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Prediction of Body Weight and other linear Body Weight Measurements of Leghorn Versus Two Egyptian Strains of Chicken

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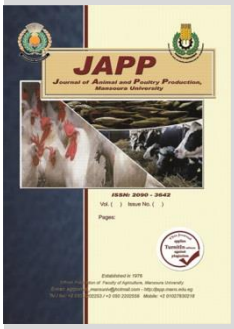

ABSTRACT

The aim of this study was to undertake the relationship between body weight and linear body measurement traits in three different chicks' strains, as well as to develop some regression equations to estimate body weight from linear body measurement. A total of 600 chicks (200 each from Fayomi (F), Golden Sabahia (GS) and White Leghorn (WL)) were used for this research. Result showed that males of the three strains were significantly higher body weight (bw) and other body measurements. Comparison of three strains also showed that GS bird was significantly better than F and WL birds for all traits under study. Lower correlation value was obtained between BW and back length (BL) and significant in male WL strain at 8 weeks old. At 12 weeks old, high, positive and significant values were observed between BW and circumference breast (CB) in female WL strain. A stepwise multiple regression analysis revealed that BW was best predicted using shank length (SL), keel length (KL), CB, BL for male WL, SL, CB, BL for female WL, GS and male F. Meanwhile, BW was best predicted using SL and CB for male GS. It was concluded that breed differences do exist between the strains under study and some of body measurements can be used as accurate indicators to improve body weight. Therefore, breeding programs designed for genetic improvement of body weight in the population of Leghorn, Golden Sabahia and Fayoumi chicks can use selection of different body measurements as selection criteria.

Keywords: Correlation; Fayomi; Golden Sabahia; Regression; Shank length.

INTRODUCTION

Chicken production is one of the most widely practiced poultry husbandry systems in Egypt. Chickens play an important role in economically, small and marginal farmers. Approximately, 90% of small holder farmers and a great number of urban households rely on aviculture as a clean and cheap source for animal protein and as a contributor to income. Poultry production differs from other animal production activities in several ways including, the rate of capital circulation, capital and feed consumption. Egypt has a large variety of chickens, including native breeds with high disease resistance and good performance in poor environmental and nutritional conditions, as well as imported exotic breeds like the White Leghorn (Hosny, 2006). The Egyptian Fayoumi breed is well appreciated due to it offers better disease resistance than imported breeds (Pinard-Van Der Laan *et al*., 1998; Tixier-Boichard *et al*., 2009). Golden Sabahia is a developed egg production strain that has 1.02 kg, 0.850 kg at 12 weeks for male and female, respective 219 egg numbers per year (Ghanem *et al*., 2017). White leghorn is an exotic Mediterranean egg producing breed and body weight of 1.3kg at 8 months. This breed has been adapted to the Egyptian environmental conditions for more than 20 years (Hosny, 2006). Knowing a chicken's body mass is essential for good poultry management, which includes adjusting feed supply, monitoring growth, and selecting replacement males and females. Body measurements are useful in determining the morphological structure and development ability of the chicken. Genetics and environmental factors have an impact on these biometric measurements. The relationship between body weight and morphological traits could be used for selection programs for the genetic progress of the local chicken breeds (Dzungwe *et al*., 2018). There have been many studies on the prediction of live body weight by means of morphological traits in different genotypes raised in different regions (Egena *et al*., 2014; Dzungwe *et al*., 2018; Tadele, 2019). As a result, the purpose of this study was to investigate the relationship between body weight and linear body measurement traits in three different chicks' strain, as well as to develop some regression equations to estimate body weight from linear body measurement. The information gathered could be used in selection programs to improve the breeds.

