent light with vitamin E the best in female.

There were no significant difference among light colors blood cells, GPT, GOT and platelets. While, the difference between light colors on white blood cells was highly significant (P<0.01).The interaction between (color × strain), (treatment × strain), (color × treatment × sex × strain) and (color × treatment × strain) in hemoglobin (Hb), red blood cells (RBCs), hematocrit value (HCT), white blood cells (WBCs) and platelets value (PLT) were not significant. While, All interaction effects such as (treatment × sex × strain),(sex × strain) and (color × sex) in Hb were highly significant (P< 0.01).

The correlation coefficient between blood characteristics under the effect of light color , vitamin E, strain and sex were mostly positive and no significant or high significant. But, only few traits had negative correlation coefficient between each other.

Key words: *light colors, vitamin E, blood traits, local stains, chickens.*

INTRODUCTION

Light is an important aspect of an environment. Avian species as well as mammalian species respond to light energy in a variety of ways, including growth and reproductive performance. The colour of light can have many different effects on behaviour growth and production in poultry. Birds sense light through their eyes (retinal photoreceptors) and through photosensitive cells in the brain (extra – retinal photoreceptors). Science long wavelength of light (towards red end of the spectrum) penetrate the skin and skull more efficiently than short wavelengths, it has been observed that growth and behaviour are linked to retinal photoreception (and shorter wavelengths) whereas the reproduction has been linked to extra-retinal photoreceptors. Birds have pigmented sensitivities of 415 nm, violet; 460 nm, blue; 510 nm, green, and 560 nm, yellow for young birds with: a peak at 580 nm, orange for adults, by Andrews *et al.,*(1990), Scheideler (1990) and Widowski *et al.,* (1992). Scott and Siopes (1994) found that light color (blue, green, red or incandescent) equalized at a photon output of 9.0 µm/sec/m2 had no effect on the total number of erythrocytes, leukocytes or plasma corticosterone levels, cutaneous basophil hypersensitivity, anti-SRBC titers, number of heterophils an

heterophil/lymphocyte ratios. The oxidised α-tocopheroxyl radicals produced in this process may be recycled back to the active reduced form through reduction by other antioxidants, such as ascorbate, retinol or ubiquinol. However, the importance of the antioxidant properties of this molecule at the concentrations present in the body are not clear and it is possible that the reason why vitamin E is required in the diet is unrelated to its ability to act as an antioxidant. Other forms of vitamin E have their own unique properties. For example, γ-tocopherol (also written as gamma-tocopherol) is a nucleophile that can react with electrophilic mutagens. Herrera (2001), Packer, Lester (2001) and Gladine *et al.*, (2007) confirmed in rats the ability of plant-rich polyphenols, including grape extract, to exhibit a significant antioxidative protective effect in plasma and liver.

MATERIALS AND METHODS

The present work was conducted at the Poultry Research Farm, Department of Poultry Production, Faculty of Agriculture, Minufiya University, Shibin El-Kom to study the effect of different light colors on some physiological parameters in Sinai and Norfa strains.

Two hundred and forty females and males Norfa and Sinai strains aged 16 weeks (72 males and 168 females), were selected randomly. All experimental birds were kept and managed under the same conditions. Conventional diet and fresh clean water were available at all the experimental period. Routine veterinary care was conducted.

At 16 weeks of age, birds of each strain were divided into three comparable groups of 20 birds each (14 females and 6 males). The first group was exposed to incandescent light (control), the second one was exposed to fluorescent light, and the third one was exposed to infrared light. All birds under light treatments were exposed to the light regimes for 14 hours / day. Each group was divided into two subgroups, the first: vitamin E 1ml/L (20.000IU) added to one liter drink water for 5 day/wk, whereas the second one consume drink water without vitamin E. The number of experimental groups treatments were 12 (6 treatments for each strain). The treatments continued till the 44 weeks of age.

The birds were reared on the floor and supplied with incandescent, fluorescent, or infrared light colors under normal ambient temperature. Birds were kept in brooder pens, its area was 2X2 m^2 provided with a lamp hanged at middle of the pen. The height of all lamps was 1.5m from the floor for all treatments. Pens were light-proof by covering the windows with black sheets to prevent day light.

Blood plasma constituents:

Blood samples were collected into heparinized test tubes, by bleeding the slaughtered birds (4 birds) from each experimental group after sexual maturity at 45 weeks of age. Plasma was separated by centrifugation at 3000 rpm for 20 minutes and stored frozen at (-20°C) until analysis. Concentration of complete blood picture the numbers of red blood cells (RBCs) Erythrocytes counts (RBCs) were done using Thoma haemocytometer in red blood diluting pipette (Coffin , 1955 and Schalm , 1965), white blood cells (WBCs) Serum sample from each chicken was collected and immediately examined for total leukocytes counts (WBCs) by using white blood pipette (Coffin, 1955 and Schalm , 1965) which monitored to count by using photomicroscope provide with a monitor screen and a counter, hemoglobin was determined by kits strored at 20-25^{0}C according to the methods of Wintrobe, (1965), hematocrit value was determined before and after separation and expressed as a percentage of packed cell volume (PCV %) according to Hunsaker (1969). and platelets value were determined. Also, the concentrations of glutamic oxaloacetic transaminase (GOT) was determined by IFCC mod. (International Federation of Clinical Chemistry) according to the methods of Thefeled, W. (1974), and glutamic pyruvic transaminase (GPT) was determined by IFCC mod. (International Federation of Clinical Chemistry) according to the methods of Schumann, G. and Lauke

(2003). Data obtained were statistically analyzed using (SPSS, 2004 for windows). Dancan's multiple range was used for the multiple comparisons of means (Duncan, 1955).

