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Effect of plumage colour and housing systems on qualitative characteristics of two breeds of brown and black quail

ABSTRACT

This study was conducted in the poultry farm of the Department of Animal Production-College of Agriculture, Tikrit University from 21/10 to 23/12/2021. The aimed to study the effect of plumage colour and housing systems on the egg specific characteristics of Japanese quail. A total of 180 quail at age 21 days were divided into two groups according to feather color, each group divided into two treatments, each treatment was divided into three replicates (15 birds per replicate), and the sex ratio was (2:1). The results of the study showed that there were no significant differences between the study in the weight of egg , weight of the shell , egg shape index , Albumin index, yolk index , and the superiority of black quail in the thickness of the shell and Hue unit, the superiority of the quail raised in cages.

INTRODUCTION

Japanese quail (*Coturnix japonica*), is the smallest type of domestic bird that is bred to produce eggs and meat is considered an economic alternative to chicken. There are many reasons to encourage breeders to raise quails, which are the low cost of breeding and the low investment projects that are interested in breeding this bird (Jeke et al. 2018) It is also characterized by early maturity the first egg (42-35) Day and its resistance to diseases and diseases associated with high egg production (Schultzand et al. 2009). The quail bird is characterized by its production of eggs (280egg per year). The average weight of the egg10 gram (Lukanov et al. 2019) . The housing system has a significant impact on the performance of the productive quail, for example, the bird that was raised in the litter system outperformed the yolk index and the shell ratio compared to the birds that were raised in the cage system (Roshdy.,2010). The breeding system is an important

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factor in maintaining the external quality of eggs, as the quality of eggs plays an important role in the economic aspect, as the poor quality of eggs leads to economic losses in the egg industry. Therefore, changes in the external quality lead to changes in the internal quality. Therefore, this study was show the effect of plumage colour and breeding type on the qualitative characteristics of quail eggs.

MATERIAL AND METHODS

Conducted This study is in the field of Quail belonging to the Department of Animal Production -faculty of Agriculture_Tikrit University for the duration of 12/ 10/2021 up to 12/23/2021. The herd was obtained from the Agricultural Research Department belonging to the Ministry of Agriculture. 180 birds of age 21 days were used in this study After Sexing birds The flock was divided into two groups depending on the color of the birds' feathers (black and brown)Each group included 90 birds, each group divided into two parts according to housing system (batteries and flooring) housing system contains15 birds and the sex ratio was 2:1. Water and feed were provided freely throughout the study period, use in the study diet contained protein 20,11 % and metabolizable energy of 2860kcal/kg of feed.

Studied traits

The weight of the egg (grams), Shell weight with the membranes (grams), the thickness of the shell (mm), the egg shape index, yolk index, and Albumin index. I calculated and checked what was found by (Al-Fayyad and Naji,1989) and the Hue unit was calculated according to the equation modified before (Card and Nesheim, 1972).

$$\text{Egg shape guide} = \frac{\text{Egg width (mm)}}{\text{Egg Length (mm)}} \times 100$$

$$\text{Yolk index} = \frac{\text{yolk height(mm)}}{\text{Yolk diameter (mm)}} \times 100$$

$$\text{Albumin index} = \frac{\text{Huigh Albumin (mm)}}{\text{Diameter of Albumin (mm)}} \times 100$$

Haugh Unit = 100 Log (H +7.57- $W^{0.37}$)

H= Albumin height (mm).

W= egg weight (grams)

Statistical analysis

Statistical analyzed of results was carried out by the General Linear (GLM) Procedure of SAS (SAS, 2010). The mathematical model used for of plumage colour (brown and black) and housing system. she: Yijk = μ + ai + bj + (ab)ij + eijk

y_{ijk} = value of any observation in the breeding system and plumage colour

μ = the overall mean.

ai = the effect of the housing system (cages, Floor).

bj = effect of plumage colour (brown and the black).

e_{ijk} = the random error associated with the ijkth individual.

RESULTS AND DISCUSSION

Egg weight

The results showed in Table No. (1) There was no significant difference between the brown-feathered quail and the black-feathered quail in the egg weight characteristic, as well as the results showed the absence of a significant difference between the rearing system in cages and the flooring

flooring system in the average egg weight characteristic. The table also shows that there is no significant difference when the interaction between the brown feathered quail and the black feathered quail between the cages system and the flooring system in the average egg weight characteristic.

