

THE EFFECT OF FREEZING ON THE PROCESSING OF DRIED REBON SHRIMP AS A FORM OF LOCAL FOOD DIVERSIFICATION

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ABSTRACT

Rebon shrimp is one of the seafood species of crustaceans which has a very small size compared to other types of crustaceans. But behind its small shape, rebon shrimp has tremendous benefits. Rebon shrimp is quite easy to find in the market and is in the cheap category compared to other shrimp prices. Rebon shrimp is a food ingredient that rots easily so that processing and preservation is needed to maintain its quality. One of them is freezing and drying. This method can extend shelf life and inhibit the growth of bacteria, molds and yeasts. It can increase the selling value of rebon shrimp. This is also done as an effort to support local Indonesian food. The purpose of this study was to obtain the best process in making dried rebon shrimp. In this study, two methods were carried out, namely: method A without freezing and method B with freezing. This research was conducted using a randomized block design with one factor of rebon shrimp with 2 treatments and 3 replications. The parameters tested were water content, rehydration time and organoleptic test. The results of analysis of various water content and rehydration time showed a very significant difference. From the research results, the highest water content was found in rebon shrimp with freezing is 5.4% and the lowest in rebon shrimp without freezing is 4.8%. The longest rehydration time for rebon shrimp with freezing is 2 minutes and the fastest rehydration time for rebon shrimp without freezing is 1 minute. The sensory test showed different results. For color and texture, the most preferred is dried rebon shrimp with freezing, while for aroma and appearance, the most preferred is dried shrimp with no freezing treatment.

Keywords: Rebon Shrimp, Drying, Freezing,

INTRODUCTION

Rebon shrimp is one of the seafood species of crustaceans which has a very small size compared to other types of crustaceans. Therefore, this shrimp is called "rebon" shrimp. In society, they are often categorized as marginalized shrimp. But behind its small shape, rebon shrimp has tremendous benefits.

Rebon shrimp is an excellent source of animal protein. 100 grams of fresh rebon shrimp contain as much as 59.4% protein

(Poedjiadi, 2005). Meanwhile, for rebon shrimp iron contains 21.4 grams or equivalent to 8 times the iron content of 100 grams of beef (Mahmud et al. 2009). Rebon shrimp is very effective in improving nutrition for malnourished children. Another advantage of rebon shrimp is its high calcium. 100 grams of fresh rebon shrimp contains 757 mg of calcium. Thus, consuming rebon shrimp is very good for the

body. Besides that, rebon shrimp also has a high enough phosphorus content.

Apart from being a rich source of protein, calcium and iron nutrients, it turns out that there is a unique benefit from rebon shrimp that can be difficult to obtain from other types of crustaceans, namely different skin. Unlike other types of crustaceans, which are usually only eaten with the flesh without the skin, all the rebon shrimp can be eaten. This is mainly due to their very small size so that it is not possible to remove the skin or head like when eating other crustaceans. As a result, this is precisely what has become one of the advantages of rebon shrimp compared to other crustaceans and other protein sources (Astawan, 2009). Apart from being rich in calcium, shrimp shells actually contain a unique substance found in insect and crab shells, namely chitosan (Nasir, 2005).

Rebon shrimp is quite easy to find in the market and is in the cheap category compared to other shrimp prices. Besides that, rebon shrimp after harvesting will experience changes that take place gradually leading to decay that occurs due to autolysis, enzymatic and microbiological activities that cause deterioration of quality (Syahrin et al. 2016). Therefore processing and preservation is needed to maintain its quality. One of them is freezing and drying. This method can extend shelf life and inhibit the growth of bacteria, molds and yeasts. In addition to extending the drying shelf life of rebon shrimp, it can increase the selling value of rebon shrimp. This is also done as an effort to support local Indonesian food (Fatty, 2012).

The development of local food diversification is very supportive of food security, especially in relation to food diversity, overcoming nutritional problems and strengthening the community's economy. If the downstream side (processing and marketing) is productive, it will also boost productivity in the upstream sector, so that

food security as reflected in the fulfillment of food for households, availability of sufficient food, both quantity and quality, safe, equitable and affordable can be realized (Marsigit, 2010). With the diversification of fishery products, it is hoped that it can become an attraction for people to consume fish and other fishery products and it is hoped that new products that are healthy, nutritious and quality at affordable prices can be created so that people's interest in consuming fishery products increases (Putra, 2015).

MATERIALS AND METHODS

Tools and Materials

The tools used in this study were a basin, knife, cutting board, steamer pan, porcelain dish, digital scale, freezer, oven, water bath, desiccator. The materials used in this study were rebon shrimp purchased from market, lime, water, aluminum foil, label paper, tissue roll.

Method

This research was conducted using a randomized block design with one factor of rebon shrimp with 2 treatments and 3 replications. The treatments that are applied are as follows:

A1: No Freezing

A2: By Freezing

The parameters tested were the water content test, rehydration time and organoleptic test.

$$Y_{ij} = \mu + \tau_i + \beta_j + \varepsilon_{ij}$$

Y_{ij} = Observation on treatment -*i* and group *j*

μ = General average

τ_i = Effect of treatment-*i*

β_j = Effect of group *j*

ε_{ij} = random effect on treatment -*i* and group -*j*

Data were analyzed for variances (ANOVA), and if the results shows that there is a significant difference, followed by the Least Significant Difference (LSD) test on the interval 95% confidence in the Minitab® 17.1.0 application.