RESULTS AND DISCUSSION

Blood characteristics: The effect of different light colors and using vitamin E on blood characteristics i.e. hemoglobin, red blood cells, hematocrit value , white blood cells, platelets value , GOT , GPT in Sinai and Norfa strain were illustrated in Tables (1, 2, 3, 4 and 5).

• Hemoglobin (Hb)

- Effect of light color treatment.

Data in Table (1) showed that birds from both strains under infrared light (IR) had higher hemoglobin values than those under incandescent (INC) and fluorescent light (FL), the results were 14.3 and 13.8 g/100ml in Sinai and Norfa.

However, differences between light colors effects on Hemoglobin were not significant.

- Effect of vitamin supplementation.

The results in (Table 2) indicated that birds without vitamin E supplementation had highest hemoglobin values in Sinai, the result was 14.1. But in Norfa strain, birds provided with vitamin E had the highest value 13.3 g/100ml. This trend was in agreement with Shlig, (2009).

- Effect of the interaction between light color and vitamin E supplements.

- In Sinai strain

Data in (Table 3) indicated that, female birds provided with (FL) light had the highest hemoglobin value under vitamin E supplementation, it was 11.6 g/100ml. Also the highest value in males with vitamin E supplementation was 17.3 g/100ml under the same light color. This trend was in agreement with Hanafy *et al.,* (2009) on Bandarah local strain.

Without vitamin E supplementation, female birds under (INC) light showed higher hemoglobin value than those under (FL) and (IR) light, the values were 15.4, 13.8 and 13.8 g/١٠٠ml, respectively. But in males, birds under (IR) light had highest hemoglobin value then those under (INC) and (FL) light. These values were 17.4, 14.3 and 10.2 g/100ml, respectively.

- In Norfa strain

As obtained in Table (3) birds from both sexes under (IR) light had highest hemoglobin value than those under (INC) and (FL) light, the results were 11.8 and 17.4 g/١٠٠ml in females and males. This finding agrees with the result on Yakimenko *et al.,* (2002).

Without vitamin E supplementation, data showed that female birds under (INC) light were higher than those under (FL) and (IR) light , the results were 10.8, 10.7and 8.6 g/١٠٠ml, respectively. But in males, birds under (IR) light had higher hemoglobin value then those under (FL) and (INC) light; these values were 17.3, 15.7 and 14.2 g/100ml, respectively. These finding agree with Hanafy *et al.;* (2009) on Bandarah local strain.

The overall means of males were 14.8 g/100ml in Sinai strain and 16.4 g/100ml in Norfa strain at the same age. The corresponding values for females in Sinai strain was 12.7 g/100ml and 9.8 g/100ml in Norfa strain. This trend was in agreement Enaiat *et al.,* (2009) on Matrouh (MAT) strain.

• Red Blood cells (RBCs)

- Effect of light color treatment.

Data in Table (1) birds from both strains under (IR) light had higher red blood cells than those under (INC) and (FL) light, the values were 3.1 and 3.0 (10^6/ml) in Sinai and Norfa.

However, differences between light colors effects on red blood cells were not significant.

- Effect of vitamin supplementation.

The results in (Table 2) indicated that birds provided the same value with or without vitamin E supplementation had

highest Red blood cells in Sinai strain (3.1) $\times 10^6$/ml. However, in Norfa strain birds without vitamin E supplementations had highest red blood cells (0.3) $\times 10^6$/ml. This trend was in agreement with Leshchinsky and Klasing (2001) and Konjufca *et al.,* (2004) on broiler chickens. Dietary vitamin E could increase the number of macrophages and the phagocytic ability of macrophages for opsonized and unopsonized SRBC (Niu *et al.,* 2009).

Table (1): Blood characteristics traits ($\bar{X} + S.E$) in Sinai and Norfa strains under different light color treatments.