MATERIALS AND METHODS

The work was conducted at the poultry research unit (EL- Boston farm) Department of Animal and Poultry Production, Faculty of Agriculture, Damanhour University. Three strains named Fayomi (F as a native strain), Golden Sabahia (GS) as a developed strain and White Leghorn (WL) standard layer breed were hatched and raised on deep litter since a day old until 12 weeks. The GS is a synthetic strain developed from a crossbreeding programme between the Lohman brown and four developed strains (Silver Montazah, Golden Montazah, Mandarah and Bahij). The WL is an exotic Mediterranean egg producing breed that has adapted to the Egyptian environmental conditions for many years (Hosny, 2006). The population of chicken consisted of 200 Fayomi, 200 Sabahi and 200 Leghorn (125 female and 75 males for each strain). At day of hatch all chicks were wing banded according to the strain and placed in floor brooders at a starting temperature of 32°C during the first week after hatching and then decreased 2-3° C each week

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thereafter. All birds have similar management and environmental conditions through the whole experimental period. The chicks were fed *adlibitum* with commercial chicks' starter diet containing 23% crud protein and 3000 kcal/kg feed until 8 weeks of age. Then, they were fed on a commercial growing diet containing 21% crude protein and 3100 kcal/kg for 12 weeks. Hatched chicks Vaccination and medication were done according to the used program in the research unit, the humidity was in the range of 50-60%, the chicks were subjected to 24 hours lighting at on intensity of 3 watt / m2 along till the experimental period four week of age then reduced to 10:12 hours of light until 12 weeks.

Data collecting

Body weight was individually weighted weekly (BW2, BW4, BW6, BW8, BW10 and BW12) using a digital balance with a sensitivity 0.1 g. Other body measurements were taken using a measuring tape (cm) biweekly which included shank length(SL), keel length (KL), chest circumference (CC) and back length (BL) according to(Tyasi *et al*., 2020).

Statistical analysis:

The data was analyzed to obtain mean and standard errors for body weight and linear body measurements. Analysis of variance (ANOVA), using the General Linear Model Procedure of Statistical Procedure for SAS 9.4 (SAS, 2016) was employed in the analysis. The analysis was done on a biweekly basis. Mean separation for significant effect was done using Tukey. The model was fitted for the effect of strain and sex:

$$Y_{ijk}=\mu+B_i+S_J+e_{ijk}$$

Where: Y_{ijk}**= the observed linear body measurements of Kth individual chicken**
μ = overall mean
B_i= fixed effect of ith breed
S_j= fixed effect of Jth sex
e_{ijk}= random error

Data collected were also subjected to regression analyses. Measurements obtained from the linear body measurements were regressed against the body weight of different breeds of chicken at 12 weeks. Model for predicting body weight using the linear body parameters was analyzed using multi Regression Procedure of SAS (SAS, 2016). Conceptual predictive criterion (CP), Coefficient of determination (R^2) and Akaike Information Criterion (AIC) were used to assess the goodness of fit of each model as follow:

Conceptual predictive criterion (Cp):

$$Cp = p + \frac{(MS_{RES} - \sigma^2)(n - p)}{\sigma^2}$$

Where: MS_{RES} = residual mean square for the candidate model
σ^2 = variance estimate of the true model
***n* = the number of observations**
***p* = the number of parameters of the candidate model**

Coefficient of determination (R2):

$$R^2 = 1 - \frac{\sum_{i=1}^{n}(Y_i - \hat{Y}_i)^2}{\sum_{i=1}^{n}(Y_i - \bar{Y})^2}$$

Akaike information Criteria(AIC)

$$AIC = n\log\left(SS_{RES}/n\right) + 2p$$

SS_{RES}= the residual sum of squares
***n* = the number of observations**
***p* = the number of parameters of the candidate model**

RESULTS AND DISCUSSION

Results

From 2 weeks of age onwards, the body weight illustrated an increasing sexual dimorphism ($p < 0.001$) with males having higher average BW than females (Table 1).

Table 1. Effect of sex on body weight (g) of White Leghorn, Golden Sabahia and Fayoumi chickens from 2 to 12 weeks of age (mean ±SE)

