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The Effect of Line and Age on The Egg External Characteristics of Japanese Quail

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Abstract

External egg traits like egg length, breadth, shape index, volume and surface area play important roles for egg hatching, embryo growth, and chick survival. 313 fertilized eggs were collected from three genetic lines of Japanese quail named (white, brown, and gray) in four collected ages (57, 64, 71, and 78) days. After collecting the traits were measured by using electronic balance (0.001gm.) sensitivity, and caliper vernier (0.01 mm.). The data show significant differences between some traits and some of them differ with the age of birds and the interaction between the genetic lines and age of collecting eggs. Our results conclude there were significant differences between the three genetic lines on egg external traits and between the collecting age and their infarctions. May its helpful for future studies to establish lines special for egg production, or to make studies on molecular levels.

Key words: characteristics, egg, production

Introduction

The egg is the place that is formed in the embryo until the time of hatching after the process of fertilization that takes place inside the body of the female. Therefore, the external characteristics of the eggs are among the determining factors for the optimal growth of the embryo. In addition to what was mentioned, the shape of the egg is an important for characterizing the bird species (1-4), health condition of the hen, and as well as feeding the flock (5). The egg external traits are affected by many factors, including genetic factors (6-8), age of the bird (9-10), hen oviposition (11) and the environmental factors (12-14).

Study of (15) shown that egg shape index in chicken is between (72-76), as an increase or decrease in this rate negatively affects the growth of the embryo and it's hatching in a good health condition. Other external egg characteristics were studied and had a close relationship with embryo growth, hatching (16-18), and consumer desire, including egg length, egg breadth, egg size, and surface area (19).

The aim of current study is to the effect of genetic line and the age of oviposition and the interactions between them on the egg external traits by using three genetic lines of Japanese quail.

Materials and Methods

The study was carried out in March 2022 in the college of agriculture, Kirkuk University. Three genetic lines of Japanese quail were used, which were given names as (White, Brown, and Gray) aged 30 days. The birds were managed under closed system with all equipment. The birds were rearing using diets contain (24 %) crude protein and energy (2900) Kcal/kg.

A total of (313) eggs were collected, comparison (98) eggs from White line, (100) eggs from Brown line, and (115) eggs from the gray line when the flock age was between (100-107) days of age. After collecting eggs were weights by using electronic balance with (0.001 gm.) sensitivity. The length and breadth of eggs were measured by using caliper vernier (0.01 mm.). The three measurements were calculated as described below (20). Egg shape index (ESI) were calculated by using the equation of:

$$ESI = (B/L) * 100$$

The egg volume (EV) was calculated by using the equation of:

$$EV= (0.6057-0.0018 * B) * LB^2$$

The Egg surface area (ESA) were calculated by using the equation of:

$$ESA= (3.155-0.0136 * L + 0.0115 * B) * LB$$

Where = Breadth, L = Length

Mean, and standard error of eggs and their measurements were calculated using descriptive statistics of SPSS/PASW statistics for windows version 19. The effect of genetic lines for the traits was calculated by using one-way analysis of variance, and the differences between the means of each trait was test by using Duncan Multiple Range Test (21).

Result and discussion:

The mean and standard deviation for the egg weight in (gm.), egg length in (mm), and the egg breadth in (mm) are shown in table 1. Significant differences were observed among the lines (brown, gray, and white) in egg weight, where the gray was the highest, followed by brown and white 9.566, 9.489, and 9.368 respectively. As for egg length the gray was significantly the highest value followed by white and brown 31.659, 31.617, and 31.357 respectively. And about the Egg breadth there was no significant differences between the gray and brown lines, but both significantly differ with white line 24.864, 24.839, and 24.606 respectively. About the period (age of collecting the eggs) for the egg weight the age of 64 significantly differ upon the three ages 10.848, 10.252, 8.749, and 8.053 respectively. About the interaction between the line and the age of collection the line gray, white and brown in the age of 64 days were significantly differing with another interactions 10.937, 10.749, and 10.853 respectively.

The mean and standard deviation for the egg shape index in (%), egg volume in (mm^3), and the egg surface area in (mm^2) are shown in table 2. The brown line significantly has highest egg shape index 79.291 compare with gray and white 78.604, and 77.883 respectively. And about the egg volume there was no significant differences between the lines (P>0.05). Also egg surface area was not differing among the lines. The shape index was the highest in age 71 days compare with another three ages. But about the egg volume and the egg surface area, the age of 78 days was the highest significantly among the ages. The interaction between the brown line and the age at 71 day was significantly the highest egg shape index 79.944 among the interactions. For the egg volume and the egg surface are the interaction between the gray line and the age at 78 day was the significantly the highest among the interactions 11668.786mm^3, and 1175.609 mm^2 respectively.

