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Development of Edible Coating from Gelatin Bone Toman Fish (*Channa micropeltes*) in Frozen Shrimp

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ABSTRACT

*This study aims to see the storage time of frozen shrimp by using an edible coating of toman fishbone gelatin (*Channa micropeltes*) as a water binder that can reduce the deterioration of the quality of frozen shrimp during storage. The method used in this research is the experimental method. This research was carried out in three stages, namely: (1) making gelatin of toman fish bone and edible coating solvent (2) Characteristics of physical properties of toman fishbone gelatin (moisture content, ash content, organoleptic, amendment, water absorption); (3) Application of edible coating made from gelatin on frozen shrimp during low-temperature storage, (4) testing the quality of frozen shrimp with organoleptic parameters, WHC, cooking loss, and yield. The results of the study showed that the quality of the physical and chemical quality of the gelatin from toman fish bone was moisture content about 3.5%, about 3.5% ash content, the water of absorption about 0.00099 g/ml, and yield about 9.45%. Organoleptic results showed that gelatin powder from toman fishbone still met SNI 06-3735-1999 standards that the color of the gelatin produced was colorless to yellowish and the aroma did not smell or taste. The edible coating of frozen shrimp application with gelatin treatment resulted in decreased water content, WHC, cooking loss and organoleptic value from storage day 0 to day 30, whereas frozen shrimp with gelatin treatment resulted in water content, WHC, decreased cooking lost and organoleptic increases from storage day 0 until day 30. The best treatment results in the treatment of G2 (2% gelatin) gave a value of water content of about 33.71-82.99%, the value of WHC about 11.65-82.34%, the value of cooking losses about 2.67-6.14% and the organoleptic value is about 7.0.*

INTRODUCTION

Shrimps are one of the sources of animal protein that are popular among all societies and can be processed in dry, frozen, intact, without a head but have tails, peeled prawns and boiled prawns. Frozen shrimp is a processed product of fishery products in accordance with SNI 01-2705.3-2006, which is fresh shrimp which undergoes the process of washing, stripping or weeding without fasting

and freezing to a maximum temperature of -18°C with or without packaging. Quality problems that are often faced in frozen shrimp products are the loss of weight of shrimp products due to cooking lost, discoloration, fat oxidation, protein denaturation, increased volatile base nitrogen, texture changes, decreased water holding capacity and discharge containing solid shrimp meat or drip (Erdogdu et al., 2004). In addition, another problem with this freezing product is the occurrence of dehydration and freezer burn during freezing and frozen storage, where dehydration is a condition of the loss of water content in shrimp which will cause freezer burners (Hui et al., 2004).

According to Hui et al. (2004) that the occurrence of dehydration results in the heavy loss, the physical properties of the product change, and the tissue becomes dry and hard. In overcoming a decreasing loss of cuisine and loss of water content in shrimp, shrimp freezing industry usually uses salt and polyphosphate (STPP) by soaking it before the freezing process is carried out. According to Ockermen (1983) that polyphosphate (STPP) can function to increase water holding capacity (WHC) in the process of cooking and freezing shrimp meat. However, the use of low polyphosphate concentrations can reduce water holding capacity (WHC) in shrimp so that the water coming out is more and the cooking lost is higher. The use of concentrations of high polyphosphate can increase the ability of WHC in shrimp, but it can also cause shrimp products to be bitter (Sudrajat, 2007). For this reason, it is necessary to look for natural alternative materials that have the same properties and functions as STPP and this material is expected to be used for shrimp freezing industries. One ingredient that can replace STPP in the shrimp freezing process is by using gelatin from fish bones.

Gelatin has many benefits in the food industry and non-food industries which contain collagen in hard fish bones (teleost) around 15-17%, and the content in cartilage fish is around 22-24% (Purwadi, 1999). The content of collagen in the skin and bones of fish can be extracted into gelatin which can be used as gelling agents, stabilizers, emulsifiers, thickeners, foam formers, crystal formers, coatings, adhesives, water binders, and purifiers (Ward and Courts, 1977). The results of Sawitri, Manab, and Palupi (2008), study that the higher the concentration of gelatin added, the higher the water holding capacity of the yogurt products produced.