Method A1 (processing of dried rebon shrimps without freezing treatment)

Rebon shrimp washed and then added with lime. Dried salting process with the addition of 20% salt for 12 hours. The boiled shrimp that has been salted is then boiled and then dried in an oven at 60 °C 6 - 8 hours

Method A2 (processing of dried rebon shrimps with freezing treatment)

Rebon shrimp is washed and then added with lime. Dried salting process with the addition of 20% salt for 12 hours. The salted rebon shrimp are then boiled and then frozen at -17 °C for 24 hours. The frozen rebon shrimp are then oven-dried at 60 °C for 6 - 8 hours.

Water Content (AOAC, 2005)

The procedure for testing the moisture content is to put the empty cup in the oven for at least 2 hours, then put the empty cup in the desiccator for 30 minutes until it reaches room temperature and weigh the empty weight (A). Then put ± 2 g of mashed sample into a cup (B) and weigh it again, then put the plate that has been filled with the sample in the oven for 12 hours at a temperature of 100 °C to 105 °C. After that, the plates were transferred using a clamp to a desiccator ± 30 minutes then weighed (C).

$$\% \text{ water content} = \frac{(B-C)}{(B-A)} \times 100\%$$

Information:

- A: the weight of the empty cup, expressed in g
- B: weight of empty cup + initial sample, expressed in g
- C: weight of empty cup + dry sample in g

Rehydration Time (Yoanasari, 2003)

A total of 49 grams of sample added warm water (60 °C) little by little while stirring until the dried rebon shrimp became mushy, then recorded the time

Organoleptic Test (Setyaningsih et al. 2010)

Organoleptic testing is a subjective test of several panelists to determine whether or not a product is feasible for public consumption. The test is carried out by a semi-trained panel of 20 people by comparing the existing product with the specifications on the scoresheet, then evaluating it. The sensory test includes color, aroma, appearance and texture with a value interval of 1 to 5. Value 1 indicates very much dislike, value 2 indicates dislike, value 3 states quite like, value 4 states like, value 5 states very like.

RESULTS AND DISCUSSION

Water Content

The results of analysis of various water content showed a very significant difference (Table 1). During the freezing process, heat transfer occurs from the high temperature fish body to the low temperature refrigerant. Therefore, the water content in the fish's body will turn into ice crystals.

Table 1. Results of average water content

Treatment	Result
A1	4.8 % ± 0,887 ^a
A2	5.4% ± 0,887 ^b

Information:

* Value is the average of 3 replications ± standard deviation

* Notation with different lowercase letters indicates significantly different (P <0.05)

In this study, the highest water content was found in rebon shrimp with freezing is 5.4% and the lowest in rebon shrimp without freezing is 4.8%. This can occur due to the appearance of gaps in the specimens as water

outlet so that the drying process becomes faster. According to Sasongko (2015), the drying process can affect the weight of the final product produced. The drier the product, the lower the water content in the product so that the weight is also lower.

Rehydration Time

Rehydration time analysis results showed a very significant difference (Table 2). The longest rehydration time for rebon shrimp with freezing is 2 minutes and the fastest rehydration time for rebon shrimp without freezing is 1 minute.

Table 2. Results of average rehydration time

Treatment	Result
A1	1 menit ± 0 ^a
A2	2 menit ± 0 ^b

Information:

* Value is the average of 3 replications ± standard deviation

* Notation with different lowercase letters indicates significantly different (P <0.05)

The freezing treatment before drying causes the formation of ice crystals which increase the structure and size of the cells. treatments that affect the elasticity of the cell wall will affect the volume and time of rehydration. the greater the cell structure causes the longer rehydration time needed. The product produced after drying will experience changes on its surface, namely open porous allowing the rehydration process to be very fast (Izza, 2005)

Organoleptic Test

Color

Organoleptic test results can be seen in the Figure 1. The highest level of panelist preference for rebon shrimp with freezing is 3.06, while the lowest level of preference for panelists was for rebon shrimp without freezing is 2.81. The freezing method protects the surface from heat due to drying. This is because of the ice crystals that cover

the surface of the shrimp. The red color is formed due to the carotenoid content in the shrimp. The Carotenoid that plays the most role in shrimp red color is astaxanthin.

Organoleptic test on color

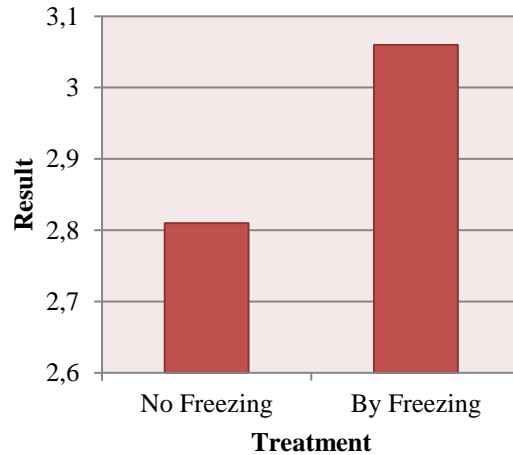


Figure 1. Organoleptic test results on color of dried rebon shrimp

Aroma

Organoleptic test results can be seen Figure 2. The highest level of preference for the panelists was for rebon shrimp without freezing is 3 while the level of preference for the panelists with the lowest value for rebon shrimp with freezing is 3.08.

