

## TABLE EGGS OF KNOWN ORIGIN AND GUARANTEED QUALITY – BRAND EGG\*\*

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**Abstract:** The fact that most of consumers according to polls and questionnaires in our country, value the most freshness of eggs, and that at the same time they are not satisfied with it, there is necessity to provide guaranteed fresh eggs of high quality. Similar situation in other countries and cities in Serbia has induced some of producers of table eggs to develop production programs and marketing of eggs of known origin and guaranteed quality. Table eggs are produced and sold according to demands of consumers with integrated control system based on two EU Directives (No 1907/90 and No 1274/91). Program contains several components (defining of brand, production, quality control, commercial advertising) and each of the components is of conceptual importance, integral part and as such cannot be left out or neglected. In general, product of such Program cannot be only brand egg but result of entire integrated system of production, sale, quality control, marketing, and represent links in the chain – from producer of eggs to consumer.

**Key words:** table egg, known origin, guaranteed quality, brand

### Introduction

Today, in developed world countries, majority of people is living healthy, if we consider globally the quality of life. Recently "quality" has become very important in many spheres of life, for instance education, living space, sports, travel, cars, clothes, telecommunications and finally although not least important aspect of life, nutrition. Above mentioned aspects are simply called "quality of life". Contrary to them, developing countries are fighting to secure sufficient food for their population in order to avoid hunger and starvation. Quantity instead of quality is for them more important issue to be discussed.

Many participants in the chain of production of table eggs, respecting new regulations – directives applied in European Union which relates to poultry welfare, origin and safe egg, also consumer opinion, have developed serious strategy for production and sale of eggs. Freshness and safety of the product are still two main criteria according to which consumer purchase table eggs, considering production system and welfare of layer hens, and this is at the same time one of the most important factors which influence their choice when buying eggs.

Table eggs in European Union are produced according to two regulations which define certain quality traits which need to be present in eggs, in production and marketing, which are in accordance with consumer demands (No 1907/90, No 1274/91). Integrated control system of table eggs is based on mentioned directives, with aim to provide eggs of guaranteed and acceptable quality.

Different stages in production of table eggs are integrated in HACCP control system which enables production of table eggs of good quality, i.e. safe product of guaranteed quality and known origin in accordance with consumer demands.

In this paper we will present existing valid EU Directives which define closely traits of egg quality, more important quality traits and effect of numerous factors prior and subsequent to laying on quality traits as well as possibility for production and marketing of eggs of special and guaranteed quality.

How do we define quality? There are many definitions which explain more closely and define the quality of products – egg. For instance, *Amaline et al.* (1965) state that quality represents group of traits which differ between product units and consumers have precisely determined degree of acceptability of the product. *Spackman* (1987) states definition of quality from the Oxford English Dictionary according to which quality is degree of perfection of certain product. *Webb* (1987) states that quality is issue of personal perception of the stimuli received by five senses. According to *Belyavin et al.* (1987) concept of quality of eggs includes evaluation of exterior and interior egg quality traits which means firm and dark shell, intensive yolk colour according to consumer demands and firm and solid egg white. Quality of egg is group of all traits which are of importance for use of eggs as food stuff (*Schwaegele*, 2003).

Considering that the last and most important link in chain of production of table eggs is consumer, and that from his attitude to certain product depends the success of production, it can be said that high quality egg is egg

preferred by consumers (*Pavlovski*, 1988). Demand for eggs produced in acceptable conditions for the consumer is increasing, focus is on organoleptic/sensory traits, welfare of layer hens and preservation of the environment. In this regard, term quality includes sum of mutual influences of people, layer hens, environment and equipment.

## EU COUNCIL REGULATIONS

Quality of eggs is regulated by two ECC Regulations, which closely determine quality traits of eggs which can be found on European Union market. First regulation relates to certain marketing standards for eggs (1907/90) and the second, which describes in detail conditions for application of Regulation No. 1907/90, Regulation No. 1274/91.