Gelatin which will be used in the shrimp freezing industry will be applied in the form of an edible coating because it is very important for food products that are easily damaged such as seafood. Application of gelatin as an Edible coating using the dipping method aims as a water binder and to inhibit microbial growth on the surface of freshly processed products (Cagri, Uspunol, and Ryser, 2004). According to Handoko et al. (2005), the benefits of an edible coating are optimizing the quality of products to protect products from the influence of microorganisms, prevent the presence of water, oxygen from food that can make products quickly damaged and moldy.

The edible coating can be hydrocolloid based in the form of proteins and polysaccharides, lipids in the form of fatty acids, acylglycerol, wax or wax or composites with a mixture of hydrocolloids and lipids (Donhowe and Fennema, 1993). Protein-based film and coating have an inhibitory and mechanical superiority compared to those based on polysaccharides. This advantage is because proteins contain 20 different types of amino acids and have special characteristics to produce functional characteristics that are more varied when compared to polysaccharides which are used as materials in the manufacture of mostly homo polymer edible films and coatings (Iwata et al., 2003). This study aims to look at the storage time of frozen shrimp by using an edible coating of toman fish bone gelatin (*Channa micropeltes*) as a water binder which can reduce the deterioration of the quality of frozen shrimp during storage.

METHOD

This research was conducted for 8 months at the workshop at Fisheries Product Quality Testing Laboratory Fishery Product Processing Technology Study Program, Department of Marine and Fisheries, Pontianak State Polytechnic. The equipment used in the manufacture of gelatin extract of toman fish bone includes water bath, thermometer, a digital scale, measuring cup, rotary evaporator,

hot plate stirrer, stainless steel container. The materials used for extracting the gelatin from toman fish bone and making edible coatings are toman fishbone, 9% citric acid, CMC and glycerol. The method used in this research is the experimental method. This research was conducted in three stages, namely: (1) making toman bone gelatin, (2) making edible coating solvent, (3) Application Frozen Shrimp Dyeing in edible coating solvent, (4) Characteristics of physical properties of toman fish bone gelatin (moisture content, ash content, organoleptic, yield, water absorption); (4) Application of edible coating made from gelatin on frozen shrimp during low temperature storage, (5) testing the quality of frozen shrimp during low temperature storage with organoleptic parameters, Water Holding Capacity (WHC), cooking loss, and yield.

1. The process of making toman bone fish gelatin

The making of toman fish bone gelatin refers to the research of Fatimah and Jannah (2008) with a few modifications as follows: a) Sample preparation, namely toman fish bone cleaned from the remains of dirt, to facilitate cleaning toman fish bone can be done with to soaking boiling water at a temperature of 70-80°C for 25-30 minutes. Fish bones that have undergone a degreasing process are then cleaned again with running water and cut into small pieces. The next process in making gelatin fish is the result of heating toman fish bones, drained, weighed and soaked in a citric acid solution with a ratio of 1:3 (b/v) for 12 days. During soaking, stirring must be done. After that the bones are washed and sprayed with water so that the dirt and citric acid solution that attaches to the bone is wasted and is followed by the gelatin extraction process of fish bones; b) Gelatin extraction process of fish bones was carried out in 3 stages, namely soaking fish bones at 50°C for 4 hours, soaking fish bones at 65°C for 4 hours and soaking fish bones at 80°C for 4 hours. Then the extract was evaporated using a rotary evaporator vacuum at 70°C, dried using a freeze dryer and then tested for moisture content, ash content, organoleptic, yield and water absorption.

2. The process of making edible coating solvent

The procedure for making edible coating was slightly modified based on Arifin, Sari, and Suparmi (2015) was gelatin weighed G0 (0%), G1 (1%), G2 (2%), and G3 (3%), then put it in the Erlenmeyer tube added with 100 ml of distilled water, 1% CMC and 2 ml glycerol, then heated at 90°C for 5 minutes.