Organoleptic test on aroma

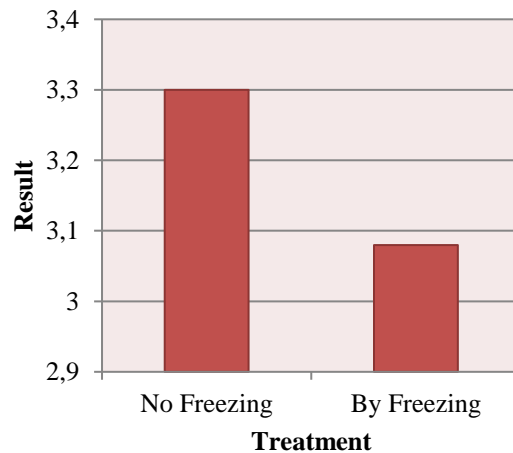


Figure 2. Organoleptic test results on aroma of dried rebon shrimp

The value from organoleptic test because the freezing method can maintain product stability, including changes in aroma. The aroma of rebon shrimp has a distinctive aroma, this is because rebon shrimp contains amino acids that play a role in aroma, namely phenylalanine, tyrosine and tryptophan (Syarif et al. 2017). The aroma contained in food will provide a sensation of volatile compounds received by the nasal cavity (Rachmawati et al. 2016).

Texture

Organoleptic test of texture results can be seen in the Figure 3. The panelist's preference level with the highest value for rebon shrimp with freezing is 3.1, while the panelist's preference level with the lowest value for rebon shrimp without freezing is 3.07.

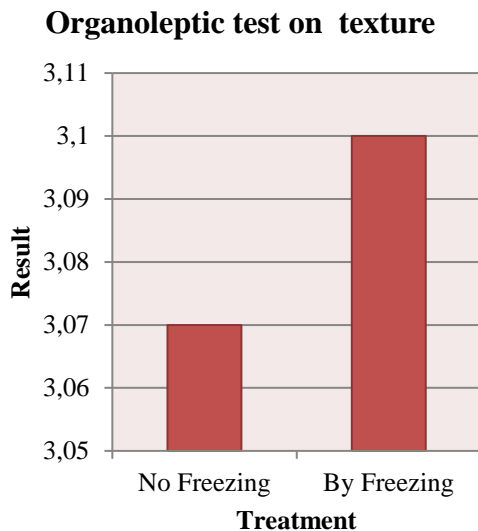


Figure 3. Organoleptic test results on texture of dried rebon shrimp

This is because the freezing method can maintain the structural stability of the material so that shrinkage and deformation after drying is very small. Food texture is one of the organoleptic attributes that affect panelist acceptance of food, texture also

affects the appearance of food (Sari et al. 2015).

Appearance

Organoleptic test results on appearance can be seen in the Figure 4. The highest preference level of panelists for rebon shrimp without freezing was 3.1, while the lowest preference level for rebon shrimp with freezing was 2.83.

Organoleptic test on appearance

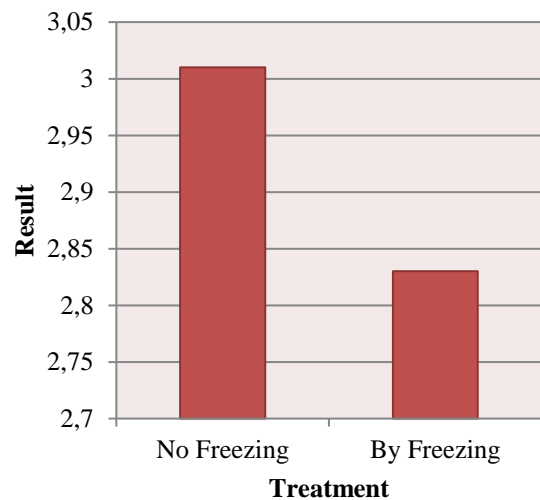


Figure 4. Organoleptic test results on appearance of dried rebon shrimp

The freezing method caused irregular gaps and swelling in rebon shrimp. This happens because of the enlargement of the volume due to the emergence of ice crystals. Besides that, drying causes a less attractive appearance due to the browning reaction. According to Badaruddin (2009), in the heating process there is also a browning reaction which can cause unwanted color or brown due to prolonged heating or the use of too high a temperature.

CONCLUSION

From the research results, it can be concluded that the best water content and rehydration time were dried rebon shrimp

with no freezing treatment. The organoleptic test showed different results. For color and texture, the most preferred is dried rebon shrimp with freezing, while for aroma and appearance the most preferred is dried rebon shrimp with no freezing treatment.

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