Blood Characteristics								
Breed	Light color	Hb (g/100ml)	RBCs (10^6/m l)	HCT (%)	WBCs (10^3/ml)	PLT (10^3/mm^3)	GOT (U/L)	GPT (U/L)
Sinai	Incandescent light	13.6±0.57	3.0±0.11	3.7±0.14	36.8±1.47[a]	17.8±2.35	17.8±0.95	22.3±1.29
	Fluorescent light	13.2±0.57	2.9±0.11	4.0±0.14	33.0±1.47[a]	20.0±2.35	16.9±0.95	15.3±1.29
	Infrared light	14.3±0.57	3.1±0.11	3.9±0.14	29.8±1.47[b]	15.6±2.35	20.8±0.95	16.9±1.29
Norfa	Incandescent light	12.5±0.57	3.0±0.11	3.9±0.14	36.8±1.47[a]	23.3±2.35[b]	18.7±0.95	20.7±1.29
	Fluorescent light	13.0±0.57	2.9±0.11	4.0±0.14	36.9±1.47[a]	23.9±2.35[b]	19.4±0.95	24.8±1.29
	Infraed light	13.8±٠.57	3.0±0.11	3.6±1.14	30.0±1.47[b]	27.0±2.35[a]	19.4±0.95	20.7±1.29

a,b,c Means within the same column and the same treatment factores carry different small superscripts are significant at level $P \leq 0.05$,

Table (2): Blood characteristics traits ($\bar{X} + S.E$) in Sinai and Norfa strains under different vitamin E supplements.

Blood Characteristics								
Breed	treatments	Hb (g/100ml)	RBCs (10^6/m l)	HCT (%)	WBCs (10^3/ml)	PLT (10^3/mm^3)	GOT (U/L)	GPT (U/L)
Sinai	Vitamin E	13.2±0.46	2.9±0.09	3.8±0.12	33.4±1.20	19.5±1.92	17.5±0.78	19.0±1.05
	Without vitamin	14.1±0.46	3.1±0.09	3.9±0.12	33.0±1.20	16.1±1.92	19.5±0.78	17.3±1.05
Norfa	Vitamin E	13.3±0.46	3.0±0.09	4.1±0.12	33.3±1.20	24.9±1.92	17.6±0.78	22.0±1.05
	Without vitamin	12.9±0.46	3.0±0.09	3.6±0.12	35.8±1.20	24.6±1.92	20.7±0.78	22.1±1.05

Table 3

Table 3 2

Table (4): Correlations between blood traits in Sinai strain.

	Hb (g/100ml)	RBCs (10^6/m l)	HCT (%)	WBCs(10^3/ml)	PLT(10^3/mm^3)	GOT(U/L)
RBCs (10^6/m l)	0.49*					
HCT (%)	0.85**	0.69**				
WBCs (10^3/ml)	0.34	0.37	0.36			
PLT(10^3/mm^3)	0.35	0.47*	0.53**	0.58**		
GOT (U/L)	0.21	-0.16	-0.02	-0.29	-0.18	
GPT (U/L)	0.16	0.22	0.08	0.52**	0.25	0.08

(**), Significant at level P≤ 0.01, (*), significant at level P≤ 0.05

Table (5): Correlations between blood traits in Norfa strain.

	Hb (g/100ml)	RBCs (10^6/m l)	HCT (%)	WBCs (10^3/ml)	PLT(10^3/mm^3)	GOT (U/L)
RBCs (10^6/m l)	0.84**					
HCT (%)	0.73**	0.54**				
WBCs (10^3/ml)	0.42*	0.59**	0.35			
PLT(10^3/mm^3)	0.54**	0.40	0.44*	0.25		
GOT (U/L)	-0.01	0.29	-0.29	0.44*	0.08	
GPT (U/L)	-0.53**	-0.42*	-0.35	-0.11	-0.21	0.11

(**), Significant at level P≤ 0.01, (*), significant at level P≤ 0.05

- **Effect of the interaction between light color and vitamin E supplements on counts of RBCs.**

- **In Sinai strain**

Data in (Table 3) indicated that, female birds provided with (IR) light had the highest red blood cells, with vitamin E supplementation. The value was 2.7 (10^6/ml) in females. But, in males value was 3.4(10^6/ml), respect. This trend was in agreement with Hanafy *et al.,* (2009) on Bandarah local strain. While, this trend was in disagreement with Shlig, (2009).

Without vitamin E supplementation, female and male birds under (IR) light showed higher value of red blood cells than those under (INC) and (FL) lights. But in males, birds under (FL) light had the highest red blood cells (3.4) ×10^6/ml.

- **In Norfa strain**

Data obtained in Table (3) illustrated that female and male birds provided with (INC) light had the highest red blood cells 2.7×10^6/ml and 3. 5×10 ^{6}/ml, respectively.

Without vitamin E supplementation, female birds under (FL) light were higher than those under (INC) and (IR) lights, the results were 2.7, 2.6and 2.1 ×10^6/ml, respectively. But in males, birds under (IR) light had higher red blood cells then those under (FL) and (INC) light, these values were 4.1, 3.2 and 3.1×10^6/ml, respectively. These finding agree with Ghany *et al., (1961)* reported that the number of erythrocytes in blood of immature Fayoumi and Rhods Island Red female were 3.294 and 3.370 x 10^6/mm^3, respectively. While, it reached to 2.92 and 2.85 x 10^6/mm^3 in mature female Fayoumi and Rhode Island Red, respectively.