Kul & Seker, (2004) in their study reported close values by using Japanese quail to study the egg parameters. Also (23) were used two breeds of Japanese quail to study the egg productivity and the egg quality and he found the Manchurian golden quail egg quality were significantly more than Pharaoh breed. May the variation between the three genetic lines in our study differ upon the selection methods and their purpose of selection as (24) Reported. Moreover (25) was used four different close quail stocks to study some egg traits for three different time of collection, he observed there was significant differences among the stocks in egg quality.

Table 1: The effect of lines, periods, and the interactions for the egg weight, egg length, and the egg

breadth

	Egg weight (gm)		Egg length (mm)		Egg breadth (mm)	
Line (L)	Mean	SD	Mean	SD	Mean	SD
Brown	9.489 **ab**	1.35	31.357 **b**	1.25	24.839 **a**	0.75
Gray	9.566 **a**	1.38	31.659 **a**	1.27	24.864 **a**	0.85
White	9.368 **b**	1.46	31.617 **ab**	1.40	24.606 **b**	0.93
Period (P)						
57 days	10.252 **b**	0.90	31.292 **c**	1.22	24.390 **c**	0.77
64 days	10.848 **a**	0.91	31.761 **b**	1.16	24.886 **b**	0.73
71 days	8.053 **d**	0.77	30.963 **d**	1.24	24.575 **c**	0.84
78 days	8.749 **c**	0.75	32.192 **a**	1.28	25.225 **a**	0.85
Interaction (L*P)						
Brown*57 day	10.296 **b**	0.84	31.181 **cd**	1.26	24.448 **ef**	0.65
Brown*64 day	10.853 **a**	0.79	31.420 **bcd**	1.09	25.037 **abc**	0.64
Brown*71 day	8.056 **d**	0.72	30.820 **d**	1.24	24.614 **def**	0.81
Brown*78 day	8.753 **c**	0.61	32.006 **ab**	1.13	25.256 **ab**	0.61
Gray*57 day	10.364 **b**	0.81	31.479 **bc**	1.13	24.463 **ef**	0.74
Gray*64 day	10.937 **a**	0.88	31.912 **ab**	1.03	24.958 **bcd**	0.63
Gray*71 day	8.110 **d**	0.70	30.960 **cd**	1.20	24.663 **cde**	0.72
Gray*78 day	8.853 **c**	0.74	32.287 **a**	1.32	25.372 **a**	1.01
White*57 day	10.094 **b**	1.04	31.198 **cd**	1.30	24.260 **f**	0.88
White*64 day	10.749 **a**	1.04	31.911 **ab**	1.31	24.674 **cde**	0.87
White*71 day	7.991 **d**	0.89	31.096 **cd**	1.31	24.446 **ef**	0.99
White*78 day	8.637 **c**	0.87	32.262 **a**	1.36	25.043 **abc**	0.84

a-d indicate significant differences in column.

Table 2: The effect of lines, periods, and the interactions for the egg shape index, egg volume, and the egg surface area.

