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EVALUATING THE GEOMETRICAL AND EGG QUALITY CHARACTERS FOR TWO DEVELOPED LAYING STRAINS

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ABSTRACT: This study aimed to evaluate the egg quality traits of Golden Sabahia (GS) and Silver Sabahia (SS) as new developed Egyptian chicken strains at 36, 46, and 56 wks of age. Four hundred–eighty eggs were randomly collected from GS and SS chickens to determine external and internal egg quality traits and to calculate the geometrical egg parameters. Results showed that the(GS) strain had significantly greater egg weight, diameter egg (DG), and egg surface area (S) compared to those of SS strain. The yolk (weight and index %), albumen (weight, height, and Haugh unit), and eggshell weight values of GS eggs were significantly higher than those of the SS strain. As expected, internal and external qualities were increased by advances age. In conclusion, the geometrical parameters of egg quality for GS and SS strains may be taken into account for improving the hatchability of the expected commercial breed. Also, it is expected from the mentioned results of egg quality that Silver Sabahia could be valid become maternal line and Golden Sabahia as paternal line for producing commercial egg-type breed.

Key world: Golden Sabahia, Silver Sabahia, egg quality, egg geometrical

INTRODUCTION

The poultry industry is one of the important agricultural commodities, and the source of high-quality animal protein in developing countries (Aggery *et al.*, 2023). Also, egg is a component of healthy diets for adults and as a major source of essential nutrients, and protein for children (Abeyrathne *et al*., 2013; El Sabry et al., 2022). The implications of climate changes, epidemics, and the delay in the food chains have attracted the attention of scientists to consider the local chicken breeds, which are more adapted to harsh conditions (El Sabry *et al*., 2021a and b) such as Fayoumi. However, the egg weight and production % of the local chicken breeds/strains are still below average compared to modern table egg strains. From another perspective, these local breeds are important as genetic sources for conservation and breeding programs (Al-Atiyat *et al*., 2023). Therefore, efforts have been made to improve the performance of local laying strains. In parallel, the quality of eggs such as egg weight, albumen height, and yolk (weight, index %, color) should be considered in the breeding programs to meet consumer's needs (Kella and Tumovi, 2016).

Egg characteristics are affected by several factors such as genetic background, age of hens, strain, housing system, and nutrition (Ahmadi and Rahmi, 2011, El Sabry *et al*., 2013, Yang *et al*., 2014; Sharma *et al*., 2022). Genotype is one of the most influential factors in birds' characteristics, affecting mainly egg weight and eggshell characteristics (El Sabry *et al*., 2017). For example, Ahmed *et al*. (2017) found that shape index significantly differs between the lines. Also, internal egg qualities such as yolk and albumen quality characteristics are affected by chicken strain (Tamova *et al*., 1993). Past investigations stated that the age of the hen has a direct effect on egg quality characteristics and egg weight (Ulmer *et al*.,2010). Moreover, age of the hens affects eggshell quality, albumen and yolk characteristics (Zita *et al.*, 2009). In this context, egg geometrical parameters are critical for the mathematical model for egg processing, manipulation, transport applications, and predictions in poultry production (Severa *et al*., 2013).

This study aimed to evaluate some egg quality traits for two new developed chicken strains named Golden Sabahia and Silver Sabahia and to determine the effect of these strains and their ages on the geometrical and egg quality characters under Egyptian conditions.

MATERIAL and METHODS

This study was conducted at El-Sabahia Poultry Research Station, Alexandria, Animal Production Research Institute, Agriculture Research Center.

Flock History

From 2004 to 2017, a recurrent selection program was applied to establish two new egg-type chicken strains named Golden Sabahia (GS) (Ghanem *et al*., 2017) and Silver Sabahia (SS))Ali *et al.*, 2017) which used as a grandparent lines for producing a commercial egg-type breed competing the international commercial egg- type breeds.

For establishing GS strain, crossing between 87% blood of Lohman Brown (LB) and 12.5% from four developed strains (Mandarh, Baheije, Silver Montazah and Golden Montazh), also, for developing SS, was contributed from 78.5% blood of Lohman Selected Leghorn (LSL) and 12.5% from four developed strains (Matrouh, Baheije, Silver Montazah and Golden Montazh)

The productive and phenotypic characteristics of the two studied strains are shown in Table (1) and Fig (1).