3. Application Dyeing of Frozen Shrimp in an edible coating solvent

Shrimp in the form of headless (HL) is cleaned and drained, then the shrimp is dipped in an edible coating solution that has been made for 1 minute and repeated 2 times to be evenly distributed. The shrimp that has been dipped in an edible coating solution is then aerated and then stored at a low temperature with a storage time of 6 times namely 0 days, 5 days, 10 days, 15 days, 20 days and 30 days. During storage of frozen shrimp observations were made on the quality of frozen shrimp with organoleptic parameters, moisture content, WHC, cooking loss, and Yield.

4. Characteristics of physical properties of toman fishbone gelatin

Moisture content (Apriyantono et al., 1989)

The aluminum cup is dried in an oven at 105°C for 15 minutes, then cooled in a desiccator for 10 minutes, then the cup is weighed using an analytic balance. A sample of 5 grams is inserted into the cup, then the cup and sample are weighed with an analytical balance. The cup containing the sample was dried in an oven at 105°C for 6 hours. Then the sample containing cup is cooled in a desiccator, then weighed. After that, the cup containing the sample is dried again in the oven for 15-30 minutes, then weighed again. Drying is repeated until a constant weight is obtained (difference in weight of ≤ 0.0005 grams). The formula for testing the moisture content is shown in equation (1).

$$\% \text{moisture content} = \frac{\text{weight of initial sample} - \text{dry sample weight}}{\text{weight of initial sample}} \times 100\% \quad (1)$$

Ash content (SNI 01-2354.1-2006)

Insert an empty porcelain ash cup into the ash furnace, then increase the temperature to reach 550°C for 1 night and lower the temperature of the ash to about 40°C, move the empty porcelain (Ag) and put 2 g of the sample into a porcelain ash glass, then put it in oven with a temperature of 100°C for 24 hours. Transfer the porcelain ash cup to the ignition furnace and increase the temperature gradually to 550°C. Maintain for 8 hours until white ash is obtained. After completion, the ignition furnace is lowered to around 40°C, move it the porcelain cup using a clamp and place it in the desiccator for 30 minutes. If the ashes are not white yet, it must be done again. Wet the ash with distilled water slowly, dry it on the hot plate and reheat at a temperature of 550°C until the weight is constant. Lower the ignition temperature to ± 40°C then transfer the porcelain ash cup in the desiccator for 30 minutes then weigh the weight (Bg) immediately after cold. The formula for testing the ash content is shown in equation (2).

$$\%ash\ content = \frac{B - A}{\text{weight of sampel (g)}} \times 100\% \quad (2)$$

Organoleptic testing (SNI 01-2346-2006)

Organoleptic tests carried out include color, aroma, texture, and general acceptance using a hedonic rating. This test was carried out on gelatin powder and the application of an edible coating on frozen shrimp during storage. The hedonic rating test uses a scale of 1-7, where the assessment criteria are (1) very dislike; (2) dislike; (3) rather dislike; (4) neutral; (5) rather like; (6) like; (7) really like it.

Water absorption

Testing of water absorption using the Razali, Amin, and Sarbon (2014) method. A gelatin sample of 0.5 g was put into a centrifugation tube. Then, 10 ml of distilled water was added to the tube and vortexed for 30 seconds. Then, gelatin dispersion was left at room temperature (25°C) for 30 minutes before being centrifuged at a speed of 4800 rpm for 25 minutes. The supernatant was filtered using Whatman No. filter paper. 1 and the volume of filtering results are calculated. The results are expressed as ml of water absorbed per gram of gelatin. The formula for testing water absorption is shown in equation (3).

$$water\ absorption\ \left(\frac{ml}{g}\right) = \frac{\text{initial volume (ml)} - \text{volume of supernatant (ml)}}{\text{initial gelatin weight (g)}} \quad (3)$$

5. Testing the quality of frozen shrimp during storage

Water Holding Capacity/WHC (Cardoso et al., 2012)

