QUALITY OF EGG FOR CONSUMPTION FROM DIFFERENT PRODUCERS IN THE MARKETS IN R. MACEDONIA: 2. HOUGH UNITS AND YOLK COLOR

Kocevski Dragoslav[1], Nedeljka Nikolova[2], Vukovic Vlado[1], Bunevski Gjoko[1], Dzabirski Vladimir[1], Gjorgievski Srecko[1], Porcu Koco[1]

[1]Faculty of Agricultural Sciences and Food - Skopje, University Ss. "Cyril and Methodius" in Skopje, Republic of Macedonia
[2]Institute of animal science, University "Ss Cyril and Methodius", Skopje, Republic of Macedonia

Corresponding author: Dragoslav.Kocevski@yahoo.com

Abstract
Eggs from 7 different brands offered to the supermarket chains in R. Macedonia were tested for meeting the minimum quality requirements defined by the Law. Egg size (egg weight in g) as well as internal quality traits (Hough Units that unbiased expressed egg "freshness" and Yolk color expressed as Roche leader scale from 1-14) were analyzed on 140 eggs. Each group was randomly represented by 10 M-weight class and 10 L-weight class eggs from each of the 7 brands, purchased directly from the supermarket shelf and analyzed the same day after the purchasing. Egg quality was analyzed in the Laboratory for control of the marketing quality of eggs at the Institute for animal biotechnology on the Faculty of agricultural science and food, using computerized equipment for measuring egg internal quality (Egg Multi Tester EMT 5200, Robotmation Co. Ltd., Tokyo, Japan). Eggs from analyzed brands in general meat the required marketing standards in respect to the analyzed parameters: egg albumen height or freshness (average = 61.56 and 58.75 Hough Units) and yolk color (average = 12.48 and 12.28 units of Roche scale) for L and M weight class, respectively. Only eggs from brand No. 4 does not fulfill the minimum required marketing standards in respect of the Hough Units (42.49 and 40.89 Hough Units) for M and L weight class, respectively. Additionally, eggs from brand No. 5 have average value below (51.95 Hough Units) the minimal required standard for freshness of 55 Hough units defined in the Law for quality of agricultural products and average weight for L class lower (62.04g) than the minimum requirement of 63g for this weight class.

Keywords: brands, eggs for consumption, markets, Hough units, yolk color.

Introduction

One of the most desired food with defined quality in terms of nutritive value are eggs. According Seuss-Baum, 2005, *e*ggs are excellent source of high valued proteins, fats (phospholipids and unsaturated fatty acids), vitamins and minerals. Eggs are also a perfect food for microorganisms and like all other food from animal origin should be properly stored, in order to avoid decreasing of the quality but also avoid possible negative effects on human health. Regular quality control of the marketed eggs is in the baseline for keeping the eggs on the side of safe food (Kralik et al., 2012). Marketing quality characteristics of the eggs are defined in the Law for quality of agricultural products, Chapter 1 "market organization", part 4 "market organization for poultry meat and eggs" (Official Gazette of R. Macedonia 2010/140, 21.10.2010), addition of this law (Official Gazette of R. Macedonia 2011/53, 14.04.2011 and (Official Gazette of R. Macedonia 2012/55, 03.05.2012) as well as escorting Rulebook for way of marking the eggs intended for market and eggs for incubation, marks and their use (Official Gazette of R. Macedonia 2011/35, 22.03.2011). These laws and Rulebooks defines marketing of and regulates: names, definitions and general terms for collecting, grading, marking, small and big packages, holding, data collecting for production and control of the quality of the eggs for consumption. Only "A" grade eggs are allowed to be marketed according the quality (freshness) requirements of the mentioned Law for quality of agricultural products. Fresh eggs are only eggs that have Hough units values higher than 55. Additionally fresh eggs are graded

according the size (weight) in four grades XL, L, M, and S. According (Roberts, 2004) one of the most often analyzed characteristics of the egg quality are albumen quality (albumen height and Hough units) and yolk color. Significant influence of the hen's age on the egg size (weight) in the Leghorn layers is reported by Baumgartner и сор. (2007), Peebles et al. (2000), Silversides and Scott (2001), Oloyo (2003), Van den Brand et al. (2004), Rizzi and Chiericato (2005), Johnston and Gous (2007). According previously mentioned, the goal of this analyze was to investigate some parameters of the quality of eggs for consumption from different producers (brands). Egg weight, internal egg quality (albumen quality through unbiased estimates of Hough Units and yolk color were analyzed in eggs marked as M and L weight classes, in order to reconfirm their declared marketing quality.