Management and experimental design

The chickens were brooded on the floor and grown in the opening house up to 16 weeks of age. Then, the hens were transferred to laying cages. The temperature during the experiment period ranged from 20 to 25 ◦C. Natural photoperiod was used in the growing period and increased to 16 hours in the laying period. Feeding system, starter diet was crude protein 23% and ME 2916 kcal/ kg diet from 0 to 2 weeks of age, crude protein 20% and ME 2966 kcal/ kg diet from 3 to 8 weeks of age, grower diet 15% crude protein and ME 2715 kcal/ kg diet from 9 to 17 weeks of age, 17% crude protein and ME 2711 kcal/ kg diet from 18 to 20 weeks of age and layer diet 18% crude protein and ME 2850 kcal/ kg diet from 21 to 60 weeks of age.

Egg quality traits

Four hundred and eighty eggs were randomly collected from GS and SS chickens at 36, 46, and 56 wks of age. Random samples from eggs within four hours after lying were used to evaluate some external and internal egg quality characteristics. The eggs were numbered and weighed using a sensitive scale to the nearest 0.01 g. The dimensions of the eggs (width and length) were measured using a digital caliper. Then, eggs were broken out on a flat glass to measure the yolk height, diameter and albumen height by a standard tripod micrometer. Dry eggshell, yolk, and albumin weights were recorded, and their relative weights were calculated: item weight (g)/ egg weight (g) *100. Also, the yolk index was calculated as yolk height /yolk diameter*100. The yolk color was determined using the La Roche yolk color fan. Haugh units were calculated according to Stadelman et al. (1988). The eggshell thickness (mm) was measured at three different points of the egg by a digital micrometer.

Geometrical parameters:

Based on the measurements of egg length (L) and width (w), five geometrical parameters; the egg shape index (SI), the geometrical mean diameter of eggs (Dg) and the surface area of egg (S), were calculated formulas as follow:

SI= (W/L)*100 (Sarica and Erensayin, 2004).

$Dg = (L*W^2)^{1/3}$ (Mohsenin, 1970).

$S = \pi * DG^2$ (Baryeh and Mangope, 2003).

Sphericity of eggs (ϕ) = (Dg/L)*100; and

Volume of eggs (V) $=(\pi/6)*L*W^2$ (Kumbar *et al.*, 2016).

Statistical analysis

Data were analyzed by a two-way ANOVA using general linear model (SAS 2004). The main effects were chicken ecotype (GS vs. SS) and age (36, 46 vs 56 wk). The interaction between the two main factors (ecotype x age) was tested. A p_value ≤ 0.05 was used to declare statistical significance.

$Y_{ii}=\mu+S_i+A_j+e_{ijK,}$

Where: Y_{ij}: an observation, µ: overall, S_i: effect of strain, $A_{j\ :}$ effect of age, e_{ij}: the residual effect.

Duncan Multiple Range test was used to test the significant differences (Duncan 1955).

RESULTS AND DISCUSSION

Egg weight is the main phenotypic parameter that affects egg quality. Results presented in Table (2) show that the egg weight of the GS (53.74g) was significantly (P ≤ 0.01) heavier than that of SS (51.69 g). A similar notice was reported by Sharma *et al.* (2022), who found that lying hen strain affects performance, egg quality indices, and eggshell microbial load. Also, Vits *et al.* (2005) and Ghanem and Afifi (2013) assumed that genotype influences egg weight. Concerning egg weight measured during different ages, results show that egg weight was significantly (p≤0.01) increased by age (50.85, 53.67, and 56.69 g) for GS strain and (47.83, 51.48, and 54.76 g) for SS one at different ages (36, 46 and 56 wks), respectively. The heaviest egg weight (p≤0.01) was recorded at 56 wk of age for GS followed by those for SS strain.

These results are in line with findings reported by Zita *et al*.(2009) who showed that egg weight was significantly increased by age from 30 to 60 wks of age. Also, Sirri *et al.* (2018) and Sharma *et al*. (2022) found the same results of the significant effect of ages and genotype on the mentioned parameters .

Results in Table 2 showed that the albumen weight, and shell weight values were significantly (p≤0.01) higher in GS eggs (30.73, and 5.2 g) compared with those of SS one (29.02, 4.77 g), respectively. While, there were no significant differences with respect to yolk weight. The averages of egg weight components for GS and SS strains were higher than those reported by Ali *et al.* (2010) due to crossing between two local Egyptian strains. However, these parameters were significantly increased (P≤ 0.01) among the different ages. The increase of yolk, albumen and shell weight with age advance were previously supports by Rajkumar *et al.*, 2009 , padhi *et al.*, 2013 and Kowalsko *et al.*, 2021.

