Internal and External Quality Characteristics of Masai Ostrich Eggs

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Abstract. The internal and external characteristics of eggs are crucial for consumer preferences regarding table eggs, hatchability performance, chick quality, and the performance of breeding eggs. High-quality eggs have a larger share in the table egg market, while lower-quality eggs are often valued at lower prices in other markets. Therefore, the quality of an egg produced is vital for the profitability of the business. Among poultry eggs, ostrich eggs, which have high table value, although being an important protein source that could be utilized in situations such as an increasing population and drought caused by climate change, have not received the recognition they deserve. This study aims to draw attention to the ostrich eggs, and internal and external quality characteristics of Masai ostrich eggs (*Stuthio camelus massicus*) were investigated in Turkey. In the study, a total of 18 Masai ostrich eggs were used. The study's findings revealed that the average egg weight was detected 1237.56 g, the ratio of albumen was 52.98%, yolk 28.58%, shell 18.44%, and shell thickness 2.02 mm. From the features of egg quality, the egg shape, yolk and albumen index, and Hough unit were calculated to be 87.71, 0.17, 18.08, and 124.77, respectively. The values for the egg yolk color of *L, a*,* and *b** were found to be 57.63, 7.26, and 57.20, respectively. Considering climate change, increased ostrich egg production and consumption in Türkiye should be encouraged.

Keywords: Ostrich Egg, Internal Quality, External Quality

1 Introduction

Ostriches are the largest living birds and have the largest eggs in the world. They are mostly rearing for their skin and feathers because of their high economic value. Eggs are mostly used to produce offspring, and those that are not hatched are considered as food. Despite being recognized as the world's largest egg it is the smallest egg in proportion to the size of an adult bird. It is on average 15 cm long, 13 cm wide and 1.5 kg in weight, which is more than 25 times the weight of a chicken egg [1,2]. Compared to chicken eggs, the ostrich egg is more oval and the shell is shiny. The shell color ranges from white to yellowish white, with a thickness of 1.6 to 2.2 mm, and is many times that of a chicken egg [3,4].

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The present study investigated internal and external quality characteristics of ostrich eggs.

2 Material and Methods

2.1 Egg Material and preparing samples

In this study, a total of 18 eggs were used and obtained from 8-10-year-old Masai ostrich (Stuthio camelus massicus) flock. They were purchased from Hasmera Ostrich Farm, a private company in Turkey. Eggs brought to the laboratory were washed with tap water and cleaned with tissue paper. Before analysis, it was disinfected with 75% ethanol, dried at room temperature and stored in the refrigerator at + 4 °C until analysis. The internal and external quality characteristics of the eggs removed from the refrigerator on the day of analysis were determined by measuring egg weight, shell weight, yolk weight, albumen weight, yolk color score (Hunter Lab, Color Flex EZ, USA), shell thickness ((top mm + middle mm + bottom mm) / 3), yolk index (width mm / height mm), albumen index (height mm / (length mm + width mm) x 100), shape index (width mm / length mm) and Haugh unit (100 x log (albumen height + 7.57-1.7 x egg weight0.37)) of each egg in Poultry Research Laboratory.

2.2 Statistical analysis

The internal and external quality parameters mean and % values of ostrich eggs were calculated by usi.ng SPSS 17.0 (SPSS Inc., Chicago, IL, USA) package program [5]. The means and SEM values were presented in tables.

3 Results

Table 1 displays the findings of the internal and external quality criteria of ostrich eggs. Average egg weight was found to be 1237.6 g.

Table 1. Internal and external quality parameters of ostrich eggs.

Parameters	Mean	SEM
Egg weight (g/egg)	1237.56	31.768
Egg width (mm)	134.95	2.996
Egg length (mm)	154.20	2.642
Shape index	87.71	2.007
Shell weight (g/egg)	220.96	8.183
Shell ratio %	18.44	0.963
Shell thickness (mm)	2.02	0.053
Albumen weight (g/egg)	630.56	68.659
Albumen ratio %	52.98	2.902

Albumen index	18.08	1.805
Hough Unit	124.77	7.507
Yolk weight (g/egg)	352.22	15.201
Yolk ratio %	28.58	1.680
Yolk index	0.17	0.151
L (lightness)	57.63	0.609
a* (redness)	7.26	0.473
*b** (yellowness)	57.20	1.216

SEM: Standard Error of Mean

It was determined that the albumen, yolk, and eggshell ratios were 52.98%, 28.58%, and 18.44%, respectively (Fig. 1). When the egg indices were taken into account, the shape index was 87.71, the yolk index was 0.17, and the albumen index was 18.08. Hough unit was also 124.77.