Chickens	Male (BW/g)	Female (BW/g)
	White Leghorn	
2nd weeks	121.21±1.81[a]	108.76±1.63[b]
4th weeks	257.7±4.78[a]	218.41±3.70[b]
6th weeks	390.9±5.06[a]	343.46± 3.67[b]
8th weeks	627.55±8.92[a]	507.84± 7.51[b]
10th weeks	873.3±12.94[a]	691.34±10.32[b]
12th weeks	1111.2±14.45[a]	864.5±12.48[b]
	Golden Sabahia	
2nd weeks	136.07±1.88[a]	121.27±1.38[b]
4th weeks	290.10±4.75[a]	249.20±3.20[b]
6th weeks	471.8± 5.24[a]	419.71±4.47[b]
8th weeks	746.28±11.80[a]	600.41±9.09[b]
10th weeks	1006.0±19.10[a]	817.53± 11.82[b]
12th weeks	1322.6±18.51[a]	1028.5±14.32[b]
	Fayoumi	
2nd week	128.49±1.44[a]	117.75±1.37[b]
4th week	267.65±3.08[a]	238.29±2.98[b]
6th week	433.7±3.90[a]	388.8±3.85[b]
8th week	671.93±8.40[a]	552.14±7.26[b]
10th week	917.5± 10.82[a]	727.0± 7.99[b]
12th weeks	1095.2±12.99[a]	848.4±9.46[b]

[a ,b,c] **Means within the same row in the same trait with different superscripts are significantly different (P≤0.05).**

The influence of sex was statistically significant for linear body measurements between compared populations. Males revealed the highest significant value of Shank length, Keel length, Circumference breast and Back length compared to females at different ages Table 2, 3 and 4.

The effect of strain on body weight and linear body measurements of three different genotypes at different ages are presented in Table 5.

Table 2. Effect of sex on linear body measurements of White Leghorn chickens from 2 to 12 weeks of age (mean ±SE)

Chickens	Male	Female
	Shank length (cm)	
2nd week	3.67±0.041[a]	3.47±0.039[b]
4th week	4.74±0.044[a]	4.39±0.039[b]
6th week	5.04±0.044[a]	4.69±0.039[b]
8th week	5.66±0.062[a]	5.29±0.059[b]
10th week	6.24±0.046[a]	5.75±0.038[b]
12th weeks	7.22±0.047[a]	6.38±0.050[b]
	Keel length (cm)	
2nd week	4.07±0.075	3.95±0.063
4th week	5.47±0.068[a]	5.09±0.048[b]
6th week	6.45±0.068[a]	6.10±0.048[b]
8th week	7.67±0.086[a]	7.01±0.076[b]
10th week	8.41±0.073[a]	7.78±0.060[b]
12th weeks	9.29±0.073[a]	8.51±0.063[b]
	Circumference breast (cm)	
2nd week	11.32±0.089	11.86±0.997
4th week	14.32±0.129[a]	13.60±0.123[b]
6th week	16.83±0.128[a]	16.10±0.124[b]
8th week	19.17±0.195[a]	17.96±0.162[b]
10th week	20.76±0.141[a]	19.26±0.135[b]
12th weeks	21.92±0.188[a]	20.61±0.110[b]
Back length (cm)		
2nd week	6.46±0.084[a]	6.13±0.084[b]
4th week	8.48±0.081[a]	8.24±0.059[b]
6th week	9.52±0.077	9.35±0.059
8th week	10.58±0.127[a]	10.01±0.123[b]
10th week	10.96±0.091[a]	10.11±0.071[b]
12th weeks	11.78±0.103[a]	10.61±0.071[b]

[a ,b,c] **Means within the same row in the same trait with different superscripts are significantly different (P≤0.05).**

Table 3. Effect of sex on linear body measurements of Golden Sabahia chickens from 2 to 12 weeks of age (mean ±SE)

Chickens	Male	Female
	Shank length (cm)	
2nd week	3.78±0.046[a]	3.62±0.036[b]
4th week	4.91±0.058[a]	4.58±0.042[b]
6th week	5.30±0.058[a]	4.98±0.043[b]
8th week	5.85±0.068[a]	5.37±0.053[b]
10th week	6.42±0.064[a]	5.75±0.039[b]
12th weeks	7.36±0.059[a]	6.46±0.045[b]
	Keel length (cm)	
2nd week	4.26±0.062	4.13±0.048
4th week	5.82±0.057[a]	5.40±0.051[b]
6th week	7.02±0.057[a]	6.61±0.051[b]
8th week	8.11±0.112[a]	7.36±0.087[b]
10th week	9.06±0.088[a]	8.28±0.063[b]
12th weeks	10.78±0.826[a]	9.14±0.072[b]
	Circumference breast (cm)	
2nd week	11.93±0.119[a]	11.54±0.074[b]
4th week	15.18±0.117[a]	14.47±0.096[b]
6th week	18.47±0.117[a]	17.77±0.098[b]
8th week	20.35±0.221[a]	19.30±0.157[b]
10th week	21.91±0.173[a]	20.42±0.155[b]
12th weeks	23.30±0.159[a]	21.58±0.147[b]
	Back length (cm)	
2nd week	6.53±0.104	6.41±0.068
4th week	8.75±0.069[a]	8.55±0.056[b]
6th week	10.06±0.069[a]	9.85±0.0.56[b]
8th week	11.36±0.156[a]	10.81±0.102[b]
10th week	11.65±0.105[a]	10.82±0.090[b]
12th weeks	12.52±0.113[a]	11.36±0.085[b]