Contents of majority of most important articles of the Regulation No.1907/90 will be presented in abbreviated form. **Article 1:** The term eggs relates to layer eggs in shell intended for human consumption. Other types of eggs are industrial eggs, breeding eggs, broken and cracked eggs. Market conditions which need to be fulfilled are described in detail (storage space and display of eggs, packaging, egg classes, production and packaging dates, expiration date, etc.) **Article 3:** Layer hens cannot be mixed with other types of eggs. **Article 4:** Producers deliver eggs only to packaging centres, collectors, food and non-food industries. **Article 5:** Only packaging centres can classify eggs according to quality, weight and production date. **Article 6:** Eggs are classified as class A fresh eggs; class B lower quality; class C eggs for food industry, which need to comply with all conditions stated in Directive 89/437/EEC. Eggs of class A need to be classified according to weight. Eggs of class A or B need to fulfil certain conditions stated in Article 20 of this Regulation. **Article 7:** On packaging of eggs of class A there can be one or more insignia (expiration date, additional information, quality, weight, number of packaging centre or name, commercial name or brand, production method, origin of eggs, producers' registration number). **Article 8:** Eggs of classes B and C also must have insignia of the quality class. **Article 10:** Large packaging of eggs or even small ones inside the large packages must have visible label with different information (name, business title, commercial brand, number of packaging centre, quality class, and weight number of eggs, expiration date, price, storage conditions, and production type). **Article 12:** „Extra“ eggs are class A eggs packaged in small boxes with printed or attached label with insignia extra, which is removed or destroyed seven days after packaging. **Article 15 and 16:** Eggs

for export and import need to fulfil conditions determined with this regulation. **Article 20:** Regulates conditions for frequency of collecting, delivery and handling of eggs, quality criteria and weight class. Quality parameters are the following: purity/cleanliness of the shell, egg white consistency, height of air chamber, appearance and mobility of yolk without blood or meat stains or foreign bodies, development of germ cell.

Regulation No. 1274/91 contains detailed conditions of certain marketing egg standards, which need to be fulfilled by eggs prior to application of Regulation No. 1907/90. **Article 1:** Delivery and collecting of eggs: Eggs are delivered at the end of every third work day (except Sweden and Finland where delivery is once a week if the temperature in the room where eggs are stored is not above 14°C). Eggs „extra“ should be collected and delivered to centres for packaging every work day from each producer. If the temperature in the room doesn't go over 18°C, then delivery can be every second work day. Classification and packaging of eggs need to be performed within two days from the moment of their reception in the packaging centre. **Article 2:** Eggs are stored, collected and transported in conditions which are not to the detriment to the initial quality of eggs. **Article 3:** Conditions which need to be fulfilled by collectors and packaging centres are determined, and related to space surface, adequate ventilation and lighting, cleanliness and disinfection of the space, protection from temperature variations, technical equipment of the packaging centre (lighting, equipment for measuring of conditions of the air space, machine for classification of eggs according to their weight, equipment for labelling of eggs). Committee/Board authorized by the government determined number for each packaging centre and only centres with special authorization can package „extra“ eggs. **Article 5 to 7:** Conditions for classification of eggs and minimal conditions are determined: Class „A“: Shell and cuticle (normal, undamaged); „Air chamber“ (height not over 6mm, and for eggs of class „extra“ not higher than 4mm in the moment of packaging, on the market and in case of export); „Egg white“ (clean, clear, gelatinous consistency, without strange odours); „Yolk“ (visible as shadow when placed in the light, without noticeable contours, centrally located, without any smell). Egg shell mustn't be washed and preserved, and eggs have to be stored on air temperature not below 5°C. Eggs of class „B“ need to fulfil following minimal requirements: „Shell“ (normal, undamaged); „Air chamber“ (height not over 9mm); „Egg white“ (clean, clear, without strange odours); „Yolk“ (visible as shadow when placed in the light, without any smell); „Germ cell“ (without development). Eggs of class „C“ don't comply

with requirements for classes A and B and are used only in food and non-food industry. **Article 8:** Eggs of class „A“ are classified according to weight in the following way: XL super large (73g and heavier); L large (from 63g to 73g); M – medium (from 53g to 63g); S - small (below 53g). **Article 13:** Eggs are stored in clean and dry premises without any strange smells and odours. Eggs in transport and during storage need to be clean, dry and without strange smells, protected from weather, light and temperature shocks and disturbances. **Article 14 to 16:** There has to be clearly displayed on packaging the expiration date.