WHC (Water Holding Capacity) states the amount of water embedded in the sample after centrifuging per 100 g of the initial amount of water in the sample. The measurement of WHC is done by weighing the sample as much as ± 2 g (Ws) then wrapped in Whatman number 1 paper which measured the initial weight of 2 layers (Wi). Samples were then centrifuged at 4000 rpm at 20°C for 15 minutes. The sample filter paper is then weighed again to measure its weight (Wf). The formula for testing the water holding capacity is shown in equation (4).

$$WHC\ (\%) = \frac{W_s \times (H/100) - (W_f - W_i) \times 100}{W_s \times (H/100)} \quad (4)$$

Cooking loss

The cooking loss testing procedure can be done by means of a sample wrapped in clip plastic and then put into a pan and cooked using a water bath for 15 minutes at a temperature of 70°C. After boiling the sample is finished and cooled. After the sample is removed from the plastic and the remaining residual water on the surface is dried using paper suction without pressing. Next, the sample is weighed (Soeparno, 2005). The formula for testing the cooking loss is shown in equation (5).

$$\text{cooking loss (\%)} = \frac{\text{sample weight before cooking} - \text{sample weight after cooking}}{\text{sample weight before cooking}} \times 100\% \quad (5)$$

Analysis Yield (Sudarmadji et al., 1989)

Analysis Yield is determined as a percentage comparison between extracts obtained from fish meat. The formula for testing the analysis yield is shown in equation (6).

$$\text{Yield} = \frac{\text{final weightg}}{\text{initial weight}} \times 100\% \quad (6)$$

Data analysis

Data analysis of physical-chemical test results from gelatin extract and application of an edible coating on frozen shrimp was carried out using variance analysis (ANOVA). If the results of the analysis of variance are significantly different, then the smallest Significant Difference (LSD) follow-up test to see which treatment is different.

RESULTS AND DISCUSSIONS

1. Quality of physical and chemical properties of Toman Fish Bone Gelatin Powder

Physical and chemical quality is very important in determining the quality of gelatin, including the parameters used in this study is the analysis of water content, ash content, water absorption, yield and organoleptic. The results of the quality of toman gelatin powder in Table 1.

Table 1
The Result of the Quality of Toman Gelatin Powder

Sample	Parameter			
	Water content (%)	Ash content (%)	Water absorption (g/mL)	Yield (%)
Toman Fishbone gelatin powder	3,5	8,35	0,00099	9,45

Water Content

The results of water content analysis in Table 1 state that the gelatin water content of toman fishbone is around 3.5%. the water content of gelatin of toman fish bone was lower than the gelatin content of tuna fish bone which was around 6.08% (Amiruldin 2007); gelatine red snapper around 6.73% (Hadi 2005); and patin fish bone gelatin around 9.26% (Nurilmala 2004). The gelatin water content of toman fish bone produced meets the standards according to SNI (1995), which is a maximum of 16%. The low water content of fish gelatin greatly affects off flavor and brightness of the quality color of gelatin (Trilaksani Nurilmala, and Setiawati, 2012).

Ash Content

The results of the ash content analysis in Table 1 state that the gelatin ash content of toman fishbone is around 8.35%. The value of ash content in toman fish bone gelatin has not met the SNI standard (1995), which is a maximum of 3.35% and JECFA standard (2003), which is a maximum of 2%. This is because during immersion in citric acid has not yet been mineralized as a whole so that bone calcium has not been formed calcium phosphate. According to Fatimah and Jannah (2008) that ash content has decreased due to the longer immersion time, where during immersion of fish bones in citric acid it will be mineralized so that bone calcium in the form of calcium phosphate will be bound by citric acid to calcium citrate.

Water Absorption

The results of the analysis of water absorption in Table 1 state that the absorption of gelatinous water from toman fish is about 0.00099 g/ml. The results showed that fishbone gelatin had a lower water

absorption value with the results of a study by Wiharja, Santoso, and Yakhin (2013) which showed that the value of water absorption in protein concentrates of tuna and red snapper eggs was 5.38 g/ml and 6.25 g/ml, while the results of the Rieuwpassa, Santoso, and Trilaksani (2013) study showed that KPTI water absorption of skipjack tuna was 1.53 g/ml (every 1.53 g KPTI skipjack was able to absorb 1 ml of water). The ability of water absorption of food can be reduced if the water content in a material (moisture) is too high so that it can inhibit the absorption of the material, conversely, if the water content in a material is low then the ability of water absorption will increase (Prabowo 2010). This is also in accordance with the statement of Lidiasari, Merynda, and Friska (2006) that dry ingredients are hygroscopic.