[a ,b,c] **Means within the same row in the same trait with different superscripts are significantly different (P≤0.05).**

Table 4. Effect of sex on linear body measurements of Fayoumi chickens from 2 to 12 weeks of age (mean ±SE)

Chickens	Male	Female
	Shank length (cm)	
2nd week	3.36±0.035[a]	3.25±0.030[b]
4th week	4.57±0.038[a]	4.34±0.037[b]
6th week	4.77±0.068[a]	4.51±0.090[b]
8th week	5.56±0.040[a]	5.07±0.035[b]
10th week	6.52±0.045[a]	5.88±0.041[b]
12th weeks	7.34±0.045[a]	6.48±0.039[b]
	Keel length (cm)	
2nd week	3.89±0.053[a]	3.66±0.044[b]
4th week	5.11±0.050[a]	4.91±0.054[b]
6th week	6.47±0.088[a]	5.89±0.073[b]
8th week	7.64±0.051[a]	7.10±0.055[b]
10th week	8.23±0.065[a]	7.71±0.052[b]
12th weeks	9.49±0.129[a]	8.65±0.055[b]
	Circumference breast (cm)	
2nd week	10.38±0.083	10.17±0.074
4th week	13.63±0.099	13.33±0.134
6th week	17.54±0.199[a]	16.62±0.128[b]
8th week	19.20±0.153a	18.55±0.137b
10th week	19.76±0.141[a]	18.98±0.111[b]
12th weeks	20.79±0.113[a]	19.74±0.097[b]
	Back length (cm)	
2nd week	6.36±0.057	6.25±0.057
4th week	8.18±0.060	8.04±0.079
6th week	9.48±0.061[a]	8.67±0.111[b]
8th week	9.91±0.101[a]	9.42±0.094[b]
10th week	10.85±0.095[a]	10.03±0.065[b]
12th weeks	11.60±0.077[a]	10.37±0.117[b]

[a ,b,c] **Means within the same row in the same trait with different superscripts are significantly different (P≤0.05).**

Table 5. Effect of strain on body weight, linear body measurements of White Leghorn, Golden Sabahia and Fayoumi chickens from 2 to 12 weeks of age (mean ±SE)

