

## CONSUMER RATING OF THE HEN EGGS FROM ORGANIC AND CONVENTIONAL FARMING

### Summary

*This article presents the results of the organoleptic evaluation of the hen eggs obtained from organic and conventional farms located in Pomeranian Province. The eggs were bought in the stores located in Gdynia. An organoleptic analysis of raw and boiled eggs from two kinds of egg farming, organic and conventional one, was performed. The eggs were assessed by 36 consumers. The analysis was carried out by means of double blind pick and organoleptic evaluation was done with five point rating scale. The final result was calculated assuming the determined significance coefficients for the defined quality parameters. The carried out studies confirmed the increasing interest in organic food, including organic hen eggs, however, the high price is a factor limiting the consumption of organic eggs. The organoleptic quality of the organic eggs was rated very high, whereas their tastiness (palatability) is highest value of the organic eggs. The low rating of conventional eggs could be caused by the long storing time and inappropriate storage conditions.*

**Key words:** hen eggs, sensory evaluation of organic and conventional eggs

## KONSUMENCKA OCENA JAJ KURZYCH Z CHOWU EKOLOGICZNEGO I KONWENCJONALNEGO

### Streszczenie

*Artykuł prezentuje wyniki konsumenckiej oceny organoleptycznej jaj kurzych pochodzących z hodowli ekologicznej i konwencjonalnej prowadzonych w województwie pomorskim. Jaja zostały zakupione w placówkach handlowych na terenie miasta Gdyni. Ocena organoleptyczna została przeprowadzona dla jaj kurzych surowych i gotowanych z dwóch sposobów chowu ekologicznego i konwencjonalnego. Oceny dokonała grupa 36 konsumentów. Badanie przeprowadzono metodą podwójnie ślepej próby, a oceny organoleptycznej jaj kurzych surowych i po ugotowaniu dokonano wykorzystując skalę pięciopunktową. Wynik końcowy obliczono przyjmując zamieszczone współczynniki ważkości dla oznaczanych parametrów jakościowych. Przeprowadzone badania wykazały, że wzrasta zainteresowanie żywnością ekologiczną, w tym ekologicznymi jajami kurzymi, a czynnikiem znacznie ograniczającym konsumpcję jaj ekologicznych jest wysoka cena. Jakość organoleptyczna jaj ekologicznych została oceniana bardzo wysoko, przy czym największą wartością jaj ekologicznych jest ich smakowitość wynikająca z przyjętego sposobu żywienia dla ekologicznego chowu zwierząt. Na niską ocenę sensoryczną jaj konwencjonalnych mógł wpłynąć sposób chowu kur oraz ich żywienia. Niska ocena jaj konwencjonalnych prawdopodobnie wynikała także ze stwierdzonego ich długiego okresu przechowywania i niewłaściwych warunków przechowywania.*

**Słowa kluczowe:** jaja kurze, ocena sensoryczna jaj ekologicznych i konwencjonalnych

### 1. Introduction

Within the last years the consumers' interests towards organic food, including organic eggs, [1, 8] can be observed. An increased demand for organic food which is considered by consumers as safe for health, tasteful and having good nutritional properties, is also visible. Organic food production, based on special standards, is considered as environment friendly [2]. This is a significant change in the attitude towards the origin of the eggs which did not matter still not long ago. Some of scientists believe that only a part of the respondents pays attention to the information about egg manufacturers [17].

The issue of organic food quality can be analysed from various points of view, taking into consideration:

- health value,
- nutritional value,
- sensory value,
- pollution value,
- absence of chemical preservatives.

However, within the last years, during the economic crisis, price is the main factor which influences one's food choice. The analysis of numerous studies on the influence of price on the assessment of food quality shows that such assessment becomes less and less significant due to the phenomenon of the consumers' learning. Price is most significant at the first purchase and then it becomes less and less important as the consumer is more experienced. During a long period of time the price reflects in a greater degree the quality of the product, but it is less important for the consumer as a piece of information about the product quality [9].

The sensory value, especially the product's tastefulness is a feature often emphasised by the consumers of organic food.

### 2. Aim of the study

The aim of this study was to evaluate the organoleptic quality of hen eggs obtained from organic and conventional farming, available on the market of Tricity (the cities of Gdańsk, Gdynia and Sopot). A hypothesis was formulated

that the palatability of the organic eggs available on the market is higher.

### 3. Material and methods

An organoleptic evaluation of eggs from organic and conventional farming was performed by consumers. The organic eggs were bought from an organic shop located in Gdynia, and they originated from a certified organic farm. The conventional eggs were bought in a grocery store, and were obtained from a conventional farm nearby the organic farm. Both farms are located in the Pomeranian Province.

The analysis was carried out by means of double blind pick and the organoleptic evaluation of raw and boiled hen eggs according to Tilgner with five point rating scale was performed [4]. The final result was calculated by means of the weights for indicated quality parameters given in the Table 1.

