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# INHERITANCE OF SOME BLOOD PLASMA CONSTITUENTS AND ITS RELATIONSHIP WITH BODY WEIGHT IN CHICKENS

**By**

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**Abstract:** *The purpose of this study was to estimate the inheritance relationships between body weights at 8 wks of age and some blood plasma constituents. Considered blood plasma measurements were (total protein, albumin, globulin, glucose and cholesterol). Two lines of Alexandria chickens; egg line and meat line were examined in this study. The data were collected from total number of 490 Alexandria chickens, which classified into 248 egg line (EL) and 242 meat line (ML) according to their genetic background. Chickens in each line were divided into three categories according to body weight at 8 wk (line mean ± 1 s.d.) as high (HW), medium (MW) and light (LW) body weight.*

***The main results obtained can be summarized as follows:***

- *Highly significant differences in growth rates during all periods were found among categories. Moreover, these results indicated that, high body weight chickens had the highest growth rates (142.7, 94.1 and 177.3 %) during day-old to 4 wks, 4 wks to 8 wks and day-old to 8 wks of age, respectively. In the same trend, light body weight chickens had the lowest growth rates (126.1, 69.8 and 160.9 %) during day-old to 4 wks, 4 wks to 8 wks and day-old to 8 wks of age, respectively.*
- *The general physiological of blood plasma total protein, albumin and globulins concentrations were (4.22 – 5.31 gm/dl), (1.63 – 2.09 gm/dl) and (3.68 – 2.14 gm/dl), respectively. While, blood plasma glucose concentrations ranged of (190.7 – 270.7mg/dl), and blood plasma cholesterol concentrations ranged of (69.3 – 94.9 mg/dl).*
- *High and medium body weight had lower glucose concentrations than of light body weight with significant differences (207.3 and 208.0 vs 229.9 mg/dl). These results may be indicating that high body weight consumes more glucose than light body weight.*

- *Highly significant concentrations of blood plasma cholesterol were found between egg and meat lines (83.5 and 88.4 mg/dl), respectively. No significant differences were found between body weight categories.*
- *Moreover, the results showed that positive correlations were found between blood plasma total protein concentration and body weight at 8 wks of age, while negative correlations were found between blood plasma glucose concentration and body weight at 8 wks of age. These results were confirmed by the increase of blood plasma total protein concentration related with high body weight. However, the decrease of blood plasma glucose concentration appeared to be correlated with high body weight.*
- *While there was no clear relation between blood plasma cholesterol concentration and body weight at 8 wks of age.*

## INTRODUCTION

Body weight at 8 wks of age trait is the most important economic traits for both egg and meat lines, which affect on potentiality of egg or meat productions. Strain differences in plasma constituents and their correlations with some economic traits are of interest because they indicate which plasma measurements may be useful as genetic markers in breeding programs.

Several investigators reported within breed or strain variability for plasma total protein concentration which ranged from 4.40 to 5.93 gm/dl in Fayoumi (Obeidah et al., 1978 and Ibrahim and Mobarak, 2002), ranged from 4.64 to 4.91 gm/dl in Plymouth Rock (Mady et al., 1986 and Bakir et al., 1988), ranged from 3.01 to 5.36 gm/dl in White Leghorn (Rai et al.,1987; Narayana et al., 1991 and Berrong and Washburn,1998), ranged from 5.17 to 7.19 gm/dl in Dandarawi (Abdel Latif, 2001; Moawad, 2002) and 5.57 to 7.04 gm/dl in Golden Montazah (Abdel Latif, 2001; Moawad, 2002).

A wide range of within breed or strain variability was reported by several authors for plasma glucose concentration in Plymouth Rock (225 to 273.4 mg/dl, Mady et al., 1986 and Bakir et al., 1988), in Fayoumi (196 to 225 mg/dl, Obiedah et al., 1978 and Ibrahim and Mobarak, 2002), in White Leghorn (250.3 to 252.8 mg/dl, Rai et al.,1987 and Narayana et al., 1991), in Dandarawi (89.02 to 178.87 mg/dl, Abdel Latif, 2001; Moawad, 2002; Metwally, 2002 and Sharara et al., 2003) and Golden Montazah (107.47 to 196.39 mg/dl, Abdel Latif, 2001; Moawad, 2002).