	Egg shape index (%)		Egg volume (mm^3)		Egg surface area (mm^2)	
Line (L)	Mean	SD	Mean	SD	Mean	SD
Brown	79.291 **a**	2.83	10874.281 **a**	932.11	225.645 **a**	19.58
Gray	78.604 **b**	2.83	11005.658 **a**	1046.61	228.366 **a**	22.07
White	77.883 **c**	2.45	10784.679 **a**	1173.81	223.667 **a**	24.66
Period (P)						
57 days	78.009 **b**	2.66	10480.087 **c**	922.88	217.257 **c**	19.36
64 days	78.411 **b**	2.46	11054.452 **b**	919.34	229.366 **b**	19.32
71 days	79.433 **a**	2.76	10525.536 **c**	1008.86	218.330 **c**	21.21
78 days	78.430 **b**	2.97	11502.122 **a**	1052.35	238.809 **a**	22.23
Interaction (L*P)						
Brown*57 day	78.485 **bcd**	2.60	10486.938 **cd**	863.28	217.429 **de**	18.07
Brown*64 day	79.749 **ab**	2.60	11056.814 **bc**	802.38	229.518 **bc**	16.87
Brown*71 day	79.944 **a**	3.09	10504.445 **cd**	946.58	217.920 **de**	19.90
Brown*78 day	78.986 **abc**	2.86	11448.926 **ab**	769.92	237.714 **ab**	16.20
Gray*57 day	77.780 **cd**	2.87	10597.237 **de**	845.50	219.697 **de**	17.77
Gray*64 day	78.251 **cd**	2.01	11164.118 **bc**	822.47	231.655 **bc**	17.30
Gray*71 day	79.724 **ab**	2.43	10592.490 **de**	929.32	219.750 **de**	19.54
Gray*78 day	78.662 **abcd**	3.52	11668.786 **a**	1175.60	242.360 **a**	24.94
White*57 day	77.818 **cd**	2.49	10351.161 **d**	1049.31	214.546 **e**	22.01
White*64 day	77.367 **d**	2.23	10937.427 **cd**	1103.69	226.830 **cd**	23.18
White*71 day	78.665 **abcd**	2.67	10474.475 **cd**	1153.74	217.212 **de**	24.26
White*78 day	77.684 **cd**	2.28	11375.652 **abc**	1135.39	236.080 **abc**	23.88

a-d indicate significant differences in column.

Conclusion:

There were significant differences between the three genetic lines on egg external traits and between the collecting age and their infarctions. May its helpful for future studies to establish lines special for egg production, us to make studies on molecular levels.

conflict of Interest

The author(s) declared that there is no conflict of interest.

References

1. Shaker, A. S., Amin, Q. A., Akram, S. A., Kirkuki, S. M., Talabani, R. S., Mustafa, N. A., et al. (2019 a). Using principal component analysis to identify components predictive of shape index in chicken, quail and guinea fowl. *International journal of poultry science , 18*, 76-79.
2. Shaker, A. S., Ameen, Q. A., Mustafa, N. A., Akram, S. A., Kirkuki, S. M., Saeed, R. B., et al. (2019 c). The variation between the proportions of egg external and internal traits in four species of birds. *Internatonal journal of advances in science engineering and technology , 7* (4), 1-4.
3. Amin, Q. A., Shaker, A. S., Akram, S. A., Kirkuk, S. M., Saeed, R. B., & Mohammed, M. S. (2019). Using principal component analysis to characterize egg component in two waterfowl species. *Journal of animal and poultry production , 10* (10), 313-316.
4. Shaker, A. S., Hermiz, H. N., Ameen, K. A., & Ameen, Q. A. (2021). Egg external characteristics uniformity between and within red-wattled lapwing nests in Kirkuk. *Proceedings of IRES international conference*, (pp. 6-10). Vienna.
5. Lim, K. S., You, S. J., An, B. K., & Kang, C. W. (2006). Effects of dietary garlic powder and copper on cholestrol content and quality characteristics of chicken eggs. *Asian-Aust.J.Anim.Sci. , 19* (4), 582-586.
6. Shaker, A. S., Hermiz, H. N., Al-Khatib, T. R., & Mohammed, R. M. (2016). Egg shape characterization for four genetic groups of Kurdish local chickens. *Food and nutrition science-an international journal , 1*, 20-25.
7. Shaker, A. S., Mustafa, N. A., Ameen, Q. A., Hermiz, H. N., Saadullah, M. A., Ramadan, A. A., et al. (2019 b). Egg traits uniformity comparison between Kurdish local chicken and two commercial strain using coefficient of variation. *International journal of advances in science engineering and technology , 7* (4), 62-65.
8. Shaker, A. S., Ameen, Q. A., Ortiga Torres, M. J., & Chassab, J. H. (2020). Using the external egg traits to predict the shape index by using multiple linear regression among local and commercial chicken. *Plant archives , 20* (2), 6685-6688.
9. Shaker, A. S., Kirkuki, S. M., Aziz, S. R., & Jalal, B. J. (2017). Influence of genotype and hen age on the egg shape index. *International journal of biochemistry, biophysics and molecular biology , 2* (6), 68-70.