The organoleptic evaluation was performed by 36 consumers, who declared to eat hen eggs. The research was carried out in 2015.

Table 1. Weights for the evaluation of the organoleptic quality of the hen eggs

Tab. 1. Współczynniki ważkości do oceny jakości organoleptycznej jaj kurzych

Raw eggs	Weight
eggshell	0,10
air space	0,10
egg white	0,30
egg yolk	0,20
embryonic shield	0,05
smell	0,25
Boiled eggs	Weight
egg white	0,15
egg yolk	0,10
embryonic shield	0,05
taste	0,30
smell	0,20
palatability	0,20

Source: own work / Źródło: opracowanie własne

### 4. Test results and discussion

The organoleptic evaluation of the hen eggs was preceded by a general commodity assessment, the assessment of the packaging and labeling in particular. The hen eggs were packed and labeled properly. The eggs were placed in egg boxes which met the requirements regarding food packaging.

The packages protected the eggs from mechanical damage properly. Also, they were dry, clean and not damaged. The eggs labels contained all the required informations. The eggs packaging was labeled with European labels of organic food and the number of certificate from the agricultural farm. The eggs were stamped properly with information about the type of the hen farming method and veterinary registry number of the farm [11, 14].

The smell of the eggshells was evaluated immediately after the package was opened. In opinion of all the testers, the smell was typical and did not indicate any strange scents. During the external features evaluation the eggs were found to be properly built in most cases.

The requirements regarding the quality and labeling of hen eggs have been described in the Regulation of the Commit-

tee (EC) No. 589/2008 of 23rd June 2008 laying down detailed rules for implementing Council Regulation (EC) No. 1234/2007 as regards marketing standards for eggs. (Official Journal L163 of 24.06.2008, page 6, with later amendment) [10, 12, 14].

The organic and conventional eggs were classified as A category and were properly classified in terms of weight as L class (large), their weight was of circa 63-73 g. The conventional eggs contained the information about the barn-farming method.

#### 4.1. Raw eggs evaluation

The evaluation of the eggs was performed in two stages. Firstly, the assessment of the raw eggs was carried out. The eggs were assessed on the basis of the eggshell appearance, the size of air space, the appearance of the egg white and egg yolk, the presence of the embryonic shield and smell [11, 14, 29].

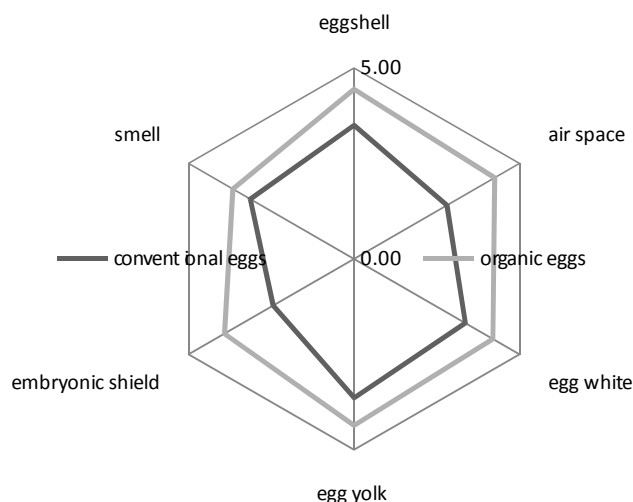
The organoleptic features of the conventional and organic raw eggs have been presented in Table 1, and the organoleptic profile is visualized in Figure 1. The results are an arithmetic mean of 36 scores.

Table 2. Organoleptic evaluation of the raw eggs (organic and conventional)

Tab. 2. Ocena organoleptyczna surowych jaj kurzych ekologicznych i konwencjonalnych

Subject of the evaluation	Conventional eggs		Organic eggs	
	$\bar{X}$	$\sigma$	$\bar{X}$	$\sigma$
Eggshell	3,50	0,94	4,44	0,91
Air space	2,81	1,35	4,25	0,73
Egg white appearance	3,36	0,72	4,19	0,82
Egg yolk appearance	3,64	0,83	4,36	0,80
Embryonic shield	2,44	1,32	3,92	1,23
Smell	3,14	0,96	3,67	1,01

Source: own work / Źródło: opracowanie własne



Source: own work / Źródło: opracowanie własne

Fig. 1. Organoleptic profile of organic and conventional raw hen eggs

Rys. 1. Profil organoleptyczny surowych jaj kurzych ekologicznych i konwencjonalnych