Inheritance appears to be due for most the individual differences in cholesterol metabolism in birds (Leveille and Sauberlich, 1964). A wide range within and between breed or strain variations for Plasma total cholesterol concentration was reported by numerous investigators, in Fayoumi (147 to

167.4 mg/dl, Obiedah et al., 1978 and Ibrahim and Mobarak, 2002), in White Leghorn (185.1 to 198.02 mg/dl, Rai et al.,1987 and Narayana et al., 1991), in Dandarawi (96.57 to 186.70 mg/dl, Abdel Latif, 2001; Moawad, 2002; Metwally, 2002 and Sharara et al., 2003) and Golden Montazah (94.36 to 154.95 mg/dl, Abdel Latif, 2001; Moawad, 2002).

Some studies found positive correlation between plasma glucose with body weight at hatch (Peebles et al., 2005), at 4 and 8 wks of age (Hassan,1993) and at 8 wks of age (Alm El Dein et al., 2008). While, Attia, (2002) found negative correlation between plasma glucose with body weight at 8 wks of age. Several investigations were conducted to relate chicken performance with some parameters of blood (e.g. Miller et al., 1978; Gootwine and Brody, 1979; Mady, 1990; Kalamah, 1995; Attia, (2002) and Alm El Dein et al., 2008).

Al-Saudi and Abbass (2007), results showed there are wide ranges in breeding value estimates for White Leghorn individuals, especially for serum cholesterol level, which refer to additive genetic variance that could be used in selection programs. Also, different estimates of heritability for plasma constituents were reported by (Abdel Latif, 2001 and Attia, 2002). Al-Hillali, et al., (2007) reported that, the heritability of blood glucose was (0.31).

The present study aimed to estimate the measurements of some blood plasma constituents (total protein, albumin, globulins, glucose and cholesterol) at 8 wks of age in egg and meat lines of Alexandria chickens, and to examine the relationship among these blood plasma constituents and body weight at 8 wks of age.

## MATERIALS AND METHODS

The present experiment was conducted at the Poultry Research Center, Poultry Production Department, Faculty of Agriculture, Alexandria University. The data were obtained during season 2006/2007 (Table 1).

The chickens used consisted of two Alexandria lines, a total number of 248 egg line (E.L) and 242 meat line (M.L) were obtained from pedigree mating (Zatter,1994 ; El-Hanoun, 1995 and El-Dlebshany, 2004). Each line was divided into three categories according to body weight at 8 wks trait (line mean ± 1 S.D.), as high body weight (H.W), medium body weight (M.W) and light body weight (L.W). The numbers of experimental chicks for each category of egg and meat lines were shown in Table (1). Through the study, the same feed and water were provided *ad libitum* for all flock (Abd Alla, 1997).

Blood samples were obtained at 8 weeks of age from each experimental bird, about 3 $cm^3$ of blood from the wing vein of each chicken.

The blood samples were taken in the morning before feeding (between 8 and 10 o`clock) by dry clean centrifuge tubes containing heparin and immediately centrifuged at 3000 rpm for 15 min. for separating plasma. Plasma samples were prepared, stored at -20 C till time of chemical analysis. Plasma samples were analyzed at laboratories of Animal and Poultry Production Department, Faculty of Agriculture, Damanhour branch, Alexandria University. The biochemical characteristics of blood were determined colourimetrically on Spekol spectrophotometer using STANBIO commercial kits and diagonistic examinations. Plasma total protein was quantitatively measured based on colorimetric determination as described by Cannon (1974). Albumin concentration was determined according to the method of Doumas et al. (1977). Globulin concentration was estimated by subtraction of albumin concentration from serum total protein value.

Plasma glucose concentration was quantitatively measured based on enzymatic colorimetric method according to Trinder (1969). Plasma total cholesterol concentration was quantitatively determined based on enzymatic colorimetric method according to Richmond (1973) and Allain et al., (1974).