## EGG QUALITY AND CONSUMER DEMANDS

System of guaranteed quality on European market is based on legal determinations and consumer demands. Consumption of eggs on market of the European Union lately has decreased considerably, on one hand, and on the other, production of eggs per layer hen and total production increased considerably. Increased efficiency in all links of the chain of egg production contributes greatly (parent flocks, incubation stations, and commercial production). Quantity of eggs and providing of consumers with eggs in European Union is not the problem at this moment, however, much attention is directed to issues of egg quality in accordance with consumer demands and EU regulations (*Pavlovski, 2004; Pavlovski et al., 2002*).

**Exterior egg quality traits:** The most important trait of exterior quality of egg is **egg mass**. Optimal egg mass is between 53g and 73g which is in accordance to classes M and L. The egg mass is under the influence of genetic basis, health condition, nutrition of layer hens, management, light regime, etc. The most important in production of eggs from the aspect of egg mass is: a) to realize quick increase of egg mass (less than 50% of eggs of class S at the age of layer hens of 22-23 weeks), and b) to stabilize egg mass at the beginning of 45th week (maximum 15-20% XL eggs at the end of laying period). Demands of the market are of the greatest importance in regard to forming of egg mass. **Shell colour** is important factor influencing the preferences of consumers and uniformity is required whether the shell is white or brown. Egg shell has to be clean, non-washed and without cracks and of average firmness of approx. 4kg and thickness of approx. 0,375 mm (*Pavlovski and Vitorović, 1996*). Egg shell colour depends mainly on genetics, age and health of layer hens. Researchers in the field of genetics have obligation to improve the colour in accordance with consumer demands.

**Interior egg quality traits: Yolk colour** is very important quality trait and it differs in reference to consumer demands in different countries in the world from light yellow to orange. So, for instance, in Canada and Israel consumers accept lighter yolk colour (3-6 Rocha), in France 11-14 Rocha, in Germany 14-14 Rocha, and in USA 9 Rocha. Based on poll carried out in our country (Pavlovski and Mašić, 1994), majority of consumers (56,5%) prefers yellow colour, to 9 Rocha, 27,4% consumers older than 40 prefer dark yellow yolk colour (over 9 Rocha). In Serbia, eggs from traditional extensive production often had yolks of more intensive colour than represented on Rocha scale, as consequence of many substances in feed for layer hens. The same effect is achieved by adding red pigments (xanthophylls) in minimal quantity of 15ppm. **Freshness and quality of egg white** is determined by objective methods. Small air chamber (< 2mm) and relatively high number of Hough units (> 75) are good values for fresh egg. More than one factor affects the quality of egg white, for instance genetics, health as factors influencing the quality of egg subsequent to lying. **Blood and meat spots** cannot be contained in the egg. Blood spots are created by bursting of blood vessels in the ovary or oviduct due to: content of vitamin A and K in diet, antagonism of vitamin K (medicine sulfakvinoksalin and some alfalfa components), toxins, stress, genotype, and disease. Meat spots depend on genotype, age and hybrid of hens, and in eggs of white shell they occur in much higher percentage. **Strange smells** are also undesired trait of eggs, and can be caused by genetic factors, health of layer hen or feed (rape seed, fish meal, tannins). Researchers in the field of genetics and breeders have the responsibility to produce the egg of supreme quality which will satisfy demands of consumers all around the world.

Quality of eggs is under the influence of many factors prior to laying of eggs. The effect of many factors must be taken into consideration in order to prevent their negative influence and provide the best possible table quality of eggs.