Material and methods

Egg weight, Hough units and Yolk color of the eggs for consumption in the region of city of Skopje eggs of two different weight grades (M, L) from 7 different producers (brands 1-7) were analyzed in egg samples purchased in different markets. Total of 140 eggs are analyzed,. In the markets eggs were kept on the refrigerated shelf on the temperature lower than 5°C. After purchasing the egg samples were stored in refrigerator and analyzed.

Table 1. Number of analyzed egg samples with indicative date of production and declared date „best before"

	Number of analyzed samples		End date of use presented on the packing(28 days after laying)		Indicative date of production*	
	M	L	M	L	M	L
BRAND 1	10	10	17-Dec-13	15-Dec-13	19-Nov-13	17-Nov-13
BRAND 2	10	10	12-Dec-13	12-Dec-13	14-Nov-13	14-Nov-13
BRAND 3	10	10	10-Dec-13	10-Dec-13	12-Nov-13	12-Nov-13
BRAND 4	10	10	26-Nov-13	04-Dec-13	29-Oct-13	06-Nov-13
BRAND 5	10	10	10-Dec-13	29-Nov-13	12-Nov-13	01-Nov-13
BRAND 6	10	10	10-Dec-13	04-Dec-13	12-Nov-13	06-Nov-13
BRAND 7	10	10	12-Dec-13	12-Dec-13	14-Nov-13	14-Nov-13
TOTAL\140	70	70				

*Date of production should be 28 before the presented end date for use and no more than 30-31 days because eggs should be graded and packed no later than 10 days after the laying (because Saturday and Sunday – weekends and production during the weekends) and presented "best before" date is 28 after laying.

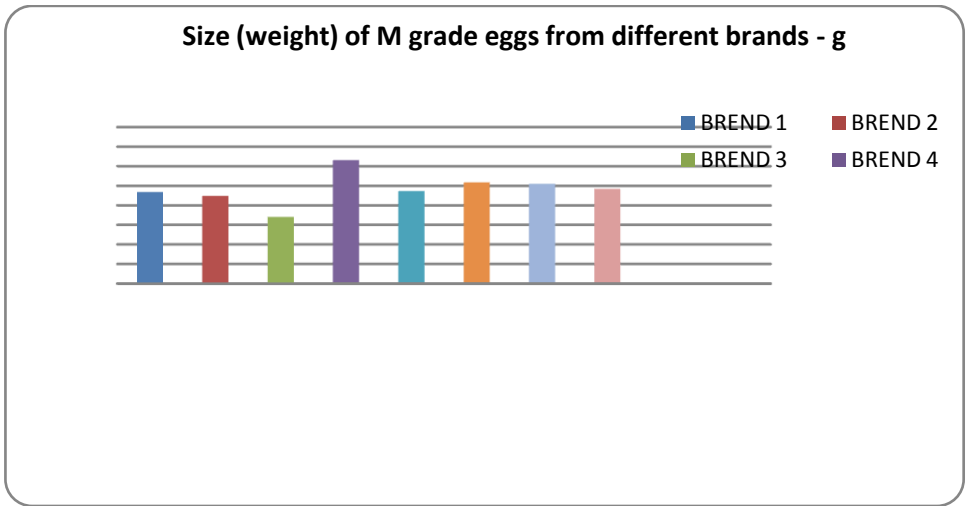
Analyzes are realized in the laboratory for control of the marketing quality of the eggs at the Institute for Animal Biotechnology at the Faculty for Agricultural Science and Food of the University „Sts. Cyril and Methodius" in Skopje, using automatic machine (Egg Multi Tester EMT 5200) for measuring the internal egg quality (egg weight in grams, albumen height, Hough units, yolk color and egg quality grade).