**Studied Traits:**

The following traits were studied:

1. Individual body weight were recorded to the nearest 0.1 (gm.) at hatch day (BW0), four weeks (BW4) and eight weeks (BW8) of age.
2. Growth rates (G.R) during the periods (day- old to 4 wks) , (4 wks to 8 wks) and (day- old to 8 wks) of age were calculated according to the formula (Broody, 1945):

$$\mathbf{G.R} = \frac{\mathbf{W_2 - W_1}}{\mathbf{\frac{1}{2}(W_2 + W_1)}} \times \mathbf{100}$$

   Where,

   $W_1$: the weight at beginning of the period.

   $W_2$: the weight at end of the period.
3. Plasma total protein (gm/dl), Plasma albumin (gm/dl), Plasma globulins (gm/dl), Plasma glucose concentration (mg/dl) and Plasma total cholesterol concentration (mg/dl) were determined of individual blood samples from experimental birds at 8 wks of age.

**Statistical analysis:**

The statistical analyses of the data for each line and category were carried out utilizing statistical analysis system (SAS, 1992). Data were analyzed by adapting the following model:

$$Y_{ijk} = \mu + L_i + G_j + (LG)_{ij} + e_{ijk}$$

Where, $Y_{ijk}$: The observation for the trait, $\mu$ : Overall mean, $L_i$ : The fixed effect of $i^{th}$ line (i=1 and 2), $G_j$ : The fixed effect of $j^{th}$ category (j=1,2 and 3), $(GL)_{ij}$ : The interaction between $i^{th}$ line and $j^{th}$ category, and $e_{ijk}$: Random error.

Estimates of genetic and phenotypic parameters of pooled data for traits were by using the random effect due to sire variance, the following model was applied:

$$Y_{ij} = \mu + S_i + e_{ij}$$

Where, $Y_{ij}$: The observation for the trait, $\mu$ : Overall mean, $S_i$ : The random effect of $i^{th}$ sire and $e_{ij}$: Random error.

Heritability, genetic and phenotypic correlation estimates were calculated according to Becker, (1985) using the hierarchical analyses of variance and covariance to compute the heritability ($h^2$), genetic ($r_g$) and phenotypic ($r_p$) correlations between them (Harvey, 1990).

## RESULTS AND DISCUSSION

**Performance of the traits:**

**Body weight at different ages:**

Data of body weight for experimental birds at hatch, 4 wks and 8 wks of age are presented in Table (2). The overall means of high, medium and light body weight categories at hatch were 36.3, 35.4 and 33.9 gm, respectively. The corresponding values at 4 wks were 218.1, 183.1 and 153.7 gm, respectively, and at 8 wks were 606.1, 459.0 and 316.2 gm, respectively. Highly differences significant among body weight categories were found at hatch, 4 wks and 8 wks of age.

The overall means for body weight of egg and meat lines at hatch were 35.8 and 34.8 gm., respectively. The corresponding values at 4 wks were 185.9 and 179.0 gm., respectively, and at 8 wks were 465.9 and 440.0 gm., respectively. Results of body weight showed highly significant

differences between lines at hatch, but there were no significant at 4 wks and 8 wks.

The interactions among line and body category were highly significant differences for body weight at 8 wks of age and there were no significant at hatch and 4 wks of age. Although, means of body weight at 8 wks of age showed no differences between high body weights (H.W) for both lines, they were 608.6 and 602.8 gm. for egg and meat lines, respectively. Also, no differences between light body weights (L.W) at 8 wks for both lines and the corresponding values were 316.7 and 315.7 gm, respectively.

**Growth rate during different periods:**

The data of growth rates during (day-old to 4 wks), (4 wks to 8 wks) and (day-old to 8 wks) of age are presented in Table (3). Results of growth rates during all periods showed no significant difference between lines. These means of egg or meat lines had no difference affected on growth rates till 8 wks of age.

Highly significant differences were found between body weight categories. Moreover, these results showed that, high body weight group had the highest growth rates (142.7, 94.1 and 177.3 %) during day-old to 4 wks, 4 wks to 8 wks and day-old to 8 wks of age, respectively. The same trend, light body weight group had the lowest growth rates (126.1, 69.8 and 160.9 %) during day-old to 4 wks, 4 wks to 8 wks and day-old to 8 wks of age, respectively.