**House and conditions of the environment** for layer hens are very important factors, which affect directly the quality of eggs. Primary role of the coop is to provide comfortable conditions of the environment for layers in order for them to achieve maximum production with optimal quality of the egg. Environment conditions in the coop such as temperature, relative humidity and air flow have to be controlled and maintained on moderate level. Adjusted light of different colours has calming effect on layer hens and needs to be adjusted for different housing systems in order to avoid abnormal behaviour of hens, so called cannibalism.

**Production system** considerably influences the quality of eggs which is confirmed by many researches. In our country, since 1967, researches on quality of eggs from layer hens reared in different housing systems were initiated. Results of our investigations of exterior and interior egg quality traits from conventional battery system, free range, deep litter system and aviary system have confirmed that eggs from the free range had the best interior quality and Haugh units as well as the most intensive yolk colour (Pavlovski *et al.* 1981; Pavlovski, 1982; Pavlovski *et al.*, 2001; Pavlovski *et al.*, 2002). It is known that in every production chain the most important link is the last link – consumer. For every production, also production of table eggs, it is very important to know why the consumer is buying this product and what requirements and attitudes he has towards certain product. Studies of the requirements and opinions of consumers and marketing strategies at the beginning of eighties are becoming important also in our country. Several studies relating to consumer attitude towards eggs produced in different production systems have been carried out (Pavlovski *et al.*, 1981b; Pavlovski and Mašić, 1993, 1994; Pavlovski *et al.*, 200b). Interestingly, in 1981, 70,6% of polled consumers in Belgrade considered battery system as acceptable production method, and 10 years later this percentage was 54,6%, and two decades later it decreased to 35,6%. In the stated period the number of consumers who were against battery system has doubled, from 6,4% to 10,3% i.e. 13,2%. In the stated investigation periods, number of consumers willing to pay higher price by 10% for egg of guaranteed and controlled quality or for eggs produced in free range system increased from 46% to 63% i.e. 75%. Obviously, the number of consumers, followers of the free range system on Belgrade market increased considerably.

**Nutrition** is very important factor and it has great influence on quality of eggs and it has to be adjusted to need of layer hens during laying period. Quality of the mixture depends on the quality of raw components and therefore biological value of different components as ingredients of the mixture must be guaranteed. Different additives which are added to mixtures (ether oils, omega 3 fatty acids, selenium, different vitamins) influence the change in nutritive value of eggs. Water for poultry has to be biologically safe and correct and without residues of heavy metals and organic substances.

**Health of layers** is also important factor influencing the quality of eggs prior to laying. In modern poultry production there is wide spectrum of present diseases which are caused by viruses (for instance Newcastle, infectious bronchitis, various adenoviruses), bacteria (mycoplasma, campilo

bacteria, coccidiosis, salmonella, etc.), parasites (worms) which considerably deteriorate the quality of eggs. Toxic substances such as metabolites of micro organisms (mycotoxins), pesticides, fungicides, sulphonamides, specific coccidiostatics, gossypol, also have adverse effect on egg quality. Also, metabolic disease, such as fatty liver, in general liver diseases, deficit of Ca and F, vit. D deteriorate the quality of eggs. Therefore the control system has to anticipate prophylactic measures to prevent or alleviate the effect of certain factors on deterioration of the egg quality. This is provided by HACCP system which includes risk analysis and determination of critical control points in production of table eggs.

Many factors influence deterioration of quality of eggs after laying. What needs to be done to ensure good quality after egg leaves such good environment as oviduct of the layer hen?

**Conditions of the environment**, in different systems of production they are the prevailing factor with adverse influence on egg quality. These factors are temperature, relative humidity, dust, strange smells and in order to avoid their adverse effect frequent collecting of eggs is recommended (article 1 of the Regulation EU 1274/91). In order to preserve the initial quality of egg, they have to be collected as soon as possible from the coop in order to prevent the negative effect of the climatic conditions in the coop and stored in storage with max. temperature up to 14°C and relative humidity of air up to 75%. In the complete marketing chain, whose first stage starts with the producer (farm) and ends with the consumer, through storage, packaging centres and retail store, adequate conditions relating to temperature and relative air humidity. This includes transport conditions (Regulation EU 1274/91/Article 13). Recommendation is that the eggs are transported in clean and dry space, without any strange smells and need to be protected from climatic and light disturbances.