The percentage of yolk differs significantly ($p \leq 0.05$) between the two studied strains as shown in Table (3), where SS eggs had a higher value of yolk% than that of GS. Also, the yolk percentage at the studied third age (56wk) had the highest significant ($p \leq 0.01$) value compared to the other experimental ages. These results are not agreement with those reported by Afifi *et al.* (2007) who found that age and strain had no effector on yolk %. Concerning albumen weight percentage, there was no significant difference between the two studied strains, moreover, albumen weight % had the lowest significant ($P \leq 0.01$) value at the third age (56 wk) compared with those for first and the second ones. These results are keeping with those reporte by Silversides and Scott (2001) and Tumova and Gous (2012) who found that albumen% decreased as age advances.

As for the egg shell%, results show significant differences ($p \leq 0.01$) between both strains and among ages where GS eggs had higher eggshell % than that of SS one. Egg shell weight % significantly decreased at 56 wk of age when compared to 36 and 46 wks of age for the two studied strains, and there results are in harmony with that of Zita *et al.* (2009) who reported that egg shell % decreased with age of hen from 26 to 54 wk for ISA, Hisex Brown and Moravia chickens, while, Padhi *et al*. (2013) showed that chickens age had no significant influence on eggshell%. The interaction analysis in this table reveals that lowest yolk % was found at 46 wk of age for GS, while, the highest values of albumen and shell weights percentages were detected for GS at 46 wk of age when compared with SS among the studied ages. Resulted in Table 2and3 indicated that the egg weight and egg weight component and percentages had been increased by age and affected by chicken strain.

Egg shell of GS strain was significantly thicker (0.32mm) than that of SS (0.31mm) (Table3). These results are in agreement with the results reported by Zita *et al*. (2009) who found that the shell for ISA Brown eggs was significantly ($p \leq 0.01$) thicker than those for both of Moravia hens and Hiesex Brown hens. Also, eggshell thickness of Rhode Island Red breed was greater than that of Hy-line brown (0.339 vs 0.351), respectively (Sokotowicz et al., 2018).

By age of hen, eggshell thickness were significantly (p≤o.o1) reduced as the studied ages 36,46 and 56 wks, represented 0.322, 0.312 and 0.308mm , respectively. These results parallel earlier studies by Afifi *et al.*, 2007 and Fathi *et al.*, 2010 for local developed strain but with higher results of thickness. While, conflicted reports were previously reported by different authors as Padhi *et al.* *(*2013) and Van Den Brand *et al.* (2004).

In Table (4), the results showed significant ($p \leq 0.01$) differences in albumen height and Haugh unit as results of interaction between strains and flock ages. Golden Sabahia recorded higher values for albumen height and Haugh unit (1.64, 93.46) than those of SS (1.60, 90.80), respectively. However, Zita *et al.* (2009) and Sokotowicz *et al.* (2018) reported that albumen height and HU values were significantly affected by genotype. While these traits significantly decreased with increasing the age of the two studied strains. These results agree with the findings of Alo *et al*. (2023) who showed that the albumen height and HU had higher values at 32 weeks of age than those at 60 weeks of age for Funaab-alpha broiler breeder hens.

Table 4 represented poorest significant values of albumen height and HU for SS eggs at 56 wk of age compared with the other values of interactions. These results are in agreement with those reported by Tumova and Gous (2012) and Padhi *et al*.(2013) who observed that the Haugh unit score was decreased toward the later part of the laying cycle. On the contrary, Rizzi and Chiericato (2005) found that the values of Haugh unit were increased with the age of hens and significantly affected by the strains.

No significant difference was found between the two strains concerning the yolk color values (Table 4), while, it was significantly ($p \leq 0.05$) increased by advancing age. High color intensity was observed at the third experimental age (56 wk), Hammershoij *et al.*, 2021 observed that the yolk color was influenced by genotype and age. Contradicted results were reported by Niranjan *et al.* (2008) and Rajkumar *et al.* (2009) reported that yolk color not affected by age or strains. Also, Yeon-Hwakim *et al.*(2015) reported that the color of egg yolk depending on the diet of the chicken that laid the egg.