**Measurements of some plasma constituents at 8 weeks of age:**

**Plasma total protein, Plasma albumin and Plasma globulins:**

Data of plasma total protein, albumin and globulins concentrations (gm/dl) for each line and category at 8 wks of age are presented in Table (4). The ranges of plasma total protein, albumin and globulins concentrations were (4.22 – 5.31 gm/dl), (1.63 – 2.09 gm/dl) and (3.68 – 2.14 gm/dl), respectively. Similar results were obtained by (Obeidah et al., 1978; Mady et al., 1986; Rai et al.,1987; Bakir et al., 1988; Narayana et al., 1991; Berrong and Washburn,1998 and Ibrahim and Mobarak, 2002).

Egg line showed highly significant difference concentration for total protein compare with meat line (5.19 vs 4.28, respectively).

**Plasma glucose and Plasma cholesterol:**

Data presented in Table (5) show that plasma glucose and cholesterol concentrations (mg/dl) for each line and category at 8 wks of

age. Plasma glucose concentrations ranged of (190.7 – 270.7mg/dl). These findings agree with that reported by (Obeidah et al., 1978; Mady et al., 1986; Rai et al.,1987; Bakir et al., 1988; Narayana et al., 1991 and Ibrahim and Mobarak, 2002). High and medium body weight had lower glucose concentrations than this in light body weight with significant differences (207.3 and 208.0 vs 229.9 mg/dl). These results may be indicating that high body weight consumes more glucose than light body weight, so glucose concentration decrease in plasma with increasing in body weight. Also, Lines had significant effects on glucose concentration, egg line had higher glucose concentration than meat line (220.1 vs 203.2 mg/dl).

Plasma cholesterol concentrations ranged of (69.3 – 94.9 mg/dl). Highly significant of plasma cholesterol concentrations were found between egg and meat lines (83.5 and 88.4 mg/dl), respectively. Higher measurements than that were reported by (Obiedah et al., 1978; Rai et al.,1987; Narayana et al., 1991; Abdel Latif, 2001; Ibrahim and Mobarak, 2002; Metwally, 2002 ; Moawad, 2002 and Sharara et al., 2003) and nearest measurements were found in Golden Montazah by (Abdel Latif, 2001 and Moawad, 2002). No significant differences were found between body weight categories. These results were indicated that meat line had cholesterol concentration higher than that of egg line by 4.9 mg/dl, moreover these increases did not relate with body weight but due to genetic potential for meat line.

**Genetic Parameters:**

**Heritability, Genetic and Phenotypic correlation estimates of some blood plasma constituents:**

Data presented in diagonal of Table (6) showed the estimated of heritability for total protein, albumin, globulins, glucose and cholesterol, these estimates are considered as high values (0.68, 0.60, 0.71, 0.74 and 0.70, respectively) were recorded. The present results are in agreement with those obtained by Abdel Latif, (2001), who estimated the heritability for plasma total protein (0.19 – 0.41), plasma glucose (0.64 – 0.82) and plasma cholesterol (0.43 – 0.61).

The genetic and phenotypic correlations between some blood plasma constituents were shown in below and above diagonal of Table (6). The positive and high values of genetic and phenotypic correlations estimated between total protein and globulins (0.88 and 0.82, respectively). However, the corresponding values were negatively and slightly high (-0.59 and -0.51, respectively) between albumin and globulins.

Small values of genetic and phenotypic correlations between cholesterol and residual studies blood constituents showed in Table (6). The correlations indicated no relationship between cholesterol and proteins or glucose concentrations at 8 wks of age.

**Genetic and Phenotypic correlations between body weight and blood plasma constituents at 8 wks of age:**

The genetic and phenotypic correlations between body weight and some blood plasma constituents at 8 wks of age were presented in Table (7).

