# RESEARCH CONCERNING THE EVOLUTION OF SOME PHYSICAL QUALITY INDICATORS OF LIQUID PASTEURIZED MELANGE PRODUCED IN ROMANIA

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**Abstract**

*Eggs represents one of the foods most commonly eaten and just because of this it is important to know the value and importance in the daily diet.*

*Due to their importance in the food chain, it can be used as liquid, frozen or dried, and its properties should be preserved even when new technologies are applied to preservation.*

*Knowledge of liquid flow and pH value of these products, as well as their evolution during storage is essential for the optimum management of certain processes in the food industry.*

*This paper aims to assess pH value and viscosity throughout its period of validity by methods according to standards. The obtained results on pH value, indicates an increase of 7.69% at day 25 compared to the beginning of storage, viscosity determined on day 0 at 5 rpm has a value of 427.51 ± 2.82 mPa*s, showing a decrease to 222.50 ± 17.57 mPa*s at the end of the analysis.*

*Knowledge of these physical indicators is important because they characterize the functionality of liquid pasteurized melange used as an ingredient in food industry.*

**Key words:** liquid egg, quality, physical indicators, consumer

## INTRODUCTION

Egg is an ingredient commonly used in food industry due to special chemical and physical properties but grant it functionality in obtaining new products [5].

The idea of increasing the shelf life of eggs and their high capitalization (linked to preferences consumption market and the growing demand of the sectors that use eggs as raw materials / auxiliary) were introduced in industrial manufacturing so-called „derived from eggs" or „egg products", foods that largely retains the natural quality of the product, but a lot better conservability than it [7,10].

In the past years, food processing through new technologies is viewed with particular interest by the food industry [6].

Among them, pasteurization has popularity among food processors because inactivate microorganisms, retains nutritional value and sensory properties of foods, thereby prolonging and their validity [2,11].

Egg product are used as the main ingredient in many foods, especially due to exceptional functional properties [3].

Use of these products in food industry requires knowledge of rheological properties and their changes during storage [1,4].

Knowledge of rheological changes is not only necessary for production equipment design but is also important for range development, sensory evaluation and quality control them [8].

Changes in physical, chemical and microbiological occur during storage and therefore are expected changes in rheological properties [9].

Understanding these changes during storage of egg products of interest for the food industry [12].

Therefore the aim of this paper is to evaluate pH value and viscosity throughout the period of validity which expresses the functionality of liquid pasteurized melange used as an ingredient in food industry.

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## MATERIAL AND METHOD

Physical quality assessment was performed on liquid pasteurized melange packed bag in box in the amount of 2 kg. This was stored under refrigeration (0…+4°C).

Were used 10 samples for each storage period (days 0,7,14,21,25). Analyses were performed according to standards.

Determination of pH value was made using a pH meter laboratory InoLab, prior to viscosity, and viscosity was determined with rheometer (Lamy Rheometer) concentric cylinder, which is based on the principle of laminar flow around some bodies rotating, thus measuring the torque induced by the viscosity of the liquid at 25°C, at different speeds of rotation 5-300 rpm for 60 seconds.

Statistical interpretation of data obtained was performed by calculating the position and variance estimators and determination of differences was performed using one-way ANOVA, included in MsExcel.

## RESULTS AND DISCUSSIONS

The pH value. Regarding analyzed melange, it is influenced by the initial quality of the product and the storage conditions.

There is an increase in pH value from one control stage to another, so fresh melange media obtained was 7.54 ± 0.01, and the melange stored for 25 days (the maximum validity period recommended by the manufacturer) is 8.12 ± 0.03. Character study shows an excellent homogeneity, the coefficient of variation is less than 10%. Statistical differences are very significant for each control period compared with the fresh product.

Data in the literature indicate an increase of pH value directly proportional to the period of storage. Thus, Wong et al. in 1996 recorded a pH value of liquid pasteurized melange on the first day of storage 8.73, and on the 35th it was 8.85; another study by de Souza et al. 2013 indicates pH values on the first day of storage showing an increase of 7.7 this stage in the 12th day of being 8.19.

Table 1 The evolution of the pH value of pasteurized liquid melange stored under refrigeration

| Storage period (days) | pH value | V (%) | Significant differences |
|---|---|---|---|
| 0 | 7.54±0.01 | 0.64 | - |
| 7 | 7.89±0.02 | 0.94 | $\hat{F}$ =147.68; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$*** |
| 14 | 7.98±0.01 | 0.78 | $\hat{F}$ =299.50; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$*** |
| 21 | 8.08±0.02 | 0.97 | $\hat{F}$ =333.05; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$*** |
| 25 | 8.12±0.03 | 1.22 | $\hat{F}$ =272.84; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$*** |

ns- not significant differences between means , * (P<0.05) – significant differences, *** (P<0.01) highly significant differences

Viscosity is the property of fluids to resist deformation that is not their volume changes by developing shear. The factors affecting viscosity are temperature, dry matter content, heat treatments of the products and other ingredients added to increase the lifetime of the product.