The yolk index can be used successfully to monitor egg quality in dependent of hen age, as shown in Table 4. Yolk index did not represent any significant change with respect to chicken strain and flock age. The same result was reported by Ghanem and Afifi (2013) who found no significant differences between strains at 40 wks of age. The interaction analysis reveals that the highest numerical values of yolk index were observed for both strains at 56 wk of age. These results support the previous report by Padhi *et al*. (2013) who found no significant different between 40 and 70 wks of age.

Egg geometrical characters for GS and SS at 36, 46 and 56 wk. of ages are shown in Table (5). Data of this table recorded that chickens strain had a significant influence on geometric mean diameter of eggs (DG), surface area (S) and volume (V), (3.91cm, 48.13cm^2 and 49.73cm^3) for GS and (3.85, 46.49 and 46.87) for SS, respectively. While, chickens age had significantly influence on all studied parameters except of degree of sphericity ((ϕ)). All the significant increase of these parameters with age advance was notice in the third studied age (56wk) for SS strains compared with the other values of interaction. Discrepancies were found in the literature concerning egg shape index with reported with Tumova and Gous (2012) and Padhi *et al.,* 2013 who found that no significant differences between age, while, Zita *et al.*, 2009 observed a significant differences between age and genotypes.

The significant increase of egg weight for GS compared to SS as represented in the current results could be explained on the light of improvement in the geometrical parameters for these chicken strains. These results and conclusion had been previously mentioned by Wang *et al.*, 2021 who found that the same studied parameters would be very helpful for the evaluation of egg shape and size, also, the eggs have large contours of diameter, surface area and volume have a highly egg weight.

CONCLUSION

It could be concluded from the current results that chickens strain on flock age had a marked influence on the quality and the geometrical parameters of eggs. These parameters may be taken into consideration to improve the hatchability of the expected commercial breed. Also, it is expected from the mentioned results of egg quality that Silver Sabahia could be valid become maternal line and Golden Sabahia as paternal line for producing commercial egg-type breed.

Table (1): Productive parameters of Golden Sabahia (GS) and Silver Sabahia (SS) strains

Trait	GS	SS
Hen's BW at sexual maturity(g)	1800	1650
Egg number / 52 weeks	219	220
Egg weight (g)	58	57
Eggshell color	Brown	Tint
Fertility (%)	88	87
Hatchability of fertile eggs (%)	84	88
References	Ghanem et al. (2017)	Ali et al. (2017)

Table (2): Weights of egg, yolk, albumen and shell egg of Golden Sabahia (GS) and Silver Sabahia (SS) strain at36, 46 and 56 weeks of age

Traits / Items		Egg weight (g)	Yolk weight (g)	Albumen weight (g)	Shell weight (g)
Golden Sabahia		53.74±0.4 A	16.27±0.1	30.73±0.3 A	5.20±0.04 A
Silver Sabahia		51.69±0.3 B	16.30±0.2	29.02±0.2 B	4.77±0.04 B
Age	**36 wk**	49.34±0.3 C	14.84±0.1 C	28.32±0.3 B	4.78±0.04 C
	46 wk	52.58±0.3 B	16.00±0.1 B	30.35±0.3 A	5.07±0.06 B
	56wk	55.73±0.6 A	18.00±0.2 A	30.94±0.6 A	5.25±0.06 A
Strain * Age					
GS	**36 wk**	50.85± 0.4 c	15.10±0.1 c	29.30 c ±0.4 c	4.96±0.06 bc
	46 wk	53.67±0.4 b	15.97±0.2 b	31.15±0.4 ab	5.34±0.09 a
	56wk	56.69±1 a	17.74±0.2 a	31.74±1 a	5.41±0.08 a
SS	**36 wk**	47.83±0.3 d	14.59±0.1 c	27.34±0.3 d	4.60±0.04 d
	46 wk	51.48±0.5 c	16.03±0.2 b	29.57±0.4 c	4.80±0.06 cd
	56 wk	54.76±0.6 b	18.27±0.3 a	30.14±0.6 bc	5.07±0.08 b
P-Value					
Strain		**	NS	**	**
Age		**	*	**	**
Strain * Age		**	*	*	**

Means ±SE followed by uppercase superscripts, within the same trait, in the columns significantly differ. *:P-Value at (p≤0.05), **: P-Value (p≤0.01), NS:non significant.