Positive and nearly high values of genetic correlation between albumin and body weight at 8 wks (0.42) was found. These results indicated that albumin had strong relationship with body weight. However, there were negatively and slightly high genetic and phenotypic correlations (-0.31 and -0.24, respectively) of glucose concentration with body weight at 8 wks of age. These results showed that high body weight at 8 wks of age caused decrease in glucose concentration. Similar result for genetic correlation was found by Attia, (2002) at 8 wks of age (-0.22).

Very small values of genetic and phenotypic correlations between body weight and cholesterol at 8 wks of age were found (0.01 and 0.02, respectively). These correlations indicated no relationship between body weight and cholesterol at 8 wks of age.

## CONCLUSION

Generally, the measurements of plasma total protein and plasma glucose concentrations for Alexandria chickens were around the range of strain which crossing of them. These measurements were ranged of (4.22 – 5.31 gm/dl) and (190.7 – 270.7mg/dl), respectively. However, plasma cholesterol concentrations ranged of (69.3 – 94.9 mg/dl), which consider as the lowest measurements comparing with other strain.

Therefore, each of plasma total protein and plasma glucose concentrations had significant effect on body weight at 8 wks of age. The increase of plasma total protein concentration related with high body weight, however, the decrease of plasma glucose concentration appeared with high body weight.

Although, plasma cholesterol concentration in meat line was higher than in egg line, but there were no relationships between plasma cholesterol concentration and body weight at 8 wks of age. Therefore, these results due to genetic potential for meat line and not to their body weight trait.

**Table (1):** Numbers of parents and chicks for each category of egg and meat lines.

| Traits | Sires | Dams | High body weight (H.W) | Medium body weight (M.W) | Light body weight (L.W) | Total |
|---|---|---|---|---|---|---|
| **Egg Line (E.L)** | 10 | 85 | 36 | 170 | 42 | 248 |
| **Meat line (M.L)** | 8 | 68 | 28 | 170 | 44 | 242 |
| **Total** | 18 | 153 | 64 | 340 | 86 | 490 |

**Table (2):** Least squares means and standard errors for body weight (gm.) at different ages in three categories of body weight for egg and meat lines and their ANOVA.

| Traits | Means ± S.E. | | |
|---|---|---|---|
| | Body weight at hatch | Body weight at 4 wks | Body weight at 8 wks |
| **Line X category :** | | | |
| E.L X H.W | 36.6 ± 0.47 | 216.8 ± 3.40 | $608.6^{a}$ ± 6.81 |
| E.L X M.W | 35.8 ± 0.28 | 185.3 ± 2.21 | $472.6^{b}$ ± 3.53 |
| E.L X L.W | 34.9 ± 0.45 | 161.8 ± 4.78 | $316.7^{d}$ ± 5.53 |
| M.L X H.W | 36.0 ± 0.67 | 219.7 ± 3.68 | $602.8^{a}$ ± 8.11 |
| M.L X M.W | 35.0 ± 0.23 | 180.9 ± 2.11 | $445.4^{c}$ ± 3.63 |
| M.L X L.W | 33.0 ± 0.43 | 146.0 ± 4.59 | $315.7^{d}$ ± 4.65 |
| **Lines :** | | | |
| Egg Line (E.L) | $35.8^{a}$ ± 0.22 | 185.9 ± 2.03 | 465.9 ± 5.92 |
| Meat line (M.L) | $34.8^{b}$ ± 0.20 | 179.0 ± 2.16 | 440.0 ± 5.70 |
| **Categories:** | | | |
| High body weight (H.W) | $36.3^{a}$ ± 0.39 | $218.1^{a}$ ± 2.49 | $606.1^{a}$ ± 5.19 |
| Medium body weight (M.W) | $35.4^{b}$ ± 0.18 | $183.1^{b}$ ± 1.53 | $459.0^{b}$ ± 2.63 |
| Light body weight (L.W) | $33.9^{c}$ ± 0.32 | $153.7^{c}$ ± 3.40 | $316.2^{c}$ ± 3.58 |
| **ANOVA** | | | |
| Line X Category | NS | NS | ** |
| Lines | ** | NS | NS |
| Categories | ** | ** | ** |

*Means having different superscript in the same column are significantly different ($P \leq 0.05$).