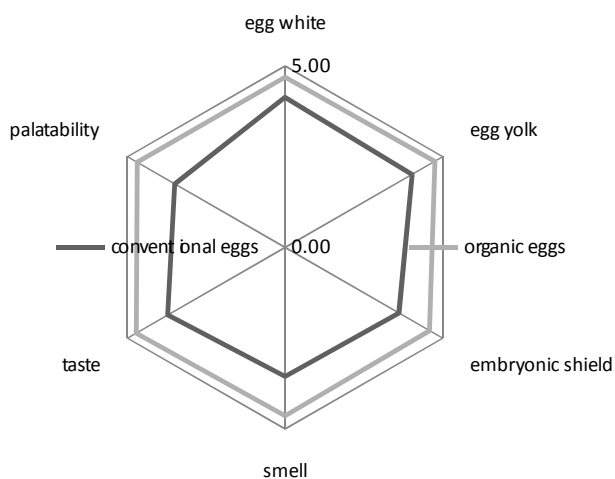
The studies regarding conventional and organic raw eggs presented in the subject literature are mainly focused

on the comparative analysis and the specifying physico-chemical parameters and the content of particular ingredients [1, 2, 5, 15, 16]. The studies do not include the consumer's quality assessment of eggs obtained from two different farming methods. Such type of studies was carried out by only few researchers. [6, 17].

The results from Table 1 show that consumers rated lower all indicators for conventional eggs. The organoleptic profile presented in Figure 1 indicates that the features which are rated at the lowest level are the air space and smell. The size of the air space of the conventional eggs shows that the majority of eggs was at least two weeks old, which resulted in a low score of this parameter (2,81). The low score of the eggshell of the conventional eggs (3,50) resulted from the thickness of the eggshell and, by the same, a low impact resistance.

#### 4.2. Evaluation of boiled eggs

The organoleptic features of conventional and organic eggs are presented in Table 2 and their organoleptic profile is presented in Figure 2. The research results show that the taste, smell and tastiness (palatability) of conventional eggs were assessed definitely lower than the organic eggs.



Source: own work / Źródło: opracowanie własne

Fig. 2. Organoleptic profile of organic and conventional boiled hen eggs

Rys. 2. Profil organoleptyczny gotowanych jaj kurzych ekologicznych i konwencjonalnych

Table 3. Organoleptic evaluation of boiled eggs (organic and conventional)

Tab. 3. Ocena organoleptyczna gotowanych jaj kurzych ekologicznych i konwencjonalnych

Subject of the evaluation	Conventional eggs		Organic eggs	
	$\bar{X}$	$\sigma$	$\bar{X}$	$\sigma$
Egg white	4,14	0,68	4,69	0,52
Egg yolk	4,03	0,65	4,75	0,50
Embryonic shield	3,61	1,59	4,58	0,84
Smell	3,56	0,91	4,64	0,61
Taste	3,72	0,77	4,72	0,59
Tastiness (Palatability)	3,50	1,08	4,69	0,62

Source: own work / Źródło: opracowanie własne

In the interview, which supplemented the assessment, the consumers paid attention to the marbleness of the egg

yolk and the lumpiness of the egg white of boiled conventional eggs.

At the same time, consumers noted a very good taste, smell and tastiness (palatability) of the organic eggs.

The final evaluation of the taste of organic eggs was  $4,72 \pm 0,59$ , while the rating for the smell was  $4,64 \pm 0,61$ . For conventional eggs from barn farming the results were respectively  $3,72 \pm 0,77$  and  $3,56 \pm 0,91$ . The studies carried out by Kaźmierska et al. [6] on the influence of different breeding methods on the quality of the hen eggs show that consumers gave the best score for the taste (4,90) and the smell (4,80) of the eggs from free-range hens.

The interview carried out among consumers confirmed that they cannot explain how the organic eggs were labeled. Only 25% of the interviewed consumers were able to explain what "O" symbol meant. Similar conclusions were drawn from the survey carried out by Trziszka et al. [17]. They stated that consumers had no knowledge about organic food, while a considerable amount of respondents mistakenly associated organic eggs with farm eggs sold on fairs. For circa 20% of consumers, as confirmed by studies of Trziszka's et al. [17] price was an important factor at the egg purchase.

The organoleptic profile of boiled hen eggs (Figure 2) shows that the most important factor mentioned by consumers is tastiness (palatability). For organic eggs it was  $4,69 \pm 0,62$ , while for conventional ones it was  $3,50 \pm 1,09$ .

For more than 50% of consumers who performed sensory examination in the survey carried out for this study, the price was an equally important factor for purchasing eggs. The price criteria is an often occurring factor of product choice, not only for eggs but for all food products [5, 17]. High price was the only comment made by consumers about organic eggs. In the period when the survey was carried out, organic eggs were 2,5 times more expensive than conventional ones. In the survey carried out in Italy by Hidalgo et al. [5] consumers also noted the twice higher price of organic eggs as compared to conventional eggs.