In both strains, sex difference was highly significant (P<0.01).

The overall means of males were 3.3×10^6/ml in Sinai strain and 3.4×10^6/ml in

Norfa strain at the same age. The corresponding values for females in Sinai strain were 2.8 $\times 10^6$/ml and 2.5×10^6/ml in Norfa strain. This trend was in agreement with Gebriel *et al.,* (2010) found that the counts of white blood cells ranged from 21.34 to 39.13X 10^3 /mm^3 with total average of 29.89 X 10^3 /mm^3 and red blood cells ranged from 1.12 to 4.81X 10^6 /mm^3 with total average of 3.18 X 10^6 /mm^3 in Norfa chickens. Also, Heaba (2010) found that males had significantly higher counts of RBCs, and WBCs than females.

• Hematocrit Value (HCT)

- Effect of light color treatment.

Data in Table (1) showed that birds exposed to (FL) light had the highest hematocrit value in Sinai and Norfa strains , the results were 4.0 % and 4.0%, respectively.

On the other hand, the differences between light colors effects on hematocrit value were highly significant.

- Effect of vitamin supplementation.

Data presented in Table (2) proved that the hematocrit value in birds which treated without vitamin E supplementation were the highest in Sinai strain was 3.9%. While, the highest average of hematocrit value was in Norfa strain with vitamin E (4.1 %). This trend was in agreement with Lorenzoni and Ruiz-Feria (2006) in broiler chickens.

- Effect of the interaction between light color and vitamin E supplements on hematocrit value.

- In Sinai strain

Data in (Table 3) indicated that, female birds provided with (IR) light had the highest hematocrit value, under vitamin E supplementation. This value was 3.3%. But, the highest value in males with vitamin E supplementation was 4.9% under (FL) light.

Without vitamin E supplementation, female birds under (FL) light had higher hematocrit value than those under (IR) and (INC) lights, the values were 4.2, 3.8 and 3.7 %, respectively. But in males, birds under (IR) light had higher hematocrit value then those under (INC) and (FL) lights, these values were 4.2, 4.0 and 3.5 %, respectively.

- In Norfa strain

Data obtained in table (3) showed that female birds under (IR) light were higher than those under (INC) and (FL) lights, the results were 3.5, 3.4 and 3.2 %, respectively. But in males, birds under (FL) light had higher hematocrit value then those under (INC) light and finally birds under (IR) light, these values were 4.9, 4.8 and 4.7%, respectively.

Without vitamin E supplementation, birds provided with (FL) light had the highest hematocrit value 4.5 %(in males) and 3.5% in females.

The overall means of males were 4.2% in Sinai strain and 4.4% in Norfa strain at the same age. The corresponding values for females in Sinai strain were 3.6% and 3.3% in Norfa strain.

• White Blood Cells (WBCs)

- Effect of light color treatment.

Data in Table (1) showed that Sinai birds under (INC) light had the highest white blood cells value 36.8×10^3/ml. But in Norfa strain, birds under (FL) light had the highest value 36.9×10^3/ml.

Also (Table 1) illustrated that the differences between light colors effects on white blood cells were significant.

- Effect of vitamin supplementation.

Data presented in Table (2) proved that the white blood cells in birds which treated with vitamin E were the highest in Sinai strain was 33.4 x 10^3/ml. While, the highest average of white blood cells was in Norfa strain for birds without vitamin E supplementation (35.8 x 10^3/ml).

- Effect of the interaction between light color and vitamin E supplements.

- In Sinai strain

Data in (Table 3) indicated that, female birds provided with (FL) light had the highest white blood cells, with vitamin E

supplementation. Where, the result was 34.5 (10^3/ml). But, the highest value in males with vitamin E supplementation was 43.5 (10^3/ml) under (INC) light. This trend was in agreement with Shlig (2009).

Without vitamin E supplementation, female birds under (INC) light had the highest white blood cells value than those under (FL) and (IR) lights, the results were 32.6, 30.5 and 27.5 x 10^3/ml, respectively. But in males, birds under (INC) light had higher white blood cells then those under (IR) and (FL) lights, these values were 38.5, 37.8 and 31.2 x 10^3/ml, respectively. This trend was in agreement with Ghany *et al., (1961)*, they reported that the average numbers of WBCs in Fayoumi and Rhode Island Red pullets were 67.0 x $l0^3$/$mm^3$and 73.0 x $l0^3$/mm^3 blood, respectively.

- **In Norfa strain**

As obtained in Table (3) female birds under (INC) light had the highest value 34.4×10^3/ml. But in males, birds under (FL) light had the highest value 45.2×10^3/ml.

Without vitamin E supplementation, female birds under (INC) light were higher than those under (FL) and (IR) light, the results were 34.4, 31.4 and 25.5 (10^3/ml), respectively. But in males, birds under (FL) light had higher white blood cells then those under (IR) light and latterly birds under (INC) light, these values were 45.2, 40.0 and 38.4×10^3/ml, respectively.