**Table (3):** Least squares means and standard errors for growth rate (%) during different period of ages in three categories of body weight for egg and meat lines and their ANOVA.

| Traits | Means ± S.E. | | |
|---|---|---|---|
| | **Growth Rate (0-4 wks)** | **Growth Rate (4-8 wks)** | **Growth Rate (0-8 wks)** |
| **Line X Categories:** | | | |
| E.L X H.W | 142.1 ± 0.83 | $94.9^{a}$ ± 1.55 | $177.2^{a}$ ± 0.35 |
| E.L X M.W | 134.0 ± 0.90 | $87.5^{b}$ ± 1.04 | $171.7^{b}$ ± 0.26 |
| E.L X L.W | 127.5 ± 1.78 | $65.1^{d}$ ± 2.95 | $159.9^{c}$ ± 0.83 |
| M.L X H.W | 143.4 ± 0.99 | $93.0^{a}$ ± 1.52 | $177.3^{a}$ ± 0.57 |
| M.L X M.W | 134.1 ± 0.75 | $84.7^{b}$ ± 0.88 | $170.6^{b}$ ± 0.28 |
| M.L X L.W | 124.7 ± 1.62 | $74.4^{c}$ ± 2.41 | $161.9^{c}$ ± 0.64 |
| **Lines :** | | | |
| Egg Line (E.L) | 134.1 ± 0.74 | 84.8 ± 1.07 | 170.5 ± 0.40 |
| Meat line (M.L) | 133.5 ± 0.69 | 83.8 ± 0.84 | 169.8 ± 0.37 |
| **Categories**: | | | |
| High body weight (H.W) | $142.7^{a}$ ± 0.64 | $94.1^{a}$ ± 1.10 | $177.3^{a}$ ± 0.32 |
| Medium body weight (M.W) | $134.1^{b}$ ± 0.58 | $86.1^{b}$ ± 0.68 | $171.1^{b}$ ± 0.19 |
| Light body weight (L.W) | $126.1^{c}$ ± 1.21 | $69.8^{c}$ ± 1.95 | $160.9^{c}$ ± 0.53 |
| **ANOVA** | | | |
| Line X Category | NS | ** | ** |
| Lines | NS | NS | NS |
| Categories | ** | ** | ** |

*Means having different superscript in the same column are significantly different (P≤ 0.05).

**Table (4):** Least squares means and standard errors for total protein, albumin and globulins (gm./dl) in three categories of body weight for egg and meat lines and their ANOVA.

| Traits | Means ± S.E. | | |
|---|---|---|---|
| | **Total Protein** | **Albumin** | **Globulins** |
| **Line X Category:** | | | |
| E.L X H.W | $5.31^{a}$ ± 0.18 | $1.63^{d}$ ± 0.05 | $3.68^{a}$ ± 0.16 |
| E.L X M.W | $5.31^{a}$ ± 0.09 | $1.78^{c}$ ± 0.02 | $3.53^{a}$ ± 0.08 |
| E.L X L.W | $4.59^{b}$ ± 0.11 | $1.89^{bc}$ ± 0.07 | $2.70^{b}$ ± 0.13 |
| M.L X H.W | $4.22^{c}$ ± 0.07 | $2.09^{a}$ ± 0.06 | $2.14^{c}$ ± 0.09 |
| M.L X M.W | $4.28^{bc}$ ± 0.03 | $2.06^{a}$ ± 0.02 | $2.22^{c}$ ± 0.04 |
| M.L X L.W | $4.30^{bc}$ ± 0.07 | $1.95^{b}$ ± 0.05 | $2.35^{c}$ ± 0.07 |
| **Lines :** | | | |
| Egg Line (E.L) | $5.19^{a}$ ± 0.07 | $1.77^{b}$ ± 0.02 | $3.41^{a}$ ± 0.07 |
| Meat line (M.L) | $4.28^{b}$ ± 0.03 | $2.04^{a}$ ± 0.02 | $2.24^{b}$ ± 0.03 |
| **Categories:** | | | |
| High body weight (H.W) | $4.84^{a}$ ± 0.12 | 1.83 ± 0.05 | $3.01^{a}$ ± 0.14 |
| Medium body weight (M.W) | $4.79^{a}$ ± 0.05 | 1.92 ± 0.02 | $2.87^{a}$ ± 0.06 |
| Light body weight (L.W) | $4.44^{b}$ ± 0.07 | 1.92 ± 0.04 | $2.52^{b}$ ± 0.08 |
| **ANOVA** | | | |
| Line X Category | ** | ** | ** |
| Lines | ** | ** | ** |
| Categories | * | NS | * |