Trait	White Leghorn	Golden Sabahia	Fayoumi
	Body weight (gm)		
2 weeks	113.4± 1.30[c]	126.9± 1.22[a]	122.8±1.06[b]
4 weeks	233.0± 3.19[c]	264.7± 3.01[a]	252.2 ±2.40[b]
6 weeks	361.1± 3.41[c]	439.4±3.84[a]	410.2± 3.20[b]
8 weeks	552.3±7.15[c]	655.6±8.74[a]	609.0±6.95[b]
10 weeks	759.6± 10.18[c]	887.0±12.11[a]	816.6±9.43[b]
12th weeks	955.3±12.80[b]	1142.1±15.39[a]	965.54±11.84[b]
	Linear body measurements (cm)		
Shank length at 2 weeks	3.54±0.030[b]	3.68±0.029[a]	3.30±0.023[c]
Shank length at 4 weeks	4.52±0.032[b]	4.71±0.036[a]	4.45±0.028[b]
Shank length at 6 weeks	4.82±0.032[b]	5.10±0.036[a]	4.64±0.060[c]
Shank length at 8 weeks	5.43±0.045[b]	5.55±0.045[a]	5.30±0.031[c]
Shank length at 10 weeks	5.94±0.034[b]	5.99±0.041[b]	6.18±0.038[a]
Shank length at 12 weeks	6.69±0.046[b]	6.81±0.048[a]	6.89±0.043[a]
Keel length at 2 weeks	4.00±0.049[b]	4.18±0.038[a]	3.77±0.035[c]
Keel length at 4 weeks	5.23±0.041[b]	5.56±0.041[a]	5.00±0.038[c]
Keel length at 6 weeks	6.23±0.041[b]	6.77±0.041[a]	6.18±0.080[b]
Keel length at 8 weeks	7.26±0.062[b]	7.65±0.073[a]	7.36±0.042[b]
Keel length at 10 weeks	8.01±0.051[b]	8.57±0.058[a]	7.96±0.045[b]
Keel length at 12 weeks	8.80±0.055[b]	9.77±0.326[a]	9.05± 0.074[b]
Circumference breast at 2 weeks	11.66±0.623[a]	11.69±0.065[a]	10.27±0.056[b]
Circumference breast at 4 weeks	13.87±0.094[b]	14.74±0.078[a]	13.47±0.085[c]
Circumference breast at 6 weeks	16.38±0.095[c]	18.03±0.079[a]	17.08±0.150[b]
Circumference breast at 8 weeks	18.41±0.131[c]	19.69±0.133[a]	18.86±0.104[b]
Circumference breast at 10 weeks	19.82±0.112[b]	20.97±0.127[a]	19.35±0.093[c]
Circumference breast at 12 weeks	21.10±0.108[b]	22.25±0.125[a]	20.24±0.083[c]
Back length at 2 weeks	6.25±0.062[b]	6.45±0.058[a]	6.31±0.041[ab]
Back length at 4 weeks	8.33±0.048[b]	8.63±0.044[a]	8.09±0.051[c]
Back length at 6 weeks	9.41±0.047[b]	9.93±0.044[a]	9.06±0.067[c]
Back length at 8 weeks	10.22±0.091[b]	11.01±0.088[a]	9.65±0.071[c]
Back length at 10 weeks	10.43±0.061[b]	11.16±0.076[a]	10.42±0.063[b]
Back length at 12 weeks	11.05±0.071[b]	11.81±0.079[a]	10.96±0.084[b]

[a ,b,c] **Means within the same row in the same trait with different superscripts are significantly different (P≤0.05).**

Strains had a statistically significant effect on different parameters at all ages. Strains had a statistically significant effect on different parameters at all ages. Chicks of Golden Sabahia (GS) strain had the heaviest BW at different ages compared to Leghorn (WL) and Fayoumi (F).This trend was consistent from 2 to 12 weeks of age for all the three strains studied. Remarkably, it exhibited a 186.8 g and 176.56 g increase in body weight at week 12 compared to leghorn and Fayoumi chicks, respectively.

(GS) strain showed the highest significant value of body measurements followed by (WL) and (F) strains, respectively ($p<0.05$). Through the comparison between the three strains, it might be observed that the GS strain exceeded the other two strains by 9.77%, 22.25%, and 11.81% for keel length, circumference breast and back length at week 12, respectively.The phenotypic correlation coefficients of body weight and body measurements of different genotypes are shown in Table 6. Results showed that there was a significant correlation between body weight and linear body measurements except for BW-BL (0.178), BW-SL (0.165) and BW-CB (0.165) in male and female leghorn chicks at 2 weeks, respectively and BW-KL (0.032) in male Golden Sabahia chicks at 12 weeks. BW-BL (0.124) in male Fayoumi chicks at 2 weeks . Also, BW-SL (0.359 and 0.509) in male and female, BW-KL(0.421)in female only of Fayoumi chicks at 6 weeks, respectively and BW-BL (-0.086 and 0.052) in male and female Fayoumi at 6 weeks.

Predictive equations relating to body weight of different genotypes to linear body weight measurements at week 12 are presented in Table7. Body weight and linear body measurements had significant association. The result showed that the value of the coefficient of determinant (R^2) ranged from (0.5341 to 0.7828). Comparatively, male and female chicks had the best predictor for estimating body weight.