Table (3): Yolk, albumen and shell egg relative weights and shell thickness of Golden Sabahia (GS) and Silver Sabahia(SS) strains at 36, 46 and 56 weeks of age

Traits / Items		Yolk weight (%)	Albumen weight (%)	Shell weight (%)	Shell thickness (mm)
Golden Sabahia		30.44±0.3 B	56.91±0.4	9.8±0.1 A	0.32±0.002 A
Silver Sabahia		31.73±0.2 A	56.45±0.2	9.4±0.1 B	0.31±0.002 B
Age	**36 wk**	30.28±0.3 B	57.17±0.4 A	9.7±0.1 A	0.322±0.002 A
	46 wk	30.51±0.3 B	57.64±0.3 A	9. 7±0.1 A	0.312±0.002 B
	56 wk	32.46±0.4 A	55.23±0.5 B	9.5±0.1 B	0.308±0.004 B
Strain * Age					
GS	**36 wk**	30.0±0.5 c	57.26±0.6 a	9.80±0.1 ab	0.33±0.003 a
	46 wk	29.83±0.3 c	57.93±0.4 a	9.98±0.2 a	0.32±0.004 ab
	56wk	31.49±0.4 b	55.54±0. 8 b	9.65±0.2 ab	0.32±0.001 ab
SS	**36 wk**	30.55±0.3 bc	57.09±0.3 a	9.63±0.1 abc	0.32±0.003 ab
	46 wk	31.19±0.4 bc	57.35±0.4 a	9.36±0.1 bc	0.31±0.003 bc
	56 wk	33.44±0.6 a	54.91±0.7 b	9.31±0.2 c	0.30±0.004 c
P-Value					
Strain		*	NS	**	**
Age		**	**	*	**
Strain * Age		**	*	*	*

Means ±SE followed by uppercase superscripts, within the same trait in the column, significantly differ.:*P-Value at (p≤0.05), **: P-Value (p≤0.01), NS: non significant

Table (4): Albumen height, Haugh unit, yolk color and yolk index of Golden Sabahia (GS) and Silver Sabahia(SS) at 36, 46 and 56 weeks of age

Traits / Items		Albumen height	Haugh unit	Yolk color	Yolk index
Golden Sabahia		$1.64{\pm}0.01^{A}$	$93.46{\pm}0.7^{A}$	7.04±0.1	44.3±0.32
Silver Sabahia		$1.60{\pm}0.01^{B}$	$90.80{\pm}0.7^{B}$	7.07±0.1	43.9±0.33
Age	36wk	$1.65{\pm}0.01^{A}$	$96.68{\pm}0.6^{A}$	$6.93{\pm}0.1^{B}$	43.8±0.27
	46 wk	1.62 ± 0.01^{A}	$91.56{\pm}0.8^{B}$	$7.05{\pm}0.1^{AB}$	44.3± .44
	56wk	$1.570{\pm}0.02^{B}$	$83.44{\pm}1^{C}$	$7.35{\pm}0.1^{A}$	44.5±0.58
Strain * Age					
GS	36 wk	$1.66{\pm}0.01^{a}$	$98.03{\pm}0.9^{a}$	6.79±0.2	44.0±0.42
	46 wk	$1.63{\pm}0.01^{ab}$	$92.4{\pm}1^{bc}$	7.13±0.1	44.5±0.61
	56wk	$1.63{\pm}0.02^{ab}$	$85.75{\pm}1^{d}$	7.40±0.1	44.8±0.7.
SS	36 wk	$1.63{\pm}0.01^{ab}$	$95.33{\pm}0.8^{ab}$	7.06±0.2	43.6±0.35
	46 wk	$1.59{\pm}0.02^{b}$	$90.72{\pm}1^{c}$	6.96±0.1	44.2±0.63
	56 wk	1.51 ± 0.02^{c}	$81.02{\pm}1.4^{e}$	7.31±0.7	44.1±0.95
P-Value					
Strain		**	**	NS	NS
Age		**	**	*	NS
Strain * Age		**	**	NS	NS

Means ±SE followed by uppercase superscripts, within the same trait in the column, significantly differ.:*P-Value at (p≤0.05), **: P-Value(p≤0.01), NS: non significant

Table (5): Egg geometrical parameters of Golden Sabahia (GS) and Silver Sabahia(SS) at 36, 46 and 56 weeks of age