*Means having different superscript in the same column are significantly different (P≤ 0.05).

**Table (5):** Least squares means and standard errors for glucose and cholesterol (mg/dl) in three categories of body weight for egg and meat lines and their ANOVA.

| Traits | Means ± S.E. | |
|---|---|---|
| | Glucose | Cholesterol |
| **Line X Category :** | | |
| E.L X H.W | $190.7^{c}$ ± 8.69 | $90.8^{a}$ ± 5.80 |
| E.L X M.W | $213.9^{bc}$ ± 5.16 | $85.4^{a}$ ± 2.41 |
| E.L X L.W | $270.7^{a}$ ± 13. 76 | $69.3^{b}$ ± 4.00 |
| M.L X H.W | $228.7^{b}$ ± 7.35 | $91.7^{a}$ ± 3.40 |
| M.L X M.W | $202.1^{bc}$ ± 1.97 | $86.2^{a}$ ± 1.66 |
| M.L X L.W | $191.1^{c}$ ± 4.54 | $94.9^{a}$ ± 2.83 |
| **Lines :** | | |
| Egg Line (E.L) | $220.1^{a}$ ± 4.66 | $83.5^{b}$ ± 2.01 |
| Meat line (M.L) | $203.2^{b}$ ± 1.92 | $88.4^{a}$ ± 1.35 |
| **Categories:** | | |
| High body weight (H.W) | $207.3^{b}$ ± 6.28 | 91.2 ± 3.56 |
| Medium body weight (M.W) | $208.0^{b}$ ± 2.77 | 85.8 ± 1.46 |
| Light body weight (L.W) | $229.9^{a}$ ± 8.28 | 82.4 ± 2.79 |
| **ANOVA** | | |
| Line X Category | ** | ** |
| Lines | * | ** |
| Categories | * | NS |

*Means having different superscript in the same column are significantly different (P≤ 0.05).

**Table (6):** Heritability (in diagonal), genetic correlation (below diagonal) and phenotypic correlation (above diagonal) estimates for some blood plasma constituents at 8 wks of age.

| Traits | Total Protein (TP) | Albumin | Globulins | Glucose | Cholesterol |
|---|---|---|---|---|---|
| **Total Protein (TP)** | **0.68 ± 0.16** | 0.04 | 0.82 | - 0.004 | 0.09 |
| **Albumin** | - 0.15 ± 0.24 | **0.60 ± 0.15** | - 0.51 | 0.12 | 0.08 |
| **Globulins** | 0.88 ± 0.06 | -0.59 ± 0.24 | **0.71 ± 0.16** | - 0.07 | 0.04 |
| **Glucose** | -0.15 ± 0.23 | 0.19 ± 0.23 | -0.20 ± 0.22 | **0.74 ± 0.16** | - 0.03 |
| **Cholesterol** | 0.26 ± 0.22 | 0.06 ± 0.24 | 0.21 ± 0.22 | -0.08 ± 0.23 | **0.70 ± 0.16** |

**Table (7):** Genetic and phenotypic correlations between body weight and some blood plasma constituents at 8 wks of age**.**

| Traits | Body weight at 8 wks | |
|---|---|---|
| | $r_g$± S.E. | $r_p$ |
| **Total Protein** | 0.11 ± 0.22 | - 0.05 |
| **Albumin** | 0.42 ± 0.20 | 0.15 |
| **Globulins** | - 0.13 ± 0.22 | -0.14 |
| **Glucose** | - 0.31 ± 0.20 | -0.24 |
| **Cholesterol** | 0.01 ± 0.22 | 0.02 |