Analysis Yield

The results of the Yield values in Table 1 state that the gelatin of toman fishbone is around 9.45%. The Yield value produced from the gelatin of toman fish bone was higher than the results of the Amiruldin (2007) study which stated that the yield of tuna gelatin bone yield ranged from 5.76% to 8.37%. This is because the immersion process with the old citric acid solution will cause the collagen structure to open so that the extraction process will produce more gelatin powder. According to Sompie et al. (2012) stated that the higher the concentration of acetic acid the more the yield of gelatin produced. Overall the yield of tuna skin gelatin is in the range of 14.02% - 15.01%. According to Ulfah (2011) reported that acetic acid solution can hydrolyze collagen thereby facilitating its solubility in hot water during gelatin extraction so that the structure of collagen is open due to several bonds in the protein molecule released. Acid solutions function to hydrolyze collagen so that it facilitates its solubility in hot water when extracting gelatin, this occurs because the structure of collagen is open due to several bonds in the protein molecule being released (Chamidah and Elita 2002). According to Kasankala et al. (2007), the yield produced from a gelatin production process is strongly influenced by the extraction process on collagen protein.

Testing Organoleptic

Organoleptic testing carried out on gelatin powder of toman fish bone using a score sheet with parameters that observed namely flavor, texture and color. The results of the organoleptic test gelatin powder toman fishbone in Table 2.

Table 2
 The Results of the Organoleptic Test Gelatin Powder Toman Fishbone

Treatment	Organoleptic testing		
	Flavor	texture	Color
Gelatin powder toman fishbone	No smell of fish	A little smooth	Yellowish white

The results of the organoleptic testing on the parameters of the aroma of gelatin powder from toman fish bone did not smell of fish. gelatin which is traded in the commercial market is tasteless, odorless. This fishbone used is still fresh, so the gelatin produced is of high quality. The freshness of raw materials will affect the quality of the aroma of the product produced. The fresher the raw material, the higher the product quality (Ward and Courts 1977). According to SNI 06-3735-1995 that the gelatin aroma/odor produced is normal/odorless and tastes (acceptable to consumers).

The results of the organoleptic testing on the texture parameters of the gelatin powder of brittle toman fish, the granular which is a bit rough. Gelatin which is produced through an acidic process has a rather rough and not uniform or irregular texture (Agnes, Agustin, Sompie, 2015). According to Sahubawa and Ustadi (2014) that gelatin powder traded in the commercial market is fragile, shaped like glass.

The results of the organoleptic testing on the color parameters of the gelatin powder of toman fish bone were yellowish white. This gelatin powder is almost close to the gelatin which is traded in the dim yellow commercial market to brown yellow. The color of gelatin is influenced by the type of raw material, process method, and amount of extraction (Imeson, 1999). According to Soekarto (1985)

which states that food aroma in many ways determines whether or not food is delicious. The smell sensitivity of the buffers is generally higher than the taste senses so that the odor test will quickly provide hedonic value. According to SNI 06-3735-1995, the color of gelatin produced is colorless to yellowish.

2. Edible Coating Application on Frozen Shrimp

The application carried out in the study by means of shrimp shelled in the form of headless is then cleaned and drained, then dipped in an edible coating solution for 1 minute and stored at low temperatures with a storage period of 0, 5, 10, 15, 20 and 30 days later. observation of the quality of frozen shrimp during storage with organoleptic parameters, water content, WHC, and cooking loss.