In both strains, the overall means of males were 36.0×10^3/ml in Sinai strain and 38.1×10^3/ml in Norfa strain at the same age. The corresponding values for females in Sinai strain were 30.4×10^3/ml and 31.1×10^3/ml in Norfa strain. This trend was in agreement with Heaba (2010) in Norfa strain.

• Platelets (PLT)

- **Effect of light color treatment.**

Data in Table (1) Sinai and Norfa birds under (FL) light had the highest platelets value 20.0 ×10^3/mm^3 and 23.9×10^3/mm^3, respectively.

However, differences between light colors effects on Platelets were not significant.

- **Effect of vitamin supplementation.**

Data in Table (2) provided that the platelets in birds which treated with vitamin E were the highest in Sinai strain (19.5×10^3/mm^3). Also, the highest average of platelets in Norfa strain with vitamin E was (24.9×10^3/mm^3).

- **Effect of the interaction between light color and vitamin E supplements.**

- **In Sinai strain**

Data in (Table 3) indicated that female birds, which were exposed to (INC) light with vitamin E supplementation had higher platelets than those under (FL) light, then birds with (IR) light, these values were 16.3×10^3/mm^3 in females. But, male birds under (FL) light had the highest PLT. The value was 33.6×10^3/mm^3.

Without vitamin E supplementation, female and males birds under (IR) light had higher platelets than those under (INC) and (FL) lights, the results were 14.4 and 20.7×10^3/mm^3 in female and male, respectively.

- **In Norfa strain**

As obtained in table (3) female birds, which were exposed to (IR) light with vitamin E supplementation had higher platelets than that under (INC) and (FL) light, these values were (24.8, 20.2 and 13.3×10^3/mm^3, respectively.

Continues, male birds with vitamin E supplementation showed another trend, where males under (INC) light were higher than males under (FL) and (IR) light. The values were 31.9, 31.7 and 27.4×10^3/mm^3, respectively.

Without vitamin E supplementation, female birds under (IR) light had the highest value (25.5×10^3/mm^3). Also in males, birds under (IR) light had the highest (30.6×10^3/mm^3).

In both strains, sex difference was highly significant (P<0.01). The overall means of males were 22.4 $\times 10^3/mm^3$ in Sinai strain and $30.2\times10^3/mm^3$ in Norfa strain at the same age. The corresponding values for females in Sinai strain was $13.3\times10^3/mm^3$ and $19.4\times10^3/mm^3$ in Norfa strain.

- **Glutamic oxaloacetic transaminase (GOT)**

- Effect of light color treatment.

Birds provided with (IR) light in Sinai strain had the highest GOT than those under (INC) and (FL) light, the values were 20.8, 17.8 and 16.9 U/L, respectively (Table 1). Also, Norfa strain provided with (IR) and (FL) light had the highest GOT than those under (INC) light, the results were 19.4, 19.4 and 18.7 U/L, respectively (Table 1).

However, differences between light colors effects on GOT were not significant. This trend was in agreement with Saad (1995). Also, Pescatore *et al.,* (1990) found that the numerical variations in plasma (GOT) and (GPT) were not significant and could be interpreted due to sex and light.

- Effect of vitamin supplementation.

The results in (Table 2) indicated that birds without vitamin E supplementation had highest GOT values, the results were 19.5 U/L and 20.7 U/L in Sinai and Norfa strain.

However, differences between treatment effects on GOT were highly significant. This trend was in agreement with Young *et al.,* (2003). But this trend was in disagreement with Sahn *et al.,* (2002)

- Effect of the interaction between light color and vitamin E supplements.

- In Sinai strain

Data in (Table 3) indicated that female and male birds, which were exposed to (IR) light with vitamin E supplementation had higher GOT than those under (FL) light, then birds with (INC) light, these values were 20.3 U/L in females and 21.5U/L in males. This trend was disagreement with those found by Sahn *et al.,* (2002) in broilers and Abd El-Latif *et al.,* (2004).

Without vitamin E supplementation, female birds under (INC) light had GOT higher than those under (FL) and (IR) lights, the results were 19.6, 18.3 and 16.8 U/L, respectively. But in males, birds under (IR) light had higher GOT then those under (INC) and (FL) lights, these values 24.7, 22.8 and 15.0 U/L, respectively.

- In Norfa strain

Female birds, which were exposed to (FL) light with vitamin E supplementation, had higher GOT than those under (INC) light and (IR) light, these values were 19.9, 18.6 and 18.0 U/L, respectively (Table 3).

Continues, male birds with vitamin E supplementation showed another trend, where males under (INC) light were higher than males under (FL) and (IR) light. The values were 17.7, 16.5 and 14.8 U/L, respectively.

Without vitamin E supplementation, female birds under (IR) light showed higher GOT than those under (FL) and (INC) light, the results were 19.4, 19.2 and 18.3 U/L, respectively. Also in males, birds under (IR) light had higher GOT then those under (FL) and (INC) lights, these values were 25.5, 22.0 and 20.1 U/L, respectively. This trend was disagreement with the result obtained by Abd El-Latif *et al.;* (2004).

