Original scientific paper
Originalan naučni rad
UDK: 598.261.7:637.4.082.47
DOI: 10.7251/AGREN1204667S

University of Banjaluka, Faculty of Agriculture
Agro-knowledge Journal

Determining Some Exterior and Interior Quality Traits of Japanese Quail Eggs (*Coturnix japonica*)

Mirjana Đukić Stojčić, Niko Milošević, Lidija Perić[1]

[1]*Faculty of Agriculture,University of Novi Sad, Serbia*

Abstract

The aim of this research was to determine some exterior and interior quality traits of Japanese quail eggs. A total of 60 Japanese quail eggs were collected from two different farms near Novi Sad, and the eggs quality traits were tested in the laboratory of poultry science at the Department of Animal Science of the Faculty of Agriculture in Novi Sad. The egg weight, albumen weight, yolk weight, shell weight, shell breaking force, shell thickness, albumen height and egg yolk colour were determined. The external and internal egg quality traits of quail eggs from two farms in Serbia do not differ from the results of quality traits from other countries.

Key words: Quail, eggs, quality traits.

Introduction

Eggs of most bird species may have similarities in nutritional composition and potential food usage. However, information on egg quality characteristics and utilisation of egg for food and other purposes has been limited mostly to chicken eggs. Recently, Japanese quail (*Conturnix coturnix japonica*) has been important as a laboratory animal, due to its easy maintenance, early sexual maturity, shorter generation interval, high rate of egg production, but Japanese quail is also becoming more popular as a source of meat and eggs (*Punya Kumari, 2008*). Chicken egg has been very well studied for its quality as well as for its composition; however such information is not so abundantly documented in other poultry species (*Dudusola, 2010*). Among many quality characteristics, external factors such as cleanliness, freshness, egg weight and shell quality are important for consumer´s acceptability of shell eggs, and interior characteristics such as yolk index, albumen index, proportions of egg components and chemical composition are also important for egg production industry (*Song, 2000*). Information on egg quality characteristics has been limited mostly to chicken eggs.

Because of the growing interest in consumption of quail eggs in our country, and due to the lack of recent investigations in this direction, the aim of this paper was to enhance the knowledge on the quality of quail eggs, and to show the quality of quail eggs in our surroundings. In this study, external and internal quality traits of quail eggs from two different commercial farms will be presented.

Materials and methods

The investigation of egg quality traits was carried out at the Department of Animal Science of the Faculty of Agriculture in Novi Sad. The experimental material comprised eggs of Japanese quail (*Coturnix coturnix japonica*) of laying type in their first year of production taken from two commercial farms near Novi Sad. The quails in all three farms are kept in battery-cages. Examination of egg quality parameters was carried out on the random sample of 30 eggs per producer. The following egg quality traits (external and internal) were assessed:

Egg weight (g), yolk weight (g), albumen weight (g) and shell weight (g) were measured with analytic scale with 0.01 g accuracy.

To determine the proportions of egg parts, each egg was carefully broken and shell separated. Egg shell (not dried) was weighed and the relative weight calculated by relating the shell weight to the weight of the egg. An egg separator was used to separate the yolk from the albumen. Relative yolk weight was calculated in percentages by relating the yolk weight measured to the nearest gram to the whole weight of that particular egg and multiplied by 100. The albumen weight was calculated by subtracting the yolk and shell weights from the whole egg weight. The albumen weight relative to the individual egg weight was calculated.

Yolk index (%) was calculated according to the formula: Yolk index = yolk height (mm) x 100% / yolk width (mm).

Haugh units were calculated according to the formula (Haugh, 1937): $HU = 100 \log (H + 7.57 - 1.7 * M^{0.37})$, H – average thick white height (mm), W – egg weight (g).

Shell breaking force was measured by an Egg Force Reader (Orka Food Technology Ltd, Israel). The stand of the device was modified for measuring quail eggs.

Egg yolk colour was determined according to Roche yolk colour fan (*Vuilleumier, 1969*).

Eggshell thickness (mm) was measured together with shell membranes at the equatorial part of the egg using a micrometer screw.

Based on the obtained data, statistical analysis was performed using ANOVA and Duncan post-hoc test (STATISTICA 8, Stat Soft Inc, 2007).

Results and Discussion

Table 1 presents results of egg quality traits. No significant differences were found in the egg weight and shape index between eggs derived from two producers.