Water Content

The water content of the product is closely related to the humidity of the storage space, where the humidity factor becomes very important which can affect the quality, stability, and safety during storage of shrimp (Kanatt et al., 2006). Based on the results of the water content analysis that the treatment of G0 (control), G1 (1% gelatin), G2 (2% gelatin), and G3 (3% gelatin) decreased the moisture content of the 0 to 30-day storage. The value of water content in treatment G0 is around 46.26%-83.27%, treatment of G1 (1% gelatin) is around 41.4-82.83%, treatment of G2 (gelatin 2%) is around 33.71-82.99% and treatment G3 (3% gelatin) around 39.0-80.69%. Water content analysis results can be seen in Fig. 1.

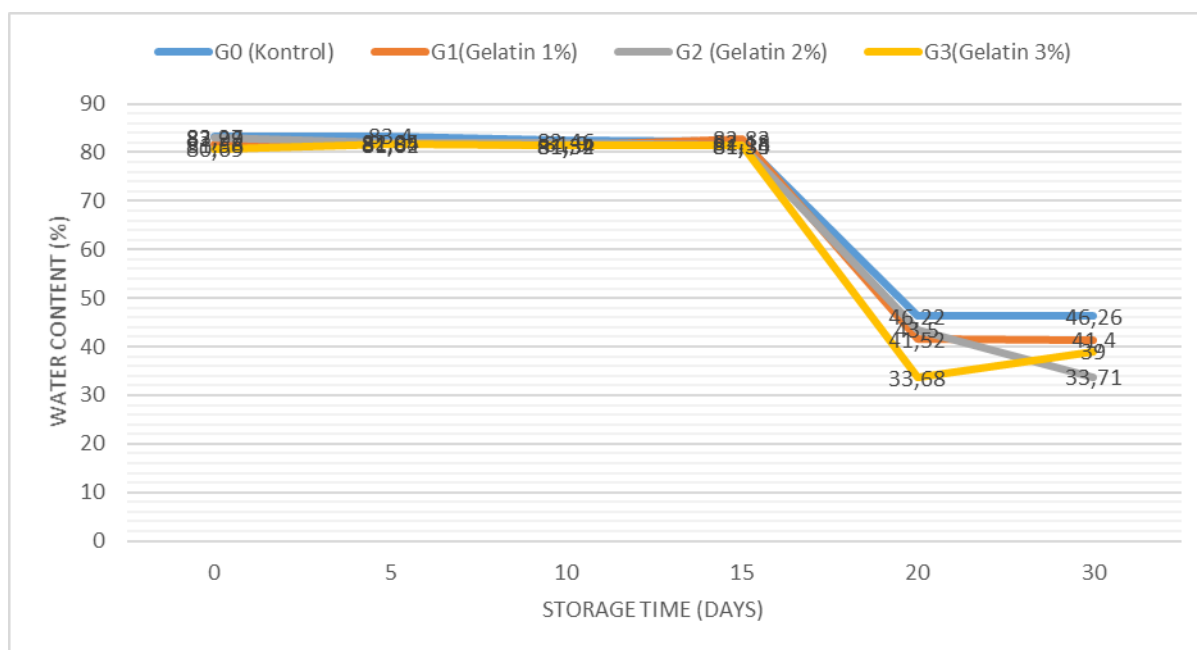


Fig 1. Water content analysis results

The results of the ANOVA analysis showed that there was a significant effect on the addition of toman fish gelatin with a storage time of 0, 5, 10, 15, 20 and 30 days to the value of frozen shrimp water content. The results of the advanced test analysis revealed that the treatment of G0 (control) was significantly different from the treatment of G2 (2% gelatin) and G3 (3% gelatin) with storage periods of 20 and 30 days. It is seen that the application of dying fish gelatin powder in frozen shrimp is able to protect products from water loss quickly, whereas in frozen shrimp without gelatin powder frozen shrimp products lose water slowly. An edible coating can function as a barrier to moisture, oxygen, flavor, aroma and or oil to improve food quality, besides that, it can provide mechanical protection to food, and reduce damage and improve food integrity (Krochta, 2002).