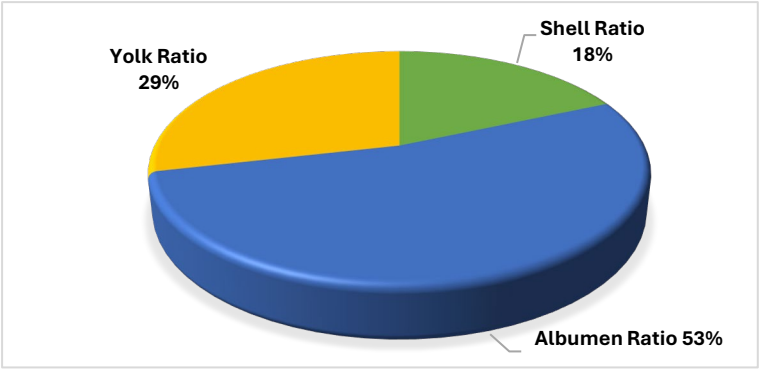

Fig. 1. Albumen, yolk, and eggshell ratios of ostrich eggs.

The L value of the yolk was observed at 57.63, the a* value 7.26, and the b* value 57.20 when the egg yolk parameters are taken into consideration.

4 Discussion

In the current study, the average weight of eggs was found to be 1237.56 g, which is lower than those reported by Selvan et al. [6]. (1435.1 g), Al-Obaidi et al. [2] (1576 g), Cooper et al. [4] (1500 g), and El-Shawaf et al. [7] (1630 g), and higher than reported by Mineki et al. [8] (1189 g). The findings varied because of the animal's varying genotypes, ages and diet ingredients [9,10].

In this study, the shape index was 87.71, which was higher than the values found by Selvan et al. [6] (74.2), Al-Obaidi et al. [2] (74.6), Mineki et al. [8] (81.8), and Moreki et al. [11] (82.65). The shape index of a normal chicken egg is between 72 and 76 [12] and the eggs are long. As the shape index increases, the eggs become more rounded.

The calculated value in ostrich eggs was 87.71. The ostrich eggs used in the study are seen to be fairly rounded.

In the previous studies, albumen, yolk and shell ratios of eggs were observed by Selvan et al. [6] 57.51, 27.64, 14.83, Al-Obaidi et al. [2] 48.65, 31.12, 20.23, Mineki et al. [8] 56, 24, 20, Di Meo et al. [1] 57.1, 23.3, 19.6, El-Shawaf et al. [7] 53.68, 26.38,19.95 and Moreki et al. [11] 60.5, 26.04, 13.36. They were identified as 52.98, 28.58, and 18.44 in the current study. The various egg weights are the cause of the discrepancy in the ratios.

Shell thickness was determined 2.56 by Selvan et al. [6] 2.0 by Mineki et al. [8] 2.20-2.24 by Di Meo et al. [1], 1.6-2.2 by Cooper et al. [4] while it was determined as 2.02 mm in the present study. Egg shell quality or structure is effect by many factors, such as genotype, age, laying time and duration, ration, water quality, rearing system, stress, temperature, humidity, diseases, induced molt, calcium, phosphorus, vitamins, non-starch polysaccharides, enzymes, nutritional factors and feed contamination [12,13,14,15]. This is the reason why the shell thicknesses were different from each other in the studies.

Mineki et al. [8] found that the yolk index of the eggs was 0.17, which is consistent with the present study's findings; however, Al-Obaidi et al. [2] found that it was 0.44.

The L, a* and b* values of egg yolk were determined as 57.63, 7.26 and 57.20 respectively in the current study. Mineki et al. [8]) stated that 34.17, -0.77 and 19.44 respectively. The color of the egg yolk varies according to the ration content of the animal [16,17].

Moreki et al. [11] found that the Hough unit of the egg was an average of 131.16 in their study. It was determined as 124.77 in this study, which was lower than the literature. The Hough unit is impacted by the length of storage, temperature, age of the hens, kind of bird, diet, illnesses, supplements, exposure to ammonia, mold-induced growth, and medications [18].

5 Conclusion

The ostrich eggs examined were found to be lighter in weight and more rounded in shape than reported in the literature. Despite this, encouraging ostrich farming, which is highly adaptable, is crucial for future protein supply, especially given the increasing drought conditions.

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