### **EGG OF KNOWN ORIGIN AND GUARANTEED QUALITY:**

In production of table eggs numerous strategies have been used in order to create product – egg of special quality and known origin and name, in other words brand egg. In our country, Program of production and marketing of eggs of special quality (KO-KO) has been developed, and such eggs were sold on Belgrade market at a price by 20% higher than standard eggs (*Pavlovski et al.*, 1988, *Pavlovski et al.*, 1996).

Production of eggs in EU in 2006 was considerably lower, and consumption per capita also lower in comparison to previous three years. Production of eggs in EU-25 in total was 1.6 million tons, or by 2% less than



in 2005, whereas the production of eggs in EU-15 decreased to 5.5 million tons or by 1.5% less than in 2005 god. Still the leading producer of eggs in EU in 2006 was France with 980.000 tons, followed by England 818.00 tons, Spain with 800.00 tons. Then, Italy with 780.000 tons and at the end Germany with 776.000 tons. Considerable decrease in production of eggs was registered in Belgium and Spain mainly because of introduction of alternative rearing systems for layer hens, changes in consumer habits and bad image of egg as food stuff.

Decreasing trend in consumption of table eggs is present in the world and in our country, therefore, producers of eggs in cooperation with marketing teams should find adequate measures to stop further decrease of consumption and return of the consumers who like eggs. The development and application of programs of production and marketing of eggs of known origin will provide new product with known name (brand egg).

And finally, all consumers be able to dividing into three types:

- **organic influence** They are only consumers to give farming method as a determining criterion.
- **battery farming – sensitive consumers** These consumers, who form the maority, are strongly opposed to battery farming. However, the farming method does not feature in their actual purchasing criteria, and there is considerable contradiction between their and their attitudes and their purchasing behaviour. This contradiction can be interpreted as resulting from two currently distant spheres between which the consumer alternates, i.e. that of word citizen (indignation with intensive farming method, which are cosidered as against nature) and that of consumer for whom the importance of the final use (freshness, size, brand name) determines purchasing behaviour.
- **Non-aware consumers** Such consumers, who are in the minority, are interested only in egg quality, purpose of use and price.

## **KONZUMNA JAJA POZNATOG POREKLA I GARANTOVANOG KVALITETA- BRAND JAJA**

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## Rezime

Činjenica, da najveći broj potrošača po rezultatima anketa sprovedenih u našoj zemlji, pri kupovini jaja najviše ceni svežinu, a da ista ne zadovoljava na tržištu, ukazala je na neophodnost obezbeđenja garantovano svežih i kvalitetnih jaja. Slična situacija u drugim zemljama i gradovima u Srbiji navela je neke proizvođače konzumnih jaja, da razrade programe proizvodnje i marketnga jaja poznatog porekla i garantovanog kvaliteta. Proizvodnja i prodaja konzumnih jaja se odvija u skladu sa zahtevima potrošača i ima integrisani sistem kontrole zasnovan na dve direktive Evropske Unije (No 1907/90 i No 1274/91). Program sadrži nekoliko komponenata (definisanja branda, proizvodnje, kontrole kvaliteta, komercijalne propagande) i svaka je od koncepcijskog značaja, integralni njegov deo i kao takva ne može se izostaviti ili zanemariti. U celini posmatrano, proizvod iz ovog Programa ne može i ne sme biti samo jaje sa brend imenom, već rezultat celog integrisanog sistema proizvodnje, prodaje, kontrole kvaliteta, marketinga i tesno su povezane karike u lancu na putu jaja od proizvođača do potrošača.

**Ključne reči :** konzumno jaje, poznato poreklo, garantovan kvalitet, brand

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