Results and discussion

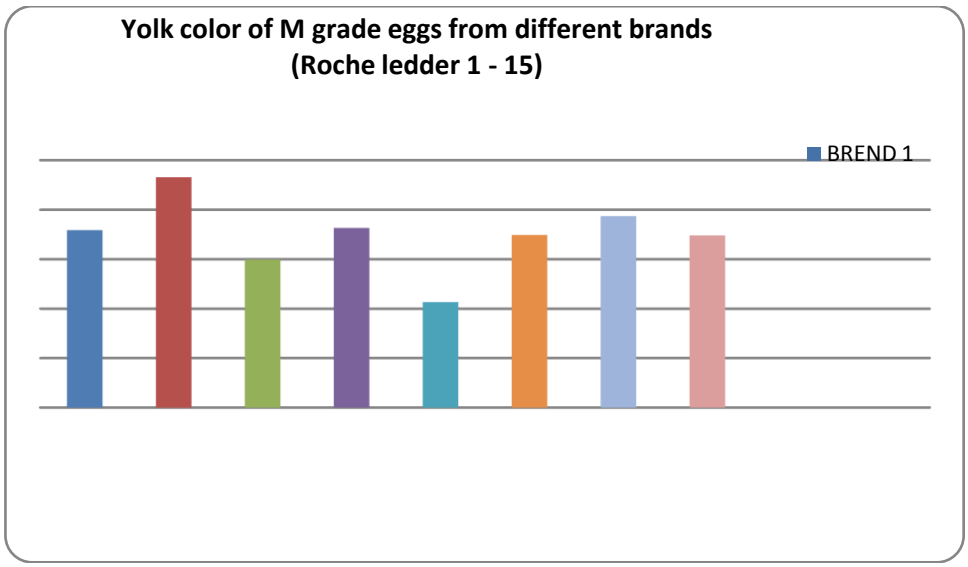
Data from analyze of the internal egg quality parameters (egg weight, Hough Units and Yolk color) in two grades (M and L) of 7 different brands are presented in table 2. No significant deviations in egg weight are notified in grade M eggs. Declared weight is in the standards for this grade (53-63 g). Hough Units standard requirements (above 55) are fulfilled in all brands except brand No. 4 (42.49 Hough Units). Additionally, in L weight graded analyzed samples of eggs Brand No.4 and 5 had also lower than the requested by Law values for Hough Units (40.89 and 51.95, respectively).

Table 2. Analyzes of egg size, Hough Units and Yolk color in weight grades M, L

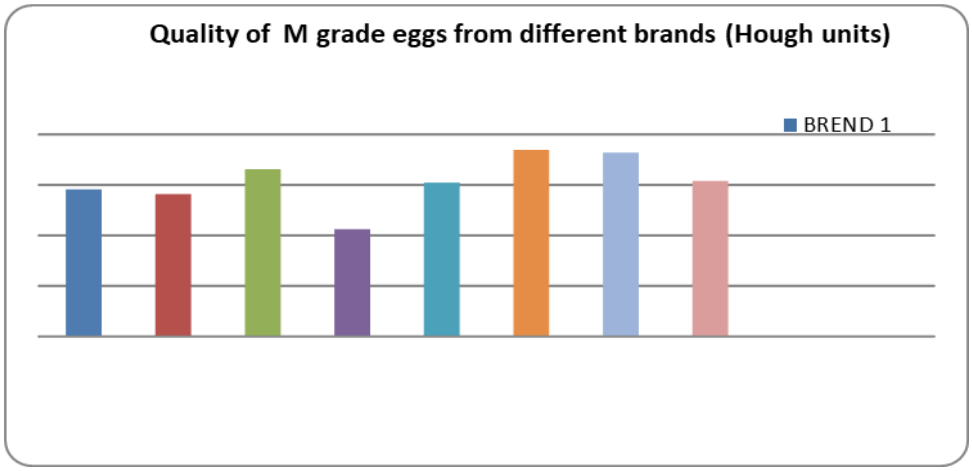
Different brands	Grade M			Grade L		
	Egg weight	Yolk color	Hough Units	Egg weight	Yolk color	Hough Units
BRAND 1	59.35	12.59	58.25	63.20	13.36	57.70
BRAND 2	58.97	13.66	56.39	64.72	12.92	65.96
BRAND 3	56.81	11.99	66.21	65.39	12.01	66.09
BRAND 4	62.62	12.63	**42.49**	63.64	11.78	**40.89**
BRAND 5	59.46	11.13	60.90	**62.04**	11.29	**51.95**
BRAND 6	60.35	12.49	73.88	65.98	12.06	58.71
BRAND 7	60.21	12.87	72.82	64.78	12.52	69.97
AVERAGE	59.68	12.48	61.56	64.25	12.28	58.75



