The quality characteristics of frozen salted egg yolk salting using various media

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Abstract. This research was aimed to find out the quality of frozen salted egg yolk, which was being salting using various media. This research used a completely randomized design (CRD) with 2 factors, i.e. salting media (M): (salt solution; mixture of rice husk ash, salt and water; mixture of red bricks powder, salt and water; mixture of red bricks powder, rice husk ash, salt, water and 5 % of tea) and salting time (L): (15 days; 20 days; 25 days). The results show that the differences in salting media had a very significant different effect on NaCl and general acceptance. The length of salting gave a very significant different effect on protein content, fat content, NaCl and general acceptance. Moreover, the interaction between the differences in salting media and salting time had a very significant effect NaCl level. It was found that saline solution media with salting time of 25 days produced the best frozen salted egg yolk.

1. Introduction

Egg is a perfect food, because it contains nutrients needed for human beings such as protein, fat, vitamins and minerals in sufficient quantities. Egg contains high-grade protein because it contains a complete essential amino acid arrangement so that the egg is used as a benchmark in determining the quality of various protein food [1]. Salted egg is one of the egg salting products to prevent from egg damage during storage. The main purpose of this egg-salting process is to remove fishy taste and creating a distinctive flavour and to extend the shelf life of eggs and can increase the economic value of the eggs [2]. Eggs commonly used in the manufacture of salted eggs are duck eggs, because the pores of the skin are larger, so the salt is easier to get into the eggs during the process of making salted eggs [3].

Today, the variation of food products use a lot of salted egg yolks as a distinctive source of taste and flavour, such as a restaurant that presents a menu of salted egg sauce, and other food products using salted egg stuffing such as Onde-onde, Donuts, Bakpao, Croissant, Moon cakes and etc. These give the inspiration to make a frozen salted egg yolk in order to practically use it in food so that there is no need to separate the yolks from the whites, and can increase the economic value of salted egg products. this is what drives research the quality characteristics of frozen salted egg yolk salting using various media. the purpose of this research was to determine the quality and characteristics of frozen salted egg yolk from the media and salting time.
2. Material and method

2.1. Equipment and materials
The equipment and materials used in the manufacture of frozen salted egg yolks were; jars, freezer, digital scale, duck egg, rice husk ash, brick powder, salt and mineral water. The equipment and materials used for analysing were; analytical scale, kjeldahl, soxhlet, scale pipe, aquadest, CuSO₄ (copper sulphate), K₂SO₄ (potassium sulphate), H₂SO₄ (sulphuric acid) concentrated, NaOH (sodium hydroxide), hexane solvent, AgNO₃ (silver nitrate), K₂CrO₄ (potassium chromate).

2.2. Research method

2.2.1 Implementation of research. The manufacture of frozen salted egg yolks was done as follows: the duck egg was sorted and washed with warm water (37-39 °C) and dried, then egg shells were sanded. The whole egg was divided into 4 parts:

Part I : Created salt media : water (1:3) then put in a jar containing 6 eggs.
Part II : Created mixed media of rice husk ash : salt : water (2:1:1), 6 eggs dipped in dough, wrapped in a newspaper and then stored in a jar.
Part III : Created mixed media of brick powder : salt : water (2:1:1), 6 eggs dipped in dough, wrapped in a newspaper and then stored in a jar.
Part IV: Made from a mixture of brick powder: rice husk ash : Salt : Water (1:1:1:1) and 5% of black tea, 6 eggs were dipped into dough, wrapped in a paper newspaper and then stored in a jar.

After completion of the time of the distribution of 15, 20, 25 days the eggs were then cleaned from the dough. After that the egg yolks were separated from the white. Wrapped on a sealed container and then precooled for 30 minutes and kept in freezer for 3 days.

2.2.2 Method of measurement data. Protein content [4], fat content [4], NaCl [5] and general acceptance [6].

3. Results and discussion
The effect of media and salting time differences on the observed parameters can be seen in Table 1 and Table 2.