10. Aziz, S. R., Shaker, A. S., & Kirkuki, S. M. (2017). Changes in external egg traits of chickens during pre and post molting periods. *Poultry science journal , 5* (2), 9-13.
11. Shaker, A. S., Mustafa, N. A., Ameen, Q. A., Saadullah, M. A., Ramadan, A. A., & Aziz, S. R. (2019 d). Effect of hen Oviposition time on some egg characteristics. *J.Animal and poultry prod. , 10* (6), 171-174.
12. Talukder, S., Islam, T., Sarker, S., & Islam, M. M. (2010). Effect of environment on layer performance. *J. Bangladesh Agril. Univ. , 8* (2), 253-258.
13. Lewko, L., & Gornowicz, E. (2011). Effect of housing system on egg quality in laying hens. *Ann. Anim. Sci. , 11* (4), 607-616.
14. Hermiz, H. N., Shaker, A. S., Abas, K. A., Sardary, S. Y., Ameen, Q. A., & Al-Khatib, T. R. (2019). Egg producton evaluation for Kurdish local chicken in two different envirnments and estimates of their genetic parameters. *International journal of advances in science engineering and technology , 7* (4), 72-75.
15. Sarica, M., & Erensayin, C. (2004). *Poultry productis.* Ankara, Turkey: Bey-Ofset.
16. Narushin, V. G., & Romanov, M. N. (2002). Egg physical characteristics and hatchability. *World's poultry science journal , 58*, 297-303.
17. Pinowska, B., Barkowska, M., Pinowski, J., & Hahm, K.-H. (2002). The effect of egg size on hatching rate in the tree sparrow passer monyanus. *Acta ornithologica , 37* (1), 7-14.
18. Turkylmaz, M. K., Dereli, E., & Sahin, T. (2005). Effects of shell thickness, shell porosity, shape index and egg weight loss on hatchability in Japanese quail (Coturinx coturnix japonica). *Kafkas Univ. Vet. Fak. Derg. , 11* (2), 147-150.
19. John-Jaja, S. A., Abdullah, A.-R., & Nwokolo, S. C. (2016). Effects of age variance on repeatability estimates of egg dimensions of bovan nera black laying chickens. *journal of genetic engineering and biotechnolgy , 14*, 219-226.
20. Narushin, V. G. (2005). Production, modeling and education egg geometry calculation using the measurements of length and breadth. *Poultry science , 84*, 482-484.
21. Duncan, D. B. (1955). The multiple range and F test. *Biometrics , 11*, 1-45.
22. Kul, S., & Seker, I. (2004). Phenotypic correlations between some external and internal egg quality traits in the Japanese quail (Coturnix coturnix japonica). *International journal of poultry science , 3* (6), 400-405.
23. Genchev, A., & Kabakchiev, M. (2009). Egg productivity and egg quality estimation and evaluation of two breeds of japanese qauils (Coturnix Japonica). *Agricultural science and technology , 1*, 8-12.
24. Alkan, S., Karabag, K., Galic, A., Karsli, T., & Balcioglu, M. (2010). Effects of selection for body weight and egg production on egg quality trats in Japanese quail(coturnix coturnix japonica) of different lines and relationships between these traits. *Kafkas Univ Vet Fak Derg , 16* (2), 239-244.

25. Hussain, J., Akram, M., Javed, K., Sahota, A., Mehmood, S., Ahmed, S., et al. (2011). Age related canges in egg weight and quality traits in four different close bird stocks of Japanese quail. *Punjab Univ. J. Zool , 26* (2), 95-104.

تأثير الخط الوراثي والعمر على الخصائص الخارجية لبيض طائر السمان الياباني

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الخلاصة

تعد مواصفات البيض الخارجية مثل طول البيض وعرضها ومؤشر الشكل والحجم ومساحة السطح مؤشرات مهمة في فقس البيض ونمو الجنين وبقاء الافراخ على قيد الحياة. تم جمع 313 بيضة مخصبة من ثلاث سلالات وراثية لطائر السمان الياباني (أبيض، بني، رمادي) في أربعة أعمار (57, 64، 71، 78) يومًا. بعد جمع البيض تم قياس صفات البيض باستخدام الميزان الإلكتروني ذو حساسية (0.001 غم)، وجهاز قدمة الكتروني ذات دقة (0.01 مم). دلت النتائج على وجود فروق ذات دلالة إحصائية معنوية بين الخطوط الجينية الثلاثة على الصفات الخارجية للبيض وبين الاعمار المختلفة والتداخل بينها. قد يكون من المفيد للدراسات المستقبلية إنشاء خطوط خاصة لإنتاج البيض، لإجراء دراسات على المستويات الجزيئية.

الكلمات المفتاحية: الخصائص، البيضة، الإنتاج.