It is apparent from the data presented that dynamic analysis of viscosity at the same speed of rotation throughout the storage period show an decrease. In assessing the product freshness, the values for pasteurized liquid egg viscosity were 427.51±2.82 mPa*s at speed of 5 rpm, which decreased to 222.50±17.57 mPa*s at speed of 300 rpm.

In the middle of the storage period (day 14), the melange analyzed by us has a viscosity values of 348.48±2.35 mPa*s at speed of 5 rpm and of 169.28±2.35 mPa*s at speed of 300 rpm.

On the last day analysis product It was decreased to 217.94 ±2.82 mPa*s at speed of 5 rpm and of 51.77±0.73 mPa*s at speed of 300 rpm.

In 2011, Singh et all. had obtained a value of 29 mPa*s at 60 rpm debut storage, and a value of 42 mPa*s at day 14, followed at the end of storage, respectively on day 28 it is 76 mPa*s.

Table 2 Viscosity of pasteurized liquid egg during storage

| Rotation speed | Storage period (days) | Viscosity (mPa·s) | V (%) | Significant differences |
|---|---|---|---|---|
| 5 rpm | 0 | 427.51±2.82 | 2.09 | - |
| | 7 | 382.06±3.11 | 2.57 | $\hat{F}$ =12.76; $F\alpha_{0.001}$=15.37; $\hat{F} < F\alpha_{0.001} \rightarrow$ ** |
| | 14 | 348.48±2.35 | 2.13 | $\hat{F}$ =50.49; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| | 21 | 286.41±3.33 | 3.68 | $\hat{F}$ =79.93; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| | 25 | 222.50±17.57 | 24.97 | $\hat{F}$ =132.68; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| 10 rpm | 0 | 324.41±2.60 | 2.54 | - |
| | 7 | 290.56±3.02 | 3.28 | $\hat{F}$ =54.75; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| | 14 | 255.48±2.71 | 3.35 | $\hat{F}$ =262.58; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| | 21 | 191.41±2.67 | 4.42 | $\hat{F}$ =410.55; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| | 25 | 128.89±7.31 | 17.95 | $\hat{F}$ =615.35; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| 20 rpm | 0 | 294.27±3.17 | 3.41 | - |
| | 7 | 262.71±3.22 | 3.88 | $\hat{F}$ =155.16; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| | 14 | 228.30±2.38 | 3.30 | $\hat{F}$ =934.39; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| | 21 | 162.11±2.96 | 5.77 | $\hat{F}$ =1187.64; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| | 25 | 101.73±3.39 | 10.56 | $\hat{F}$ =1876.62; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| 40 rpm | 0 | 267.02±2.47 | 2.93 | - |
| | 7 | 236.80±3.10 | 4.13 | $\hat{F}$ =188.60; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| | 14 | 204.78±2.03 | 3.14 | $\hat{F}$ =1151.13; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| | 21 | 141.53±2.97 | 6.63 | $\hat{F}$ =1372.71; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| | 25 | 80.24±2.85 | 11.23 | $\hat{F}$ =2133.03; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| 80 rpm | 0 | 243.02±2.60 | 3.39 | - |
| | 7 | 218.84±3.30 | 4.53 | $\hat{F}$ =257.55; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| | 14 | 190.08±2.23 | 3.71 | $\hat{F}$ =1858.46; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| | 21 | 128.23±2.90 | 7.16 | $\hat{F}$ =1877.15; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| | 25 | 66.86±1.59 | 7.54 | $\hat{F}$ =3075.71; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| 160 rpm | 0 | 227.42±2.62 | 3.64 | - |
| | 7 | 205.71±3.07 | 4.73 | $\hat{F}$ =279.01; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| | 14 | 171.58±2.13 | 3.93 | $\hat{F}$ =1969.05; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| | 21 | 115.93±3.05 | 8.32 | $\hat{F}$ =1982.62; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| | 25 | 55.51±1.28 | 7.30 | $\hat{F}$ =3066.34; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| 300 rpm | 0 | 217.94 ±2.82 | 4.10 | - |
| | 7 | 197.76±3.11 | 4.98 | $\hat{F}$ =302.84; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| | 14 | 169.28±2.35 | 4.40 | $\hat{F}$ =2266.25; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| | 21 | 111.23±3.33 | 9.48 | $\hat{F}$ =2079.53; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |
| | 25 | 51.77±0.73 | 4.47 | $\hat{F}$ =3236.78; $F\alpha_{0.001}$=15.37; $\hat{F} > F\alpha_{0.001} \rightarrow$ *** |

ns- not significant differences between means , * (P<0.05) – significant differences, *** (P<0.01) highly significant differences

## CONCLUSIONS

Studying physical indicators of liquid pasteurized melange was done during the storage period of 25 days aiming to such product properties of 0, 7, 14, 21 and 25 days.

The pH value increased by 7.69% at day 25 compared to day 0 of storage.

The viscosity showed an descendent trend throughout the period under review, but is inversely proportional to the rotational speed.

Knowing these physical indicators is important because with increasing duration of storage protein degradation affects the quality of physical melange and not in a positive way.

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