Table 6. Correlations between body weight and linear body measurements of different strains:

	White Leghorn		Golden Sabahia		Fayoumi	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
			2 weeks old			
SL	0.165	0.549**	0.313**	0.373**	0.287**	0.451**
KL	0.284 **	0.507**	0.289**	0.245**	0.310**	0.483**
CB	0.468**	0.165	0.384**	0.453**	0.488**	0.669**
BL	0.178	0.447**	0.159**	0.332**	0.124	0.322**
			4 weeks old			
SL	0.488 **	0.551**	0.382**	0.451**	0.335**	0.429**
KL	0.416**	0.666**	0.268**	0.553**	0.422**	0.488**
CB	0.396**	0.609**	0.629**	0.708**	0.459**	0.608**
BL	0.273 **	0.555**	0.556**	0.381**	0.529**	0.128**
			6 weeks old			
SL	0.509**	0.614**	0.364**	0.446**	0.359	0.509
KL	0.541**	0.684**	0.280**	0.517**	0.462**	0.421
CB	0.400**	0.692**	0.586**	0.734**	0.707**	0.645**
BL	0.386 **	0.646**	0.519**	0.271**	-0.086	0.052
			8 weeks old			
SL	0.396**	0.608**	0.499**	0.550**	0.521**	0.589**
KL	0.499**	0.488**	0.480 **	0.532**	0.603**	0.736**
CB	0.332**	0.454**	0.649**	0.645**	0.400**	0.488**
BL	0.191**	0.384**	0.493**	0.426**	0.382**	0.453**
			10 weeks old			
SL	0.407 **	0.688**	0.486**	0.893**	0.681**	0.736**
KL	0.501**	0.592**	0.571**	0.608**	0.664**	0.620**
CB	0.274**	0.596**	0.424**	0.733**	0.564**	0.634**
BL	0.424 **	0.585**	0.344**	0.688**	0.426**	0.642**
			12 weeks old			
SL	0.546**	0.728**	0.733**	0.727**	0.592 **	0.712**
KL	0.529**	0.645**	0.032	0.658**	0.303 **	0.716**
CB	0.573**	0.748**	0.632**	0.731**	0.733 **	0.746**
BL	0.484**	0.664**	0.343**	0.591**	0.479 **	0.485**

SL= Shank length; KL= keel length; CB= Circumference breast; BL=back length ** Significant at ≤0.001

Table 7. Predictive equations relating body weight to body measurements of White Leghorn, Golden Sabahia and Fayoumi strains.

Sex	Predictive equation	C(p)	R^2	AIC
White Leghorn strain				
Male	BW= -713.26+78.08SL+41.75KL+23.48CB+30.14BL	5.0000	0.5341	636.7097
Female	BW= - 1057.80+92.08 SL+43.98CB+40.32BL	4.7202	0.7100	1058.0616
Golden Sabahia strain				
Male	BW= -852.49+172.65SL+38.77CB	2.7921	0.6167	674.2860
Female	BW= -871.79+128.81SL+37.32CB+23.06BL	4.9004	0.6538	1052.9554
Fayoumi chicken strain				
Male	BW= -1506.23+110.99SL+62.09 CB+42.69BL	4.8880	0.7477	777.3645
Female	BW= -973.67+79.43SL+52.51KL+43.19CB	3.7984	0.7828	790.0836

BW= body weight; SL= Shank length; KL= keel length; CB= Circumference breast; BL=back length. (Cp): Conceptual predictive criterion. (R2): Coefficient of determination. (AIC):Akaike information Criteria.

Discussion

The results of body weight and body measurements showed that males of different strains were significantly better than the females of the same strains under study. Some experiments have suggested that environmental factors such as age, sex and flock influenced body weight (Alabi *et al*., 2012 and Afolayan *et al*., 2006). The heavy weight in males may likely due to the natural hormonal variation in most animal species (Maria *et al.*, 2003). Regardless of sex, the Golden Sabahia strain had the highest final body weight (1142.1 g), shank length, keel length, circumference breast, and back length compared with the Leghorn and Fayoumi strains. This may be due to differences in genetic makeup of the chicks. These results suggest that Golden Sabahia chicks possesses genes for faster growth than other strains used in the present study.

