CONTRIBUTIONS TO THE KNOWLEDGE OF CHEMICAL COMPOSITION OF PASTEURIZED LIQUID EGG PRODUCTS

Andreea-Cătălina Nistor[1], Lucia Iuliana Nistor (Cotfas)[1], Aida Albu[1], M.G. Usturoi[1]

[1]University of Agricultural Sciences and Veterinary Medicine Iasi, Romania

Abstract

Hen egg is known as an important nutrient for humans for a long time. Since with the advanced technologies of the 20th century, physical and functional properties, as well as chemical composition of egg have been studied to create new products useful for food industry and home user. The objective of this paper was to determine the quality conditions of pasteurized liquid egg products (white, yolk and mix) packaged version "bag in box" units 2 kg. Product quality was assessed in terms of chemical composition, determining the water content and the dry constituents (proteins, lipids, minerals and SEN). Samples were taken from the five packing units of each type of product, on which specific analysis was carried out, approved working techniques according to food industry. The data obtained showed that the highest water content was in albumen (88.186%), followed by mix (76.608%) and yolk (57.094%). On dry weight basis, proteins had share of 14.702% in the yolk, of 12.006% in the mix and only 10.466% in whites, situation applies to the fat content (25.546% from yolk, 9.642% from mix and only 0.028% in egg white). The conclusion of our research was that the pasteurization process doesn't alter the chemical composition of liquids egg product, values registered being close to edible egg specific components (unprocessed).

Key words: chemical composition, pasteurization, quality, egg products, consumer

INTRODUCTION

Eggs are recognized as the ideal food for humans due to the high content of protein, relatively low cost and high availability in most countries (1). Due to changing lifestyles and technological progress, there is a growing demand for egg products. Through egg product is meant any product made from whole egg or its constituents after removal of the shell and shell membranes. These products can be classified as chilled liquid pasteurized, frozen, concentrated or dried products (2). Traditionally, eggs are sold as shell eggs, but recently, their consumption under the form of egg products has increased (4).

For these reasons it is desirable, knowledge of the chemical properties of these pasteurized egg liquid products. It should be recognized that the process of pasteurization show influence on the microbiological quality of liquid egg, and not the chemical composition. Thus, from chemical composition point of view egg is defined as a mixture of 12% protein, 12% fat, carbohydrates and minerals immersed in water, which can be found in a proportion of 75% of egg total weight (7). Chemical composition of the egg is particularly important to know because of this particularly characteristics, eggs are an important food for human health (8). Due to their properties to transform and perform more functions simultaneously, as gelling, emulsifying, foaming, coloring and flavoring food, knowledge of chemical properties of liquids egg products is particularly important for industry (3).

The main objective of the study is to determine the chemical quality of the liquid pasteurized eggs packed bag in box from results expressed by white, yolk and mix.

*Corresponding author: andreea.nistor10@yahoo.com
The manuscript was received: 12.09.2015
Accepted for publication: 20.10.2015

MATERIAL AND METHOD

To evaluate the chemical quality were used pasteurized liquid products packed bag in box 2 kg each (white, yolk and mix).

Samples of both batches were stored prior to chemical analysis under refrigeration (4°C, relative humidity = 90%).

The analysis carried out on (white, yolk and respectively mix) in order to register their water levels and dry mater. It has been established and the proportion of ash, protein, fat and nitrogen extract free on dry weight basis

Determination of chemical composition for each of the three product analysis was carried out on 5 boxes of 2 kg of each product. Analyses were performed according to standards as follows:

Moisture and dry matter content were determined by following two steps: determination of dry matter relative and absolute.

Samples of the egg (white, yolk, mix), dried at 60°C for 36 hours, was weighed and the data obtained were placed in relationship to calculate the relative moisture and solids.

Calculation of total dry matter depending on relative and absolute humidity was determined using the following formula:

$$DMt\ (\%) = \frac{DM_r(\%) - DM_a(\%)}{100}$$

where: DMr-relative dry substance %;
DMa–absolute dry substance %;
DMt – total dry matter %.

Determination of crude ash (mineral) was achieved by the method of 2-3g drying and calcination of the sample at 550 °C until residual area have not noticed black spots, indicating a complete and correct ignition.

After complete calcination crucible with the sample to be analyzed were removed from the oven and were placed in a desiccator to cool and then weighed. The ash was calculated using the following mathematical relationship

$$Cen.\ B\ \% = \frac{c \cdot 100}{m}$$

where: c – crude ash in grams
m – weight of sample

Crude protein determination according to Kjeldahl method that completing the three stages: mineralization, distillation, titration.

Crude fat in the samples was determined using acid hydrolysis method. Oven-dried sample was then subjected to extraction with chloroform. After extraction has cooled in the desiccator and weigh

The calculation formula for crude fat is used:

$$GB\% = \frac{(m_1 - m_2) \cdot 100}{m}$$

where: m_1 - weigh of table sachet sample before degrasing;
m_2 - weigh of table sachet sample after degrasing;
m – weigh of sample .

