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EVALUATION OF SOME EXTERNAL AND INTERNAL EGG QUALITY TRAITS OF QUAILS REARED IN BASRAH CITY

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ABSTRACT

This study was designated to evaluate some external and internal characteristics of quail eggs reared in Basrah city. Ten mature female quails were used in the present study. All birds were reared under similar environmental, managerial and hygienic conditions. To assess the egg quality parameters, a total of 100 eggs were randomly collected for 20 days.

The values related to egg weight, shape index, shell weight, shell ratio , shell thickness, egg length, Egg width, Shell index and shell surface area (cm^2) are found respectively as 7.041, 79.590, 0.973, 14.193, 0.307, 2.825, 2.245, 13.044 and 8.205. The internal traits as albumen index, albumen height, albumen weight, albumen ratio, albumen width, Albumen length, albumin average, yolk diameter, yolk height, yolk weight, yolk index, yolk ratio and Yolk : Albumen ratio are found respectively as 12.056, 3.204, 2.5, 35.515, 2.308, 3.058, 2.683, 2.195, 3.983, 2.591, 17.601, 36.746 and 1.120.

INTRODUCTION

Egg is a biological structure intended by nature for reproduction. It protects and provides complete diets for the developing embryo and serves as the principal source of food for the first few days of the chick's life (1) . It has been observed in the poultry breeding that the quails (*Coturnix coturnix*) were benefited as much as hens both for their meat and eggs, therefore, commercial quail breeding have become widespread (2).

Japanese quail are hardy birds that thrive in small cages and are inexpensive to keep. They are affected by common poultry diseases but are fairly disease resistant. Japanese quails are usually in full egg production by 50 days of age. With proper care, hens should lay 200 eggs in their first year of lay. Life expectancy is only 2 to 2½ years. Quail eggs are a mottled brown colour and are often covered with a light blue, chalky material. Each hen appears to lay eggs with a characteristic shell pattern or colour (3).

Egg quality is composed of those characteristics of an egg that affect its acceptability to consumers, it is therefore important that attention is paid to the problems of preservation and marketing of eggs to maintain the quality (4). Of internal egg quality characteristics, thick albumin is quite an important measure for the freshness of an egg (5).

Among many quality characteristics, external factors including cleanliness, freshness, egg weight and shell weight are important in consumers acceptability of shell eggs. On the other hand, interior characteristics such as yolk index, Haugh unit, and chemical composition are also important in egg product industry as the demand for liquid egg, frozen egg, egg powder and yolk oil increases (6). Moreover, external and internal quality traits of the eggs are significant in the poultry breeding for their influence on the yield features of the future generations, breeding performances, and quality and growth of the chicks (7).

It has been reported that the external and internal quality traits of the eggs in both hens and quails had significant effects on the hatchability of incubated and fertile eggs, and weight and development of the laying chicks(8),(9). In the egg processing enterprises, the weight of eggshell, albumen and the yolk that form the egg as well as their rates affect the amount and price of the product (10). Although the internal and external quality traits, especially in the eggs of hens, as well as the correlation between these traits were studied in a number of researches in previous years (9), the number of researches covering such qualities in the quails, especially the phenotypic correlation among these traits were relatively less (11).

Recently in Iraq, especially in the last years, the increasing number of quail breeding activities led the need for examining some issues such as internal and external quality traits of the quail eggs, determining the phenotypic and genetic correlation related to these traits.

MATERIALS AND METHODS

Experimental animals and Management:

The quails used in this study were sourced from Al-Sadeq Bureau for Veterinary Services in Ashar- Basrah city. Ten mature female quails were raised under similar management techniques for twenty days at June (35-42 ^{0}C) . Feed and water were supplied *ad libitum*. Egg collection was usually done in the morning and eggs were measured on the day of lay at room temperature. A total of one hundred eggs were sampled.