Graph 1. Egg weight in M graded eggs from different brands

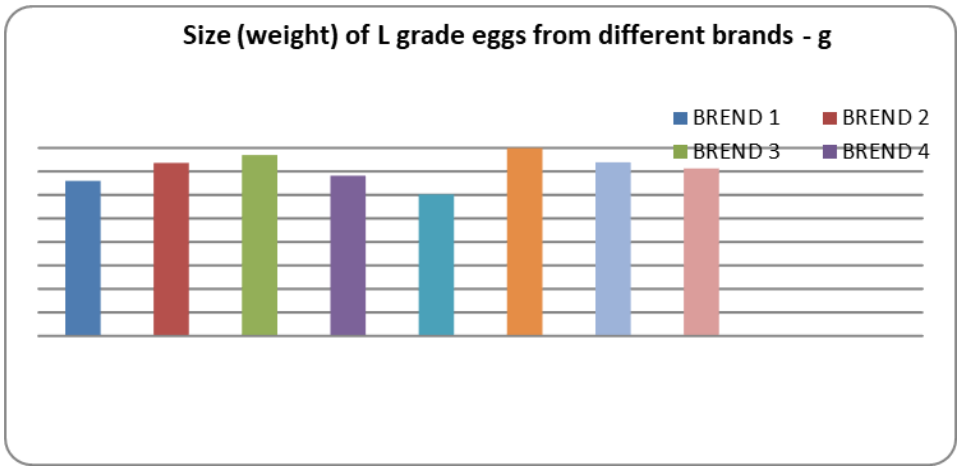


Graph 2. Yolk color in M graded eggs from different brands

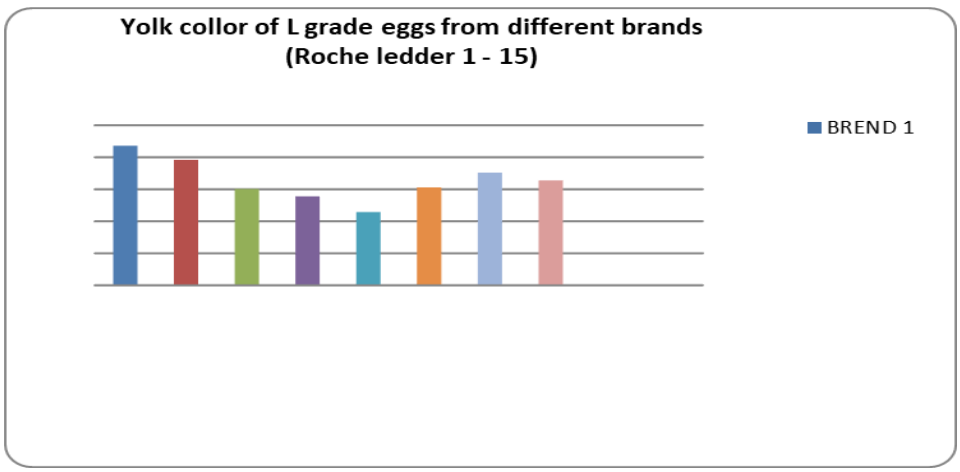


Graph 3. Hough Units (albumen quality or freshness) in M graded eggs from different brands

