Egg quality characteristics of sussex chickens reared under the housing conditions of Cukurova University farm

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Abstract. This work was conducted to evaluate the egg quality characteristic of Sussex multi-purpose chickens reared under the housing conditions of the Cukurova University Farm. A total of 81 Sussex chickens from the Poultry and Research Unit of Cukurova University were used in this study. The external and internal egg-quality paraemeters were determined using 30 eggs on both the 28th and 33rd weeks of egg production cycle. The egg quality parameters measured were the Haugh unit, breaking strength, yolk color, shell thickness, egg weight, shape index, shell weight, albumen index, yolk index, and albumen pH. The egg weight, albumen index, yolk index and Haught unit were 57.89±3.99g, 9.44±2.07, 43.22±3.57 and 84.85±8.87 respectively. The shape index, shell thickness, shell weight, shell breaking strength and albumen pH were %75.32±2.11, 0.338±27.84mm**,** 5.903±0.645g, 3.825±1.065 kg/cm^2 and 7.84±0.18 respectively. The yolk color, L, a, b and E values were 55.85±7.02, 13.91±3.33, 47.18±7.90 and 74.99±5.96 respectively. It was concluded that the external and internal egg-quality parameters of Sussex chickens reared under the housing conditions of the Cukurova University Farm were between the normal range.

1 Introduction

One of the British multi-purpose chickens reared for meat and eggs is known as the Sussex. Their plumage color is primarily white, speckled, silver, red, light, coronation, and buff and brown [1]. However, only three colors (speckled, red, and light) is recognised by the American Poultry Association. These birds have broad, long and flat back, wide shoulders and straight breast bone. The lighter strains have orange eyes but the darker strains have red eyes. They have red earlobes, single comb with white skin and legs among all breeds. Adult females weigh approximately 3.2 kg and aldult males weigh about 4.1 kg [1]. Their tail is angled at 45 degrees from their body.

Although the hens lay around 180–200 eggs per year; the light color breeds could produce around 250 eggs per year [2]. Their eggs weigh about 60g [3]. Eggs are important cheap source of rich nutrients such as protein, selenium, vitamin D and are consumed worldwide [4, 5, 6]. An egg contains 72 calories on average, 4.8g of fat and 6.3g of protein. An average intake of 277.7 eggs per person in the United States in 2018 was reported by the USDA [7]. Consumers have developed as specific desire for a certain egg size, yolk and eggshell color with specific shell strength which has to be met by producers. Some authors reported that cracked eggs provide a medium for contamination and damaged eggs accounts for 8-11% of total egg loss. [8].

Therefore, this study was conducted to determine the egg quality characteristics of light-plumage colored Sussex hens reared under the housing conditions of the Cukurova University Farm.

2 Material and method

A total of 81 Susex hens from the Research and Poultry Unit of Cukurova University and a sample size of 30 eggs each on the 28th and the 33rd week of egg production were used in this study.

2.1 External and Intenal Egg Qulaity Parameters

The egg quality characteristics considered were albumen pH, shape index, egg weight, shell thickness and weight, breaking strength, yolk color, and Haugh unit. The shell weight and egg weight were measured using an electronic balance. The formula used is reported below.

$$Albumen\ Index = \frac{Albumen\ Height\ (mm)}{Albumen\ length\ \ and\ width\ (average)/mm} x100 \quad (1)$$

$$Yolk\ Index\ = \frac{Yolk\ height\ (mm)}{Yolk\ diameter\ (mm)} x\ 100 \quad (2)$$

$$Shape\ Index\ = \frac{Egg\ Widht\ (mm)}{Egg\ Lenght\ (mm)} x\ 100 \quad (3)$$

Egg Breaking Strength

Egg breaking resistance of eggs was measured with TA-XT Plus brand Texture Analyzer.

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Haugh Unit

$$HB: 100 \log (H+7.57-1.7XG^{0.37}) \quad (4)$$

H: Albumen Height.
G:Egg Weight.

Albumen pH

The pH of the albumen was measured using pH meter.

Shell Thickness (ST) Measurement

Portions of eggshells from the broad, middle and narrow parts were taken. The thickness of each part was then measured with a shell thickness gauge and the average value for the 3 portions was recorded.

$$ST=\left(\frac{narrow+\ middle\ +\ broad\ portions}{3}\right) \quad (5)$$

Yolk Color Measurements

The three basic yolk color traits brightness (L) redness (a) and yellowness (b) were measured with HunterLab device. The formula below was used to calculate the E value.

$$E=\sqrt{(L\text{^}2+a\text{^}2+b\text{^}2)} \quad (6)$$

Statistical Analysis

The collected data were subjected to Simple Descriptive Statistics using SPSS version 26.

3 Results and discussion

The summary of the egg-quality parameters of Sussex hens housed under the environmental conditions of the Cukurova University farm is presented in Table 1. The results revealed that the egg weıght recorded was sımılar to that of a standard egg that has been documented. The hıgher albumen and yolk index values as well the higher yolk color values (L, a, b, E) observed ındıcates the freshness of the egg [9]. The breaking strength, shell thickness, shell weight, shape index, and albumen pH are within the standard/normal range reported by several authors [10-14].

Table 1. Egg-quality parameters of Sussex hens reared under the housing conditions of Cukurova University farm.

Measured Egg Qulaity Parameters		
Egg Weight (g)	57.89 ± 4.0	
Albumen Index (%)	9.44 ± 2.1	
Yolk Index (%)	43.22 ± 3.6	
Haugh Unit	84.85 ± 8.9	
Albumen pH	7.84 ± 0.2	
Sahpe Index (%)	75.32 ± 2.1	
Shell Thickness (mm)	0.34 ± 27.8	
Shell Weight (g)	5.90 ± 0.7	
Breaking Strength (Kg/cm^2)	3.83± 1.7	
Yolk Color	**L* (brightness)**	55.85 ± 7.0
	a* (redness)	13.91 ± 3.3
	b* (yellowness)	47.18 ± 7.9
	E	74.99 ± 6

4 Conclusion

It was concluded that the egg quality parameters of Sussex chickens reared under the housing conditions of the Cukurova University Farm were within the normal range.

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