Data collection:

Egg weight was measured using a 0.0g sensitive digital scale. Length and width of the egg were measured with electronic digital Vernier caliper sensitive. Shape Index (SI) is estimated using the following equation: Shape Index = [egg width / egg length] × 100 (12).

After taking the external measurements of the egg sizes, measurements of the internal components were obtained by carefully making an opening around the sharp end of the egg, large enough to allow passage of both the albumen and the yolk through it without mixing their contents together. The yolk is then carefully separated from the albumen and placed in a petri dish for weighing. Simultaneously, the

associated albumen is placed on another petri dish and weighed. Both petri dishes used in weighing the egg contents had initially being weighed and the difference in the weights of the petri dish after and before the egg component is taken as the weight of the egg components. After each weighing, the petri dishes are washed in clean water and wiped dry before next weighing. The yolk diameter and albumin height of the egg were measured with electronic caliper (13).

The shell weight with membrane was obtained by carefully placing the opened part in the shell and weighing on the electronic scale. The thickness (mm) of the shell with intact membranes was measured at three deferent points and the average of the broad, sharp and middle part of the egg was obtained by using the electronic digital vernier caliper, it was determined according to Monira, Salahuddin, and Miah (14).

Shell index(g/100 cm^2) was calculated according to following equation: (Shell weight (g) / Shell surface (cm^2) x 100. The specimens were prepared by cutting a piece (1 cm^2) of shell from the equatorial region of each egg. Shell ratio was estimated from the expression: Shell ratio (%) = (Shell weight / Egg Weight) x 100 (15).

The following measurements of egg quality traits were calculated according to Romanoff and Romanoff (16): Yolk index (%) =[Yolk height (cm)/ Yolk diameter(cm)] x 100, Yolk ratio (%) =[Yolk weight(gm)/ Egg weight(gm)] x100, Albumen index (%) = Albumen height (mm)/ Average of albumen length and width) mm x100. Egg yolk/albumin (Y/A) ratio was calculated by dividing the yolk weight by the albumen weight (17).

RESULTS AND DISCUSSION

Means, (± standard deviation) of the quality traits of the examined eggs are shown in Table 1 and Table 2.

Table 1: Means (± SD) of some external egg quality traits for quail eggs

Trait (n=100)	M ± SD	Minimum	Maximum
Egg weight (g)	7.041±1.517	5.0	11.5
Egg length (cm)	2.825± 0.142	2.6	3.2
Egg width (cm)	2.245± 0.072	2.1	2.4
Shape index (%)	79.590± 2.448	82.142	71.875
Shell weight (g)	0.973±0.149	0.50	1.06
shell surface area (cm^2)	8.205± 2.483	4.04	10.00
Shell index(%)	13.044±4.688	10	20
Shell ratio (%)	14.193± 2.934	8.695	20.010
Shell thickness (mm)	0.307± 0.056	0.20	0.38

Table 2: Means (± SD) of some internal egg quality traits for quail eggs

Trait (n=100)	M ± SD	Minimum	Maximum
Yolk weight, (g)	2.591±0.924	1	4
Yolk ratio (%)	36.746±10.215	8.69	50
Yolk height (mm)	3.983±1.610	1	6.6
Yolk diameter (cm)	2.195±0.390	1.4	2.8
Yolk index (%)	17.601 ± 5.846	6.87	28.69
Yolk : Albumen ratio	1.120 ± 0.317	0.75	2
Albumen weight, (g)	2.5 ± 0.944	0.5	4
Albumen ratio (%)	35.515 ± 11.107	10	50
Albumen height (mm)	3.204 ± 0.828	1.8	5
Albumen width (cm)	2.308 ± 0.738	1	3.4
Albumen length (cm)	3.058 ± 0.730	1.6	4.1
Albumin average (cm)	2.683 ± 0.716	1.35	3.75
Albumen index (%)	12.056 ± 5.368	7.82	17.39

Means values determined related to the external and internal quality traits of the egg included (egg width, egg length, shell thickness, shell weight, yolk diameter, albumin height, yolk ratio) indicated similarities with the findings of most researches (18),(19), (20), (10), (21), (22), but differs in other values such as (egg weight, Haugh unit, albumin length, yolk height and yolk weight). The eggs of this study were measured on the day of lay at room temperature. The parameters for measuring the quality traits of all eggs are at maximum when the eggs are freshly laid and decrease with increased storage time (23).