In both strains, sex difference was not significant. The overall means of males were 18.8 U/L in Sinai strain and 19.4 U/L in Norfa strain at the same age. The corresponding values for females in Sinai strain was 18.2 U/L and 18.9 U/L in Norfa strain.

- **Glutamic pyruvic transaminase (GPT)**

- Effect of light color treatment.

Data in Table (1) showed that Sinai birds under (INC) light had the highest GPT value 22.3 U/L. But in Norfa strain, birds under (FL) light had the highest GPT value 24.8 U/L.

However, differences between light colors effects on GPT were not significant.

- **Effect of vitamin supplementation.**

The results in (Table 2) indicated that birds provided with vitamin E supplementation had the highest GPT value, the result was 19.0 U/L in Sinai. But, birds provided without vitamin E the highest value was (22.1 U/L) Norfa strain. This trend was in agreement with Young *et al .,* (2003) and Abd El-Latif *et al.,* (2004) who found that these additives may be due to that both vitamin E and selenium involved in the formation GPT , a compound vital in the cellular detoxification mechanism.

- **Effect of the interaction between light color and vitamin E supplements.**

- In Sinai strain

Data in (Table 3) indicated that, female birds provided with (IR) light had the highest GPT, under vitamin E supplementation, it was 18.1 U/L. But, the highest value in males with vitamin E supplementation was 30.1 U/L under (INC) light. This trend was in dis agreement with Sahn *et al.,* (2002).

Without vitamin E supplementation, birds provided with (INC) light had the highest GPT 24.2 U/L (in males) and 18.7 U/L in females (Table 3).

- **In Norfa strain**

As obtained in Table (3) female and male birds, which were exposed to (FL) light with vitamin E supplementation had higher GPT than those under (IR) and (INC) light, these values were 29.2 U/L in females and 20.2 U/L in males.

Without vitamin E supplementation, female birds under (FL) light were higher than those under (IR) and (INC) light, the results were 31.7, 20.6 and 17.7 U/L, respectively. But in males, birds under (INC) light had higher GPT then those under (FL) light and finally birds under (IR) light, these values were 25.3, 19.3 and 18.3 U/L, respectively.

Interaction effects between (strain*sex* color* treatment) were significant on GPT values Table (3).

In both strains, the overall means of males were 20.0 U/L in Sinai strain and 19.6 U/L in Norfa strain at the same age. The corresponding values for females in Sinai strain were 16.2 U/L and 224.6 U/L in Norfa strain. This trend was disagreement with Heaba (2010) in Norfa strain.

Correlations:-

Table (4) and (5) illustrated that Hemoglobin was correlated positively and significantly with RBCs r= 0.84 and HCT r= 0.73 in Norfa strain (Table 5). Similar trend was reported in Sinai strain (Table 4) where r= 0.49 between Hb and RBCs. On the other side, some negative and not significant correlation coefficients were observed between hemoglobin and GOT r=-0.01 in Norfa strain (Table 5).

Positive and not significant correlation coefficients was noticed between hemoglobin and each of WBCs, GOT and GPT which ranged from r=0.16 to r=0.35 in Sinai strain (Table 4). Similar trend was reported in Norfa strain (Table 5) where r= 0.06 between hemoglobin and GOT. While, it was negative and significant correlation coefficient was found between hemoglobin and GPT where r=0.53 in Norfa strain (Table 5).

Red Blood Cells were correlated positively and significantly with HCT r= 0.54 in Norfa strain (Table 5). Similar trend was reported in Sinai strain (Table 5) where r= 0.69 between RBCs and HCT. On the other side, some Positive and not significant correlation coefficients between Red Blood Cells and PLT was found r=0.40 and between Red Blood Cells and GOT in Norfa strain r=0.29 (Table 5). Similar trend was reported in Sinai strain (Table 4) where r= 0.37 between RBCs and WBCs.

Negative and significant correlation coefficients was noticed between Red Blood Cells and GPT(r=-0.42) in Norfa strain (Table 5).

Hematocrit value was correlated positively and insignificantly with WBCs (r= 0.36 and GPT r= 0. 08) in Sinai strain (Table 4). On the other side, some positively and significantly correlation coefficients was

noticed between HCT and PLT r=-0.53 in Sinai strain (Table 4).

Negative and not significant correlation coefficients was noticed between HCT and each of GOT and GPT which ranged from r=-0.29 and r=-0.35 in Norfa strain (Table 5). Similar trend was reported in Sinai strain (Table 4) where r=- 0.02 between HCT and GOT.

White Blood Cells was correlated positively and insignificantly and each of GPT where r=0.25 in Norfa strain (Table 5). While, it was positively and significantly correlation coefficient was found between WBCs and GPT where r=0.52 in Sinai strain (Table 4).