WHC (Water Holding Capacity)

Water Holding Capacity (WHC) is the ability of meat to bind water from the meat itself as well as from outside with the principle of calculating free water area which is inversely proportional to WHC (Faridah *et al* 2006). Based on the WHC analysis that the treatment of G1 (1% gelatin), G2 (2% gelatin) and G3 (3% gelatin) decreased the value of WHC from storage to 0 days to 30 days, while treatment G0 (control) increased from day 0 to day 30. The WHC value in treatment G0 (control) is around 44.47-71.13%, treatment G1 (1% gelatin), which is about 48.14-81.58%, treatment G2 (gelatin 2%) around 11.65-82,34% and treatment of G3 (3% gelatin) around 10.45-76.67%. Water content values in the treatment of G1 (1% gelatin), G2 (2% gelatin) and G3 (3% gelatin) decreased the moisture content from the 0th day to 30th-day storage. WHC analysis results can be seen in Fig. 2.

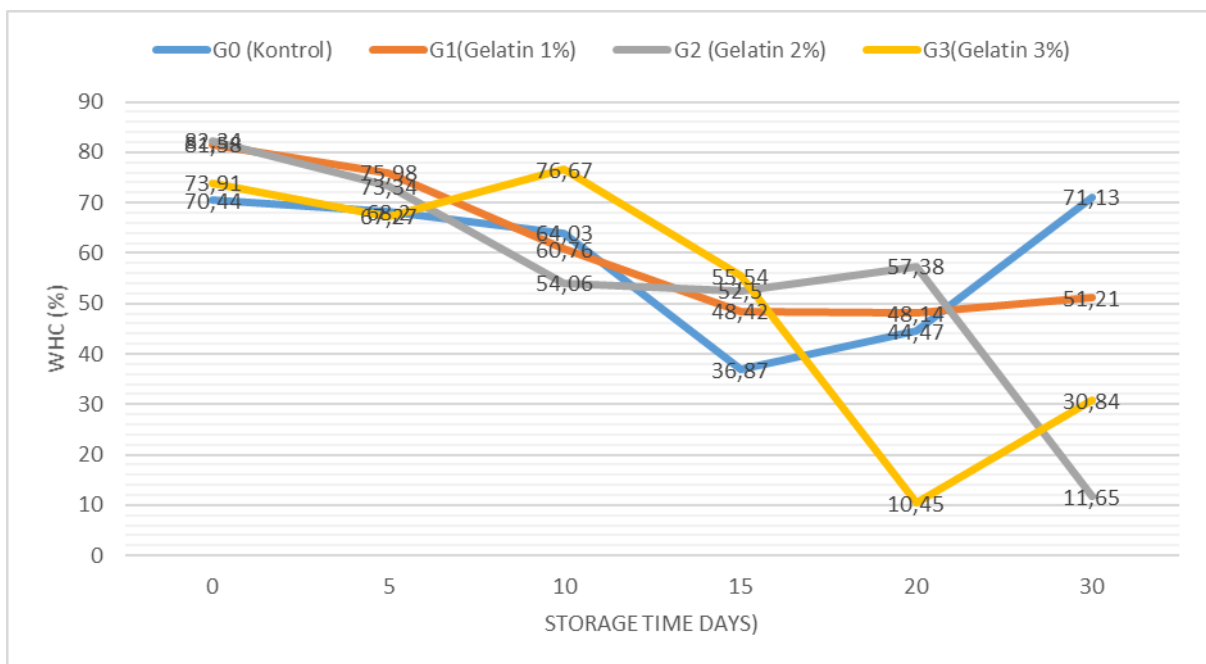


Fig 2. WHC analysis results

Based on the results of the study that the value of WHC in shrimp with G0 (control) treatment, G1 (Gelatin 1%), G2 (Gelatin 2%) and G3 (3% gelatin) with a storage time of 0 to 30 days shows that the storage time until the day 30 results in decreasing WHC values, while treatment without gelatin results in the value of WHC which increases with the length of storage until the 30th day. The results of the ANOVA analysis showed that the value of WHC in treatments G0, G1, G2 and G3 had a significant effect on the storage time of 0, 5, 10, 15, 20 and 30