The difference in shell breaking strength between farms A (1.72 kg) and B (1.63 kg) was not significant. No significant differences in shell thickness and shell weight between the two producers were found.

Tab. 1. Average values and standard deviation of external and internal egg quality traits of quail

Prosječne vrijednosti i standardno odstupanje od spoljašnjih i unutrašnjih osobina prepeličjih jaja

	Producer			
	A		B	
	X	Sd	X	Sd
Parameters				
Egg weight (g)	12,30	0,59	11,52	1,03
Shape index (%)	77,51	3,79	77,37	2,43
Breaking strength (kg)	1,63	0,38	1,72	0,33
Shell thickness (mm)	0,201	1,610	0,196	1,780
Shell weight (g)	1,80	0,26	1,73	0,20
Yolk weight (g)	3,42	0,49	3,72	0,42
Albumen weight (g)	7,08 [a]	0,38	6,07 [b]	0,67
Yolk colour (Roche)	7,6 [a]	2,32	13,6 [b]	0,97
Haugh Unit	86,1 [a]	3,02	83,65 [b]	3,27
Egg proportions (%)				
Yolk	27,71 [a]	2,85	30,00 [b]	3,34
Albumen	57,67 [a]	4,16	55,15 [b]	4,37
Shell	14,62	1,78	14,85	1,72

[a-c] Values within rows with no common superscript are significantly different ($P<0.05$)

For egg weight, no significant difference was found between farms, but for yolk and albumen weight, statistically significant differences were found between the farms. The weight of albumen was significantly different in the two farms. The difference between the highest and the lowest value was 1.01 g ($P<0.05$). Yolk, albumen and shell percentage were in the same relation as the weights of these parameters.

The most intensive yolk colour was recorded in eggs from Farm A (13.6 points), whereas quail eggs in farm B had just 7.6 points (Roche). Statistical differences were found between the farms.

The worst albumen quality (Haugh Unit) was recorded in eggs from farm A (83.65). Statistical difference was found between the Farm A and Farm B.

In this study, the average values that have been determined are similar to the results reported by *Nazligul et al.* (2001), *Ozcelik et al*. (2002), *Kul and Seker* (2004), *Nowaczewski et al.* (2010), but different from the results by *Odunsi et al.* (2007), *Ipek et al.* (2007), *Punya Kumari et al.* (2008), *Dudusola* (2009, 2010).

The mean egg weight in this experiment was similar to the results that were reported by *Dudusola* (2009, 2010). *Nowaczewski et al*. (2010), who analysed egg weight changes according to the age of experimental birds, found that the value of this trait in week 25 (10.91 g) was smaller than in week 9 (11.33 g), but about 1 g higher than in the results obtained by *Odunsi et al*. (2007), who evaluated three protein sources in the diets of growing and laying Japanese quails. The investigation from *Punya Kumari et al.* (2008) showed that mean egg weight from quail in 16th week of production was 13.71 which is more than 1 g higher compared to our results.

Shape index, shell thickness, albumen weight, yolk weight, Haugh Units and percentages of yolk and albumen were similar to the results reported by most researches *(Nazligul et al.,* 2001; *Ozcelik et al.*, 2002; *Kul and Seker,* 2004; *Punya Kumari et al.*, 2008; *Nowaczewski et al.* 2010).

The value of shell breaking strength of quail eggs was 1.63 and 1.72. This value was not compared to the results of other authors because these authors did not report the results of breaking strength. Generally it can be stated that the breaking strength is smaller compared to chicken eggs, which can as well be expected since the quail eggs have smaller weight and eggshell thickness.

The shell weight and percentage of shell in our investigation was bigger compared to the results of other authors (*Odunsi et al*., 2007; *Ipek et al.,* 2007; *Dudusola* 2009, 2010, *Nowaczewski et al.* 2010), because the shell weight was measured directly after the shell was broken and separated, and the mentioned authors measured it after drying.

In results from *Odunsi et al. (*2007) the yolk colour was lighter and in range between 1.2 and 1.5 points (Roche). In an investigation by *Punya Kumari et al.* (2008) the average yolk colour was 5.37, which is as well lighter than in our investigations, where the yolk colour was not uniform, and in the range between 7.6 and 13.6.

Conclusion

Generally, it can be concluded that the external and internal egg quality traits of quail eggs from two farms in Serbia do not differ from the results of quality traits from other countries. On the other hand, this investigation contributes to the development of science because it included some parameters, which have so far not been published in literature by other researchers from this area.

Acknowledgment

This research was financed by the Ministry of Science and Technological Development, the Republic of Serbia, project TR 31033.

References

1. Dudusola, I. O. (2010): Comparative evaluation of internal and external qualities of eggs from quail and guinea fowl. International Research Journal of Plant Science, 1(5) 112-115.
2. Dudusola, I. O. (2009): Effects of Storage Methods and Length of Storage on some Quality Parameters of Japanese Quail Eggs. Tropicultura, 27 (1) 45-48.
3. Ipek, A., Canbolat, O., Karabulut, A. (2007): The Effect of Vitamin E and Vitamin C on the Performance of Japanese Quails (Coturnix Coturnix Japonica) Reared under Heat Stress during Growth and Egg Production Period. Asian-Aust. J. Anim. 20 (2) 252 – 256.
4. 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.
5. Nazligul, A., Bardakcioglu, H.E., Turkyilmaz, N.K., Oral, D.C. (2001): The effect of cage density on egg weight, egg prodcution and feed consumpstion in Japanese quails. J. Fac. Vet. Med. Univ. 27 (2) 429-438.
6. Nowaczewski, S., Kontecka, H., Rosiñski,A., Koberling, S., Koronowski, P. (2010): Egg Quality of Japanese Quail Depends on Layer Age and Storage Time. Folia biologica, 58 3-4.
7. Odunsi, A.A., Rotimi, A.A., Amao, E.A. (2007): Effect of Different Vegetable Protein Sources on Growth and Laying Performance of Japanese Quails (Coturnix Coturnix Japonica) in a Derived Savannah Zone of Nigeria. World Applied Sciences Journal, 3 (5) 567-571.
8. Ozcelik, M. (2002): The phenotypic correlations among some external and internal quality characteristics in Japanese quail eggs. Vet. J. Ankara Univ., 49 67-72.
9. Punya Kumaril, B., Ramesh Gupta, B., Gnana Prakash, M., Rajasekhar Reddy, A. (2008): A study of egg quality traits in Japanese quails. J. Veterinary & Animal Sciences 4 (6) 227-231.
10. Zeweil, H. S. (2003): Effect of spices as feed additives on the performance and egg quality of Japanese quail. The 68th Scientific Conference of Polish Animal Production Society, 9-12 September 2003, Krakov, Poland.
11. Haugh, R.R. (1937). The Haugh unit for measuring egg quality. U.S. Egg Poultry Magazine, **43**: 552-553 and 572-573.
12. Vuilleumier, J.P. **(**1969). The 'Roche Yolk Colour Fan'-An Instrument for Measuring Yolk Colour. Poultry Science, 48: 767-779.
13. Song, K. T., Choi, S. H., Oh, H. R. (2000). A comparison of Egg Quality of Pheasant, Chukar, Quail and Guinea Fowl. Asian-Aus. J. Anim. Sci. 13 (7) 986-990.

Određivanje spoljašnjeg i unutrašnjeg kvaliteta jaja kod japanske prepelice (*Coturnix japonica*)

Mirjana Đukić Stojčić, Niko Milošević, Lidija Perić[1]

[1]*Poljoprivredni fakultet, Univerzitet u Novom Sadu, Srbija*

Sažetak

Cilj ovog rada je bio da se ispitaju spoljašnje i unutrašnje osobine kvaliteta jaja japanske prepelice. Ukupno je bilo 60 jaja od dva različita proizvođača prepeličjih jaja u blizini Novog Sada a ispitivanje kvaliteta jaja je odrađeno u labaratoriji za živinarstvo na Departmanu za stočarstvo, Poljoprivredni fakultet Novi Sad. Ispitivani su sledeći parametri: masa jaja, masa belanca, masa žumanca, masa ljuske, čvrstoća ljuske, debljina ljuske, visina belanca i boja žumanca. Spoljašnji i unutrašnji parametri kvaliteta prepeličijih jaja sa dvije farme u Srbiji ne razlikuju se u odnosu na parametre kvaliteta iz drugih zemalja.

Ključne reči: prepelice, jaja, parametri kvaliteta.

Mirjana Đukić Stojčić
E-mail Address:
mirjana.djukicstojcic@stocarstvo.edu.rs