Platelets was correlated positively and insignificantly with GOT (r=0.08) in Norfa strain (Table 5).While, it was negative and not significant correlation coefficient was found between PLT and GOT where r=-0.18 in Sinai strain (Table 4).

Glutamic oxaloacetic transaminase was correlated positively and insignificantly with GPT r= 0.11 in Norfa strain (Table 5). Similar trend was reported in Sinai strain (Table 4) where r= 0.08 between GOT and GPT.

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تأثير بعض العوامل البيئية على بعض صفات الدم في سلالتين محليتين من الدجاج

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الملخص العربي

أجريت هذه الدراسة بمزرعة بحوث الدواجن، قسم إنتاج الدواجن ، كلية الزراعة بشبين الكوم، جامعة المنوفية. وأجريت التجربة بهدف دراسة تأثير ألوان الاضاءة المختلفة الضوء الأبيض (الفلورسنت) و الضوء الأصفر والأشعة تحت حمراء وتأثير اضافة فيتامين هـ علي بعض صفات الدم في سلالتي نورفا وسيناء. حيث قسمت الطيور الي ستة مجموعات و كل سلالة تحتوي علي ثلاثة مجموعات كالآتي:

في المجموعة الاولي : عرضت الطيور للون الأبيض (الفلورسنت) ,في المجموعة الثانية : عرضت الطيور للأشعة التحت الحمراء, في المجموعة الثالثة : عرضت الطيور للضوء الأصفر.

حيث تم وضع في كل مجموعة عدد ٢٠طائر وتقسم كل مجموعة الي تحت مجموعتين حيث عوملت الاولي بفيتامين هـ بتركيز (٢٠ ألف وحدة دولية) بمعدل ١ مل / لتر ماء لمدة ٥ أيام في الاسبوع والتحت مجموعة الاخري غير معاملة بالفيتامين وذلك تحت ظروف الاضاءة المختلفة أي استخدمت ٦ معاملات في كل سلالة أي (١٢ معاملة) في كلا السلالتين.

تم تلخيص النتائج المتحصل عليها كما يلي:-

أظهرت النتائج في سلالة سيناء أن الضوء الأبيض بدون إضافة فيتامين هـ أدي الي أعلي قيم لصفات الدم في الذكور ، بينما في الإناث التي عرضت للأشعة تحت حمراء مع فيتامين هـ كانت أعلي قيم في صفات الدمز

أما في سلالة نورفا فقد لوحظ أن الذكور التي عرضت للأشعة تحت حمراء بدون إضافة فيتامين هـ كانت أعلي قيم في صفات الدم ، بينما سجلت الإناث التي عرضت للضوء الأبيض مع إضافة فيتامين هـ أعللي القيم لصفات الدم.

لم يكن هناك فروق معنوية بين كل من : الوان الضوء ، خلايا الدم ، أنزيمات الكبد (GOT, GPT) و الصفائح الدموية ، بينما كانت الفروق عالية المعنوية بين كل من الوان الضوء وخلايا الدم البيضاء.

كان التداخل غير معنوي بين (الوان الضوء × السلالة) ، (المعاملات × السلالة) ، (الوان الضوء × المعاملات × الجنس × السلالة) و (الوان الضوء × المعاملات × السلالة) في الهيموجلوبين ، الهيماتوكريت ، خلايا الدم البيضاء و الصفائح الدموية.

بينما التداخل معنوي جدا بين تأثير كل من (المعاملات × الجنس × السلالة) ، (الجنس × السلالة) و (الوان الضوء × الجنس) في الهيموجلوبين.

كان معامل الأرتباط غالبا موجب وغير معنوي أو عالي المعنوية بين صفات الدم تحت تأثير كلا من لون الضوء و فيتامين هـ و السلالة و الجنس.

Table (3): Blood characteristics traits ($\bar{X} + S.E$) in Sinai and Norfa strains under different treatments (light color and vitamin E supplements).