The higher the yolk index (24) and the Haugh unit (25), the more desirable the egg quality. The lower values obtained for yolk indices may be due to environmental temperature under the hot climate of Basrah city which has the greatest effect on egg quality. A reduced temperature as low as 12 ^{0}C (refrigeration) for maximum egg quality retention (26).

Paganelli, (27) described that the initial weight of eggs of specie *Coturnix coturnix* (Japanese Quail) is 9.62, this result is similar to the average egg weighs of this study but it differs from that recorded by (3), which is about 10 g, about 8% of the bodyweight of the quail hen, also differs from (28) who recorded that the overall least-squares means for egg weight score were 13.71 g, and that of (17) who reported an average about 10.89 , these results were higher than the mean of egg weights of this investigation and this may explain due to the genetic differences of quail strains.

The shape index observed in the present investigation (79.590) agreed well with (28) who studied Brown Japanese quails (79.57) as well as with that recorded by (18) (67.42 - 83.28). However, the shape index was not referred to be a good estimator for the shell thickness and the shell ratio. On the contrary, (19) reported that the egg shape index would be used as a criterion for determining the stiffness of eggshell.

According to the results obtained in this research, almost all internal and external quality traits of the egg were showed similar and differences from research to another

and this may resulted from the genetic structure, health condition, flock age, use of different diets, and husbandry management conditions of the quails.

CONCLUSION

It has been considered that it was possible to use the results obtained in this study that contain numerous external and internal quality traits of the quail eggs to contribute in the studies of other researchers who will study on these traits as well as the activities of the breeders who deal with the quail eggs breeding and improvement.

تقييم بعض الخصائص الخارجية والداخلية لبيض السمان المُرَبَّى في مدينة البصرة

مضر عبد سلمان أبو طبيخ

المستشفى البيطري في البصرة ، وزارة الزراعة ، العراق.

الخلاصة

صممت هذه التجربة لتقييم بعض المواصفات الخارجية والداخلية لبيض طائر السمان المربى في محافظة البصرة. عشر من إناث السمان استخدمت في هذه التجربة. جميع الطيور خضعت لظروف متشابهة في الأجواء والرعاية والتربية. مائة بيضة جمعت عشوائيا خلال عشرون يوما لإجراء الاختبار. سجلت القياسات الخارجية كوزن البيض، دليل الحجم ، وزن قشرة البيض، نسبة القشرة ، سمك القشرة، طول البيضة، عرض البيضة، دليل القشرة والمساحة السطحية للقشرة (سم٢) فكانت كالأتي: ٧.٠٤١، ٧٩.٥٩٠، ٠.٩٧٣، ١٤.١٩٣، ٠.٣٠٧، ٢.٨٢٥، ٢.٢٤٥، ١٣.٠٤٤و ٨.٢٠٥ أما القياسات الداخلية مثل دليل الألبومين، ارتفاع الألبومين، وزن الألبومين، نسبة الألبومين، عرض الألبومين، طول الألبومين، معدل الألبومين، قطر الصفار (المح)، ارتفاع الصفار، وزن الصفار، دليل الصفار، نسبة الصفار ونسبة الصفار- الألبومين فكانت ١٢.٠٥٦ ،٣.٢٠٤، ٢.٥، ٣٥.٥١٥،٢.٣٠٨ ، ٣.٠٥٨،٢.٦٨٣، ٢.١٩٥، ٣.٩٨٣، ٢.٥٩١، ١٧.٦٠١،٣٦.٧٤٦ و ١.١٢٠.

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