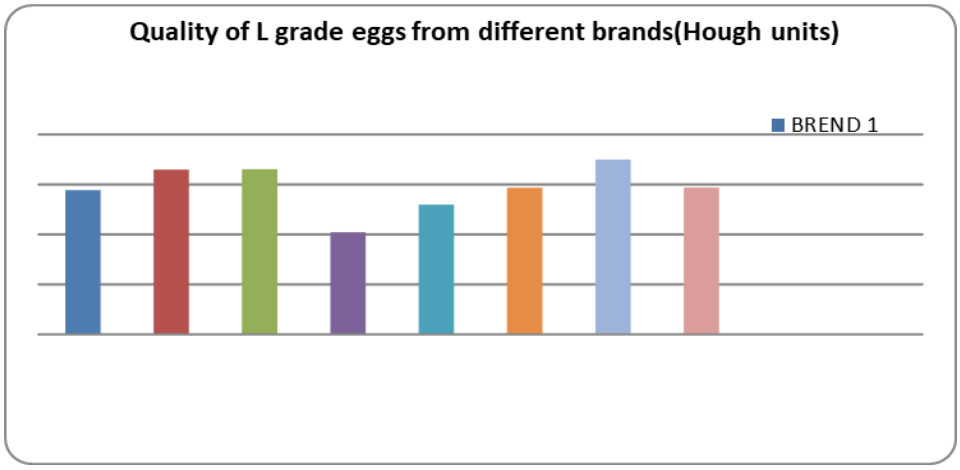
In L weight graded eggs brand No.5 eggs had average egg weight below the required standard (63-73g) for this weight class. This means that the packing center has mixed the eggs from lower grade with the eggs from the higher grades (in this case L graded eggs) with a goal to get additional income and profit from sales of lower weight grade eggs as higher weight graded eggs and actually deceive the consumers to higher price for this.



Graph 4. Egg weight in L graded eggs from different brands



Graph 5. Yolk color in L graded eggs from different brands



Graph 6. Hough Units (albumen quality or freshness) in L graded eggs from different brands

According already mentioned Law for quality of agricultural products, deviations in content of lower weight graded eggs in to the packaging of higher weight graded eggs, or more precisely presence of eggs from lower weight grades in the packages that should contain higher weigh grades should not be more than 5% or if the sample is smaller than 180 eggs such deviation should be double or 10%. Shortly this means that packers or packing centers have mixed the eggs with lower weight (lower grade eggs) with the bigger (eggs of higher weight).

Conclusions

Egg samples from 7 different brands sampled from different markets showed significant deviations from the declared and standard requirements by the Law of quality of agricultural products values for egg size (weight in g) and freshness (Hough Units) in the realized analyze. Results shows that deviations from the requred standards by Law are bigger in higher weight L class, that has a better market price due to the bigger size, but also exist in the M weight class. In general all brands meet egg quality standards determined in the regulatives (law for quality of agricultural products). Only one brand (brand No.4) out of seven brands express lower internal egg quality standard (Hough units) for albumen quality (42.49 and 40.89 Hough units for M and L weight class, respectivelly). Only one brand (brand No.5) out of seven brands express lower internal egg quality standard (Hough units) for albumen quality (51.95 Hough units for L weight class) but additionally has lower average weight (62.04g) that the standard required weight of 63g in the Law for quality of agricultural products.

Internal egg quality monitored through unbiased Hough Unit estimates in our analyze stressed the needs for more regular checks in respect to the freshness of eggs in the marketing channels. More often controls are also needed on the storage conditions of the eggs on the farm premises but also in the supermarkets warehouses and markets. This will discourage some of the distributers that use “smart approach” of buying and selling “older” eggs on lower price. Such approach have negative financial effect for all the stakeholders in the egg value chain due to consumers distrust in the egg as a product regardless of the brand behind the product.

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