Shell weight

According to the statistical analysis data shown in Table No. 1 There was no significant difference between quail with brown feathers color and black feathers quail in the average of the relative weight characteristic of the shell. Likewise, in the same table, it is noted that there is no significant difference between the rearing system in cages and the flooring system in the average of the characteristic of the relative weight of the shell. The table also indicates that there was no significant difference at the interaction between quail with brown feathers color and black feathers quail between the rearing system in cagesand the flooring system in the average of the relative weight characteristic of the shell.

Shell thickness

The results of Table No. 1 There was a significant difference, as the brown feathered quail was superior to the black feathered quail in the average thickness of the shell, respectively. The results of the table also showed that there was no effect in the average of the thickness of the shell between the rearing system in cages and the floor rearing system. In the same table, a significant effect was found in the mean of the thickness of the shell when overlapped, as the brown-feathered quail in the two rearing systems outperformed the black quail reared in the two rearing systems. The reason is that there is no significant difference in the thickness of the shell between brown and black feathers quail. This study agreed with the study of Al-Tikriti and Al-Douri (2018) in which he indicated that the thickness of the eggshell of a quail bird was 0.26 mm.

Table (1): Effect of plumage colour and breeding type and the interaction between them the weight of the egg and the relative weight of the shell The thickness of the shell (mean ± standard error)

influence of plumage colour				
Treatments		Shell thickness(mm)	Relative weight of the shell (%)	egg weight (grams)
Brown		0.28±0.01 a	13.41±0.15	11.54 ±0.11
Black		0.25±0.009 b	13.11±0.49	11.58±0.09
The effect of the type of housing				
Cages		0.27±0.01 a	12.84±0.17	11.42±0.06
Floor		0.26±0.01 a	13.68±0.42	11.71±0.10
The effect of the interaction between plumage colour and housing type				
Brown	Cages	0.29±0.01 a	13.11±0.10	11.36±0.05
	Floor	0.27±0.01 a	13.71 ±0.12	11.72±0.19
Black	Batteries	0.24±0.008 b	12.57±0.26	11.47±0.12
	Floor	0.25±0.01 b	13.65 ±0.94	11.70±0.11

Different letters within the same column indicate significant differences at the level of ($P \leq 0.05$).

Egg shape index

The results obtained in Table No. 2, There are no significant differences between brown-feathered quail and black-feathered quail in the average trait of the yolk shape index.The table also indicates that there is no significant difference between the cages rearing system and the flooring system in the rate of the egg shape index trait. The table also shows that there is no significant difference when the interaction between quail with brown feathers color and quail with black feathers color and between the rearing system in cages and the flooring system in the average of the egg shape index trait. The results of the obtained egg shape index trait fall within the range of quality of the oval shape, as its value is in the range (80-73)% . The results obtained in Table No.2 There was no significant differences between quail with brown feathers color and black feathers quail in the mean of the yolk shape index trait. The same table also shows that there is no significant difference between the cages system and the flooring flooring system in the rate of the yolk shape

index trait. Also, the same table indicates that there is no significant difference when the interaction between quail with brown feathers color and quail with black feathers color and between the cages system and the flooring system in the mean of the yolk shape index trait. The reason for the absence of significant differences in the character of the yolk index may be due to the existence of a positive relationship between the size of the egg and the diameter of the yolk, as the diameter of the yolk increases relative to the increase in the size of the egg, which in turn is reflected in the rate of the yolk index, as well as the improvement in the height of the yolk of the egg as well, which together represent the yolk index.

Albumin index

The results show in Table No.2 There were no significant differences between quail with brown feathers color and quails with black feathers color in the average of the index characteristic of the shape of albumin. The results of the same table indicated that there was no significant difference between the cages system and the flooring system in the rate of the egg shape index trait. The table also showed that there was no significant difference when the interaction between quail with brown feathers color and quail with black feathers color and between the battery breeding system and the ground breeding system in the average of the egg shape characteristic. The value of the albumin index is determined by its height and drop, which depends on the extent to which it contains amino acids and proteins, especially the ovamiosin protein, which shows the gelatinous texture of the albumin.