The results on linear body measurements in this research showed that Golden Sabahia chicks had the highest value of Shank length, keel length, circumference breast, and back length compared with the Leghorn and Fayoumi strains. Circumference breast has been used as an indicator for fleshing of a chicken (Tadele *et al*., 2018) and shank and keel length has been used as indicator of skeletal development of chicks, which is related to the amount of meat a chicken can carry (Melesse,2007). Hence, the current study suggests Golden Sabahia could be used for meat production under Egyptian conditions due to their higher circumference breast and shank and keel length.

Estimates of phenotypic correlations between body weight and linear body measurements of different strains were positively and very different (ranged from 0.052 to 0.893). This result indicates that there was a strong association between body weight and body measurement. Also, the

correlation coefficient, in general, increases as age advances. This finding agrees with (Egena *et al*., 2014; Ige *et al*., 2016 and Ezzeldin *et al*., 1994) found that all estimates of phenotypic correlations between body weight and linear body measurements were medium to high and positive. Based on the findings of this study, we can suggest that either of these linear measurements or their combination could be a good predictor of chick's body weight.

The coefficients of determination of the regression equations developed were different for different strains, and the body measurements used to predict weight were different; this could be due to differences in growth and proportion of conformational traits at different strains. This implies that at different strains, different conformational traits may be better at predicting weight and can be more accurate for selection.

CONCLUSION

According to the findings of this study, the Golden Sabahia strain has significantly higher body weight and body measurements than other strains.Furthermore, the positive phenotype correlation between body weight and linear body measurements suggests that these measurements can be used to improve body weight with greater accuracy. This relationship could be used in selection programs for genetic improvement of body weight gain in the different strains of chicks. Therefore, breeding programs designed for genetic improvement of body weight in the population of Leghorn, Golden Sabahia and Fayoumi chicks can use selection to different body measurements as selection criteria.

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التنبؤ بوزن الجسم وبعض المقاييس الخطيه الأخري لوزن الجسم لسلالة اللجهورن مقارنة بسلالتين من الدجاج المصري

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هدفت هذه الدراسة إلى إجراء العلاقة بين وزن الجسم وبعض مقاييس الجسم الخطيه لثلاث سلالات مختلفة من الكتاكيت، وكذلك تطوير بعض معادلات الانحدار لتقدير وزن الجسم من مقاييس الجسم الخطيه. حيث تم استخدام عدد 600 كتكوت (200 كتكوت من سلالة الفيومي (F) ، 200 كتكوت من سلالة الصبحيه الذهبي (GS) و200 كتكوت من سلالة اللجهورن الأبيض (WL)). وقد أظهرت النتائج أن ذكور السلالات الثلاثة كانوا أعلى معنويا في وزن الجسم وقياسات الجسم الأخرى. وبمقارنه الثلاث سلالات أظهرت النتائج أن سلالة الصبحيه الذهبي كانت أفضل من سلالة الفيومي واللجهورن الابيض لجميع الصفات المدروسه. كما وجد أنه يوجد قيم ارتباط منخفضه بين وزن الجسم وطول الظهر وكان هذا الارتباط معنوي في ذكور سلاله اللجهورن عند عمر 8 أسابيع وكان الارتباط مرتفع معنويا وموجب عند عمر 12 أسبوع بين وزن الجسم ومحيط الصدر في اناث سلالة اللجهورن. وعند أجراء تحليل الانحدار المتعدد التدريجي وجد أن أفضل تنبؤ لوزن الجسم باستخدام طول عظمة الساق والصدر ومحيط الصدر وطول الظهر لذكور سلالة اللجهورن الابيض، وباستخدام طول عظمة الساق ومحيط الصدر وطول الظهر لأناث الجهورن والصبحية الذهبي وذكور الفيومي. بينما كان أفضل تنبؤ لوزن الجسم في ذكور الصبحيه الذهبي باستخدام طول عظمة الساق ومحيط الصدر. وخلصت الدراسه إلي أنه يوجد أختلافات بين السلالات تحت الدراسه ويمكن استخدام بعض قياسات الجسم كمؤشرات دقيقة لتحسين وزن الجسم. وبالتالي يمكن ادخال بعض مقاييس الجسم المختلفه كمعايير انتخابيه في برامج التربية للتحسين الوراثي لوزن الجسم في عشائر دجاج اللجهورن والصبحيه الذهبي والفيومي.