Determination of nitrogen extract free was carried out after the following formula:

SEN % = SO% – (PB % + GB%)

The test results were processed statistically calculating the position and variance estimators (arithmetic mean, standard deviation and coefficient of variation average and V%), establishing significance of differences.

RESULTS AND DISCUSSION

The analysis carried out on the three types of liquid pasteurized, indicate variations in the chemical composition depending on the type of product.

The chemical composition of the white pasteurized liquid shown in Table 1 indicates a proportion of dry matter of 11.814 % fresh product as constituted included proteins with 10.466 %, lipids with 0.028 %, ash at a rate of 0.728 % and nitrogen extract free with 0.592 %.

Uniformity chemical characteristics of pasteurized liquid egg albumen was good for all components analyzed, except in nitrogen extract free when its value was V%=30.013 and lipids (V%=15.971) heterogeneity identifying characteristic analyzed.

Data from the literature on the chemical composition of pasteurized liquid albumen indicates values of 12.100% dry matter, proteins 10.200% and crude ash of 0.680% (5).

Table 1 Chemical composition of pasteurized liquid albumen (g/100 g fresh product)

Specification	n	$\overline{X} \pm S_{\overline{X}}$	V%	Min	Max
Water (%)	5	88.186± 0.058	0.148	88.05	88.4
Dry mater (%)	5	11.814± 0.058	1.111	11.6	11.95
o Proteins (%)	5	10.466±0.026	0.555	10.38	10.53
o Lipids (%)	5	0.028± 0.002	15.971	0.02	0.03
o Ash (%)	5	0.728± 0.008	2.642	0.70	0.75
o Nitrogen extract free (%)	5	0.592± 0.079	30.013	0.29	0.76

The data on the chemical composition of pasteurized liquid egg yolk shows higher values of this fat being 25.546%, and the proteins were 14.702%. But they were also reported very low levels of 1.576% crude ash and nitrogen extract free of 1.082%.

The coefficient of variation was between 0.181 to 9.524%, indicating homogeneity analyzed indicator.

Regarding literature, it shows that the values of 39.500% dry matter and protein 12.500% (6).

Table 2 Chemical composition of pasteurized liquid egg yolk (g/100 g fresh product)

Specification	n	$\overline{X} \pm S_{\overline{X}}$	V%	Min	Max
Water (%)	5	57.094± 0.046	0.181	57.01	57.26
Dry mater (%)	5	42.906± 0.046	0.241	42.72	42.99
o Proteins (%)	5	14.702± 0.027	0.414	14.62	14.78
o Lipids (%)	5	25.546± 0.037	0.331	25.42	25.62
o Ash (%)	5	1.576± 0.010	1.460	1.54	1.60
o Nitrogen extract free (%)	5	1.082± 0.046	9.524	0.97	1.18

Table 3 presents the average values for the chemical characteristics of liquid pasteurized mix. The dry matter content values its registered 23.392%, and the water of 76.608 %.Proteins in the mix is 12.006%, followed by lipids 9.642%, 0.994%, crude ash and nitrogen extract free represented a rate of 0.750%.

Coefficient of variation for liquid mix. Chemical analyzes indicate an excellent homogeneity pasteurized is below 10%. The values found in the literature for the chemical composition of liquid pasteurized mix indicated a rate of 24.500% dry, 12.000% protein, 10.900% fat and 1.000% ash (5).

Table 3 Chemical composition of mix pasteurized liquid (g/100 g fresh product)

Specification	n	$\overline{X} \pm S_{\overline{X}}$	V%	Min	Max
Water (%)	5	76.608± 0.015	0.045	76.56	76.65
Dry mater (%)	5	23.392± 0.015	0.149	23.35	23.44
o Proteins (%)	5	12.006± 0.020	0.375	11.94	12.06
o Lipids (%)	5	9.642± 0.006	0.153	9.62	9.66
o Ash (%)	5	0.994± 0.004	0.899	0.98	1.00
o Nitrogen extract free (%)	5	0.750± 0.030	9.043	0.69	0.86

CONCLUSIONS

If the white pasteurized liquid was found a percentage of dry matter of 11.814% and minimum content in literature was 10.500%, the proteins rate of 10.466%, while in the literature it was 10.200%.

Data on the chemical composition of the yolk liquid pasteurized indicate that dry matter recorded was 42.906%, higher than the minimum indicated by the literature, in the same situation are the lipids that have reached a value of 25.546%, and the

literature indicated minimum value is 25.000%.

Regarding the composition of liquid pasteurized mix, its dry matter values were 23.392%, higher than those obtained in the literature 22.000% and 12.006% of protein was obtain and the minimum value indicated being 10.500%.

Chemical determinations carried out on three types of pasteurized liquid founded that pasteurization did not affect the characteristics of the products analyzed.

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