strain	treatment	sex	Light color	Blood Characteristics						
				Hb (g/100ml)	RBCs (10^6/ml)	HCT (%)	WBCs (10^3/ml)	PLT (10^3/mm^3)	GOT (U/L)	GPT (U/L)
Sinai	Vitamin E	Female	Incandescent light	10.5±1.14	2.7±.23	3.2±.28	32.8±2.95	16.3±4.71	17.0±1.91	16.3±2.57
			Fluorescent light	11.6±1.14	2.3±.23	3.3±.28	34.5±2.95	13.1±4.71	17.3±1.91	16.1±2.57
			Infrared light	11.0±1.14	2.7±.23	3.3±.28	24.5±2.95	10.5±4.71	20.3±1.91	18.1±2.57
			Overall	11.0	2.6	3.2	30.6	13.3	18.2	16.8
		Male	Incandescent light	14.1±1.14^{C}	3.4±.23^{A}	4.0±.28^{C}	43.5±2.95^{A}	26.6±4.71^{B}	12.0±1.91^{C}	30.1±2.57^{A}
			Fluorescent light	17.3±1.14^{A}	3.3±.23^{B}	4.9±.28^{A}	35.8±2.95^{B}	33.6±4.71^{A}	16.9±1.91^{B}	16.3±2.57^{C}
			Infrared light	15.1±1.14^{B}	3.3±.23^{B}	4.2±.28^{B}	29.3±2.95^{C}	17.1±4.71^{C}	21.5±1.91^{A}	17.4±2.57^{B}
			Overall	15.5	3.3	4.4	36.2	25.7	16.8	21.2
	Without vitamin E	Female	Incandescent light	15.4±1.14	2.9±.23	3.7±.28	32.6±2.95	11.3±4.71	19.6±1.91	18.7±2.57
			Fluorescent light	13.8±1.14	2.7±.23	4.2±.28	30.5±2.95	14.2±4.71	18.3±1.91	15.7±2.57
			Infrared light	13.8±1.14	3.2±.23	3.8±.28	27.5±2.95	14.4±4.71	16.8±1.91	12.1±2.57
			Overall	14.3	2.9	3.9	30.2	13.3	18.2	15.5
		Male	Incandescent light	14.3±1.14^{B}	3.2±.23^{C}	4.0±.28^{B}	38.5±2.95^{A}	17.0±4.71^{C}	22.8±1.91^{B}	24.2±2.57^{A}
			Fluorescent light	10.2±1.14^{C}	3.4±.23^{A}	3.5±.28^{C}	31.2±2.95^{C}	19.3±4.71^{B}	15.0±1.91^{C}	13.2±2.57^{C}
			Infrared light	17.4±1.14^{A}	3.3±.23^{B}	4.2±.28^{A}	37.8±2.95^{B}	20.7±4.71^{A}	24.7±1.91^{A}	20.2±2.57^{B}
			Overall	14.0	3.3	3.9	35.8	19.0	20.8	19.2

A,B,C Means within the same column and the same treatment factores carry different capital superscripts are significant at $P \leq 0.01$

Table (3): Continued

strain	treatment	sex	color	Blood Characteristics						
				Hb (g/١٠٠ml)	RBCs (10^6/m l)	HCT (%)	WBCs (10^3/ml)	PLT (10^3/mm^3)	GOT (U/L)	GPT (U/L)
Norfa	Vitamin E	Female	Incandescent light	8.6±1.14	2.7±0.23	3.4±0.28	35.3±2.95	20.2±4.71	18.6±1.91	23.8±2.57
			Fluorescent light	8.5±1.14	2.6±0.23	3.2±0.28	34.6±2.95	13.3±4.71	19.9±1.91	29.2±2.57
			Infrared light	11.8±1.14	2.6±0.23	3.5±0.28	25.5±2.95	24.8±4.71	18.0±1.91	24.7±2.57
			Overall	9.6	2.6	3.3	31.8	19.4	18.8	25.9
		Male	Incandescent light	16.2±1.14 ^{C}	3.5±0.23	4.8±0.28 ^{B}	39.2±2.95 ^{A}	31.9±4.71	17.7±1.91	16.3±2.57
			Fluorescent light	17.3±1.14 ^{B}	3.3±0.23	4.9±0.28 ^{A}	36.5±2.95 ^{B}	31.7±4.71	16.5±1.91	20.2±2.57
			Infrared light	17.4±1.14 ^{A}	3.2±0.23	4.7±0.28 ^{B}	29.1±2.95 ^{C}	27.4±4.71	14.8±1.91	18.2±2.57
			Overall	17.0	3.3	4.8	34.9	30.3	16.3	18.2
	Without vitamin E	Female	Incandescent light	10.8±1.14	2.6±0.23	3.2±0.28	34.4±2.95	12.0±4.71	18.3±1.91	17.7±2.57
			Fluorescent light	10.7±1.14	2.7±0.23	3.5±0.28	31.4±2.95	20.4±4.71	19.2±1.91	31.7±2.57
			Infrared light	8.6±1.14	2.1±0.23	2.9±0.28	25.5±2.95	25.5±4.71	19.4±1.91	20.6±2.57
			Overall	10.0	2.4	3.2	30.4	19.3	19.0	23.3
		Male	Incandescent light	14.2±1.14 ^{C}	3.1±0.23 ^{C}	4.0±0.28	38.4±2.95 ^{C}	29.2±4.71	20.1±1.91 ^{C}	25.3±2.57
			Fluorescent light	15.7±1.14 ^{B}	3.2±0.23 ^{B}	4.5±0.28	45.2±2.95 ^{A}	30.2±4.71	22.0±1.91 ^{B}	18.3±2.57
			Infrared light	17.3±1.14 ^{A}	4.1±0.23 ^{A}	3.3±0.28	40.0±2.95 ^{B}	30.6±4.71	25.5±1.91 ^{A}	19.3±2.57
			Overall	15.7	3.5	3.9	41.2	30.0	22.5	20.9

A,B,C Means within the same column and the same treatment factores carry different capital superscripts are significant at P $\leq$ 0.01