### Table 1. Effect of the diversity of salting media on the observed parameters

| Quality parameters       | Effect of salting media | Standard deviation |
|--------------------------|-------------------------|--------------------|
|                          | M₁                       | M₂                 | M₃                 | M₄                 |                  |
| Protein content (%)      | 13.1544ab               | 14.2415a           | 12.5686b           | 12.8184b           | 0.7373           |
| Fat content (%)          | 10.3174                 | 10.5058            | 10.0629            | 10.0707            | 0.2134           |
| NaCl (%)                 | 1.2986aA                | 1.2397bAB          | 1.1588cC           | 1.2014bcBC         | 0.0594           |
| General Acceptance       | 4.4667aA                | 4.3852bB           | 4.1926cC           | 4.2667cC           | 0.0797           |

Different notations show significantly different effect at the 5% (lower case) and 1% very real different (upper case). M₁ = salt : water (1:3), M₂ = rice husk ash : salt : water (2:1:1), M₃ = red bricks powder : salt : water (2:1:1), M₄ = red bricks powder : rice husk ash : salt : water (1:1:1:1) 5% tea.
Table 2. Effect of the diversity length of salting to the observed parameters

| Quality parameters          | Effect of salting media | Standard deviation |
|----------------------------|-------------------------|--------------------|
|                            | L1                      | L2                 | L3                 |                      |
| Protein content (%)        | 14.4907aA               | 13.5189bB          | 11.5775cC          | 1.4832               |
| Fat content (%)            | 11.3812aA               | 9.9701bB           | 9.3663bB           | 1.0341               |
| NaCl (%)                   | 1.0296cC                | 1.1422bB           | 1.5021aA           | 0.2468               |
| General Acceptance         | 4.1889cC                | 4.3833bB           | 4.4111aA           | 0.1211               |

Different notations show significantly different effect at the 5% (lower case) and 1% very real different (upper case). L1 : (15 days), L2 : (20 days), L3 : (25 days).

3.1. Protein content
It was obtained that the rice husk ash : salt : water (2:1:1) treatment was a better of rice husk ash has the highest protein rate of 14.2415%, while the length of salting takes time, then the less protein levels of 25 days treatment for 25 days by 11.5775%. The salting process lowered the protein content of salted eggs compared to fresh eggs [7]. Relations of media and the length of salting of frozen salted egg yolks can be seen in Figure 1 and Figure 2.

![Figure 1](image1.png)

![Figure 2](image2.png)

3.2. Fat content
The length of salting, lowered the fat content. The decrease of fat content was due to the increase of moisture content of the final product. The relations of length of salting with the fat content of frozen salted egg yolks can be seen in Figure 3.
3.3. NaCl

The results of the analysis showed that the M1 treatment of saline solution has the highest NaCl, i.e., 1.2986%. This is due to the more ionic saline solution entering the egg than the other medium that causes the egg to become salty so that it is directly proportional to the NaCl [8]. Relations of media and the length of salting of frozen salted egg yolks can be seen in Figure 4 and Figure 5.

Figure 3. Relations of length of salting with content of frozen salted egg yolk

The interaction showed that the highest NaCl levels was found in the treatment with salting media (water: salt) and the salting time 25 days i.e., 1.6518%. It showed that media and long-term salting were very influential in the amount of chloride that penetrates the salted egg [9]. Interaction effect of salting media and length of salting with NaCl on frozen salted egg yolk can be seen in Figure 6.
3.4. General acceptance
Figures 7 and 8 show that the treatment of salt: water (1:3) media was much liked by the panellists from the overall scale, so that has a higher general acceptance value of 4.4667. The favourite test needs to be done to determine the extent to which the consumer's receiving power of a product and test is related to the product's existence and the customer's receiving power to a product [10].

![Figure 7](image1.png)
**Figure 7.** Relations of salting media with general acceptance of frozen salted egg yolk

![Figure 8](image2.png)
**Figure 8.** Relations of length of salting with general acceptance of frozen salted egg yolk

![Figure 9](image3.png)
**Figure 9.** Product frozen salted egg yolk

4. Conclusion
The results of the research, showed the highest protein and fat content was obtained from the mixed media of rice husk ash: salt: water (2:1:1) with the length of salting 15 days, while NaCl level and the highest general acceptance was obtained from the salt: water (1:3) with salting time of 25 days.

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