Haugh unit

results show in Table No.2 There were no significant differences between quail with brown feathers color and black feathers quail in the mean trait of the Hue unit. While the results in the same table showed that there were significant differences, as the birds raised in the cages system outperformed the birds raised in the flooring system in the mean of the Hugh unit trait. The same table indicates that there are significant differences when overlapped, as the black quail bred with batteries outperformed the brown quail in the two housing systems, and it outperformed the black quail raised on the flooring in the average of the Hugh unit trait. The albumin index depends on its diameter and height, which are predetermined by its protein content and amino acid content, especially ovamiosin, which is responsible for the gelatinous texture of albumin, which in turn leads to higher values of the Hue unit, which is one of the important measures in expressing the quality of albumin. The improvement in the quality of eggs may be due to what distinguishes the quail bird in its ability to resist many diseases, which makes the use of the nutrients available in the feed more. These results agreed with (Al-Obaidi el.at, 2007), whose results did not show significant differences between two breeds of brown and white quail, as this trait is significantly affected by environmental conditions more than by genetic factors, especially storage conditions.

Table (2): The effect of plumage colour and housing type and the interaction between them in Egg shape guide, yolk index, Albumin index, Hugh unit(mean ± standard error)

Influence of plumage colour					
Treatments		Egg shape index	yolk index	Albumin index	Haugh unit
Brown		79.53±0.36	41.57±0.90	13.53±0.36	93.05 ±0.78 a
Black		79.47±0.46	44.87±1.27	14.38±0.48	93.12±1.34 a
The effect of the housing type					
cages		79.41±0.36	42.96± 1.10	14.24±0.57	94.30± 1.01 a
Floor		79.58±0.46	43.48±1.50	13.67±0.26	91.86±0.89 b
The effect of the interaction between plumage colour and housing type					
Brown	Cages	79.36±0.56	40.93±0.83	13.33±0.74	92.86±1.69 b
	Floor	79.69±0.55	42.21±1.71	13.73±0.20	93.24±0.40 ab
Black	Cages	79.46±0.60	44.98±1.14	15.16±0.51	95.75±0.43 a
	Floor	79.47±0.86	44.76±2.59	13.60±0.56	90.49± 1.40 b

Different letters within the same column indicate significant differences at the level of ($P \leq 0.05$).

Conclusions

The superiority of the brown-feathered quail in the thickness of the shell. and the superiority of quails reared in batteries in the Hugh unit, while the rest of the traits have no significant difference between the two plumage colour and in the difference of the housing system.

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تأثير لون الريش ونوع التربية في الصفات النوعية للبيضة لسلالتين من طائر السمان البني والأسود

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الخلاصة

أجريت هذه الدراسة في حقل الدواجن التابعة لقسم الإنتاج الحيواني - كلية الزراعة - جامعة تكريت في الفترة من 10/21 إلى 2021/12/23. وهدفت هذه التجربة لدراسة تأثير لون الريش ونوع التربية على الصفات النوعية للبيض لطائر السمان الياباني . استخدم في هذه التجربة 180 طير سمان بعمر 21 يوماً وقسمت الى مجموعتين حسب لون الريش والجنس 90 طير بني و90 طير أسود كل مجموعة مقسمة الى معاملتين معاملة تم تربيتها في نظام التربية في البطاريات ومعاملة تم تربيتها في نظام التربية الأرضية كل معاملة تحتوي على 45 طير والمعاملة الواحدة مقسمة الى ثلاث مكررات كل مكرر يحتوي على 15 طير واستخدمت النسبة الجنسية هي 2:1 . بينت نتائج التجربة عدم وجود فروق معنوية بين المعاملات في وزن البيضة والوزن النسبي للقشرة ودليل شكل البيضة ودليل البياض ودليل الصفار وتفوق طائر السمان الأسود في سمك القشرة وفي وحدة هيو تفوق طائر السمان المربى في البطاريات.

الكلمات المفتاحية:
الصفات النوعية، نوع التربية، البني والاسود، بيضة.