Traits / Items		Shape index(%)	Diameter of egg (cm)	Egg surface area (Cm^2)	Sphericity Degree (%)	Volume cm^3
GS		77.04±0.3	$3.91{\pm}0.01^{A}$	$48.13{\pm}0.31^{A}$	72.2±0.17	49.73±0.5
SS		76.39±0.26	$3.85{\pm}0.01^{B}$	$46.49{\pm}0.24^{B}$	71.93±0.16	46.87±0.41
Age	**36wk**	$76.7{\pm}0.28^{B}$	$3.82{\pm}0.01^{C}$	$45.8{\pm}0.19^{C}$	72.17±0.17	$45.60{\pm}0.33^{C}$
	46wk	$76.11{\pm}0.31^{B}$	$3.87{\pm}0.01^{B}$	$47.03{\pm}0.24^{B}$	71.71±0.19	$47.73{\pm}0.42^{B}$
	56wk	$77.78{\pm}0.49^{A}$	$4.02{\pm}0.02^{A}$	$50.85{\pm}0.59^{A}$	72.45±0.27	$54.63{\pm}1.01^{A}$
GS	**36 wk**	$76.83{\pm}0.44^{c}$	$3.87{\pm}0.01^{bc}$	$46.99{\pm}0.28^{bc}$	72.16±0.27	$47.64{\pm}0.48^{bc}$
	46 wk	$77.1{\pm}0.43^{b}$	$3.91{\pm}0.01^{b}$	$48.0{\pm}0.33^{b}$	72.25±0.26	$49.26{\pm}0.58^{b}$
	56wk	$77.34{\pm}0.8^{b}$	$4.01{\pm}0.05^{a}$	$50.74{\pm}1.1^{a}$	72.19±0.42	$54.7{\pm}1.9^{a}$
SS	**36 wk**	$76.52{\pm}0.36^{c}$	$3.77{\pm}0.01^{d}$	$44.55{\pm}0.2^{d}$	72.19±0.33	$43.56{\pm}0.32^{d}$
	46 wk	$75.14{\pm}0.43^{c}$	$3.83{\pm}0.13^{c}$	$46.14{\pm}0.33^{c}$	71.17±0.27	$46.23{\pm}0.54^{c}$
	56 wk	$78.22{\pm}0.6^{a}$	$4.03{\pm}0.02^{a}$	$50.96{\pm}0.45^{a}$	72.70±0.35	$54.56{\pm}0.8^{a}$
P-value						
Strain		NS	**	**	NS	NS
Age		**	**	**	NS	**
Strain X Age		*	**	*	NS	*

Means ±SE followed by uppercase superscripts, within the same trait in the column, significantly differ. P-Value at (p≤0.05), **: P-Value(p≤0.01), NS: non significant

Fig. (1): Golden Sabahia and Silver Sabahia Egyptian chicken strains

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الملخص العربى

تقيم المقايس الهندسيه و صفات جوده البيض لسلالتين مستنبطتتين من الدجاج البياض

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الهدف من هذه الدراسه هو تقيم صفات جوده البيض لكلا من سلالاتى الصبحيه الذهبى و الصبحيه الفضى- سلالاتين مصريتين جديدتين- عند اعمار ٣٦ و٤٦ و ٥٦ اسبوع من العمر. تم اخذ ٤٨٠بيضه عشوائيا من الصبحيه الذهبى و الصبحيه الفضى لقياس صفات جوده البيض الداخليه و الخارجيه و ايضا لحساب المقاييس الهندسيه للبيض.

اوضحت النتائج ان سلالة الصبحيه الذهبى كانت احسن معنويا لكلا من صفات وزن البيض، قطر البيضه الهندسى، مساحة البيضه مقارنه بسلالة الصبحيه الفضى. كما ان قيم صفات الصفار (الوزن و % للدليل) و صفات البياض (وزن و اراتفاع ووحدات هيو) و ايضا وزن قشرة البيض كانت اعلى معنويا فى سلالة الصبحيه الذهبى مقارنة بسلالة الصبحيه الفضى. وجد ان صفات جودة البيض الداخليه و الخارجيه زادت مع التقدم بالعمر.

و نخلص مما سبق ان المقاييس الهندسيه لجوده البيض يمكن استخدامها فى تحسين صفات التفريخ للقطيع التجارى المتوقع انتاجه و كذلك يمكن القول ان سلالة الصبحيه الفضى يمكن استخدامها فى تكوين خط الامهات و سلالة الصبحيه الذهبى يمكن استخدامها فى تكوين خط الاباء لانتاج قطيع بيض تجارى.