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## الملخص العربي

## وراثة بعض مكونات بلازما الدم و علاقتهم بصفة وزن الجسم فى الدجاج

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**محطة بحوث مريوط – مركز بحوث الصحراء – وزارة الزراعة

أجريت التجربة بغرض دراسة العلاقة بين وزن الجسم عند عمر 8 أسابيع و بعض مكونات بلازما الدم عند نفس العمر. مقاييس بلازما الدم التى أجريت هى (البروتين الكلى والألبيومين والجلوتومينات والجلوكوز و الكولستيرول) وذلك لخطين من الدجاج الأسكندرانى هما خط البيض وخط اللحم. تم تجميع البيانات على 490 من الدجاج الأسكندرانى ( 248 من خط البيض و 242 من خط اللحم). وقسم الدجاج فى كل خط إلى ثلاث فئات تبعا لوزن الجسم عند عمر8 أسابيع (متوسط الخط ± وحدة إنحراف قياسى) :عالى (HW) ومتوسط (MW) وخفيف (LW) وزن الجسم.

**ويمكن تلخيص النتائج المتحصل عليها كالآتى:**

-وجدت أختلافات معنوية عالية لمعدلات النموخلال كل الفترات بين فئات وزن الجسم المختلفة وأوضحت النتائج إن الدجاج ذا وزن الجسم العالى كان معدلات نموه الأعلى فى القيم ( 142.7 و94.1 و 177.3 ) فى الفترات من يوم إلى 4 أسابيع من العمر ومن 4 أسابيع إلى 8 أسابيع من العمر و من عمر يوم إلى 8 أسابيع من العمر على الترتيب. وكان نفس الأتجاة فى الدجاج خفيف الوزن حيث كانت معدلات النمو منخفضة فى القيم ( 126.1 و 69.8 و 160.9) فى الفترات من يوم إلى 4 أسابيع من العمر و من 4 أسابيع إلى 8 أسابيع من العمر و من عمر يوم إلى 8 أسابيع من العمر على الترتيب.

-القياسات الفسيولوجية العامة لبلازما الدم لتركيزات البروتين الكلى والألبيومين والجلوتومينات كانت (4.22 – 5.31 جم/100 مل دم) و ( 1.63 – 2.09 جم/100 مل دم) و (3.68 – 2.14 جم/100 مل دم) على الترتيب. بينما تركيز الجلوكوز فى بلازما الدم تراوح من (190.7 – 270.7 مجم/100 مل دم) و تركيز الكولستيرول فى بلازما الدم تراوح من (69.3 – 94.9 مجم/100 مل دم).

-وجد إن وزن الجسم العالى و المتوسط كان به تركيزات أكثر أنخفاضا من الجلوكوز عن خفيفة الوزن بفروق معنوية ( 207.3 و 208.0 مقارنة 229.9 مجم/100 مل دم). هذه النتائج ربما ترجع لأن الدجاج ذا الوزن العالى للجسم يحتاج أستهلاك جلوكوز أعلى عن الدجاج ذو الوزن الخفيف.

-وجد إن هناك فروق معنوية عالية لتركيزات الكولستيرول فى بلازما الدم بين خطى البيض واللحم (83.5 و 88.4 مجم/ 100 مل دم) على الترتيب. ولم توجد فروق معنوية بين فئات وزن الجسم المختلفة.

-أظهرت النتائج أرتباط موجب بين تركيز البروتين الكلى فى بلازما الدم و وزن الجسم عند عمر 8 أسابيع من العمر بينما وجد أرتباط سالب بين تركيز الجلوكوز فى بلازما الدم ووزن الجسم عند عمر 8 أسابيع من العمر. وأكدت هذه النتائج وجود علاقة لزيادة تركيز البروتين الكلى فى بلازما الدم مع وزن الجسم العالى بينما الأنخفاض فى تركيز جلوكوز بلازما الدم ظهر مع وزن الجسم العالى، بينما لم تظهر علاقة واضحه بين تركيز الكولستيرول فى بلازما الدم ووزن الجسم عند عمر 8 أسابيع.