#### 5. Conclusions

In result of the observance of the provisions of EU directive No. 1999/74/EC of 19<sup>th</sup> July 1999 it can be assumed that, the intensive production will change into an extensive production within the next several years [3]. It can contribute to an improvement of natural environment because, as current experiences confirm, conventional animal farming affects the natural environment badly, but it is also harmful for human health [7].

The studies carried out allow to draw the following conclusions:

- the interest in organic food including hen organic eggs grows,
- the organoleptic quality of organic eggs was rated very high, while the highest value of the organic eggs is their tastiness (palatability), which results from the organic feeding regime,
- the low rating of conventional eggs is due to two main factors: conventional feeding regime and long storage time established in the study as well as improper storage conditions,
- consumers paid attention to the fact that, in spite of the high organoleptic quality of organic hen eggs, their price is still too high.

## 6. References

- [1] Biesiada-Drzazga B., Janocha A.: Wpływ pochodzenia i systemu utrzymania kur na jakość jaj spożywczych. *Żywność Nauka Technologia Jakość*, 2009, 3 (64), 69-70.
- [2] Dudek M., Rabsztyń M.: Egg quality of dual-purpose hens intended for small - scale farming. *Acta Sci. Pol., Zootechnica*, 2011, 10 (1), 3-12.
- [3] Dyrektywa Rady 1999/74/WE z dnia 19 lipca 1999 r. ustanawiająca minimalne normy ochrony kur niosek (Dz.U. L 203 z 3.8.1999, 53).
- [4] Gawęcka J., Jędryka T.: Analiza sensoryczna. Wybrane metody i przykłady zastosowań. AE Poznań, 2001.
- [5] Hidalgo A., Rossi M., Clerici F., Ratti S.: A market study on the quality characteristics of eggs from different housing systems. *Food Chemistry* 2008, 106, 1031–1038.
- [6] Kaźmierska M., Kosmaliński B., Jarosz B., Ligor M., Trziszka T.: Wpływ zróżnicowanego systemu chowu kur na zawartość luteiny w jajach. *Żywność Nauka Technologia Jakość*, 2011, 5 (78), 75-4.
- [7] Kouba M.: Quality of organic animal products. *Livestock Prod. Sci.*, 2003, 80, 33-40.
- [8] Newerli-Guz J., Śmiechowska M., Organic food advantages in consumer's opinion. *Bromat. Chem. Toksykol.*, 2004, 37 (supl.), 135-138, 7.
- [9] Nowak P.: Wykorzystanie ceny w ocenie jakości produktów. *Zesz. Nauk. Wyż. Szk. Humanitas. Zarządzanie*, Sosnowiec 2008, 2, 93-110.
- [10] Rozporządzenie Komisji (WE) nr 589/2008 z dnia 23 czerwca 2008 r. ustanawiające szczegółowe zasady wykonywania rozporządzenia Rady (WE) nr 1234/2007 w sprawie norm handlowych w odniesieniu do jaj (Dz.U. L 163/6 z dn. 24.6.2008).
- [11] Rozporządzenie Komisji (WE) nr 889/2008 z dnia 5 września 2008 r. ustanawiające szczegółowe zasady wdrażania rozporządzenia Rady (WE) nr 834/2007 w sprawie produkcji ekologicznej i znakowania produktów ekologicznych w odniesieniu do produkcji ekologicznej, znakowania i kontroli (Dz.U. L 250/1 z 18.9.2008).
- [12] Rozporządzenie Ministra Rolnictwa i Rozwoju Wsi z dnia 29 grudnia 2003 roku w sprawie metod analizy jaj kurzych. (Dz. U. z 2003 r. Nr 230, poz. 2309).
- [13] Rozporządzenie Rady (WE) nr 2052/2003 z dnia 17 listopada 2003 r. zmieniające rozporządzenie (EWG) nr 1907/90 w sprawie niektórych norm handlowych w odniesieniu do jaj (Dz. U L 305/1 z dn. 22.11.2003).
- [14] Rozporządzenie Rady (WE) nr 834/2007 z dnia 28 czerwca 2007 r. w sprawie produkcji ekologicznej i znakowania produktów ekologicznych i uchylające rozporządzenie (EWG) nr 2092/91 (Dz.U. L 189 z 20.7.2007),
- [15] Sokołowicz Z. i in.: Jakość jaj z chowu ekologicznego w pierwszym i drugim roku użytkowania niosek. *Żywność Nauka Technologia Jakość*, 2012, 4 (83), 185-194.
- [16] Śmiechowska M., Podgórnik P.: Study and assessment of selected quality parameters of organic hen eggs available on the tri-city market. *J. Res. Appl. Agric. Eng.*, 2013, Vol. 58(4), 186-189.
- [17] Trziszka T., Nowak M., Kaźmierska M.: Preferencje konsumentów jaj na rynku wrocławskim. *Żywność Nauka Technologia Jakość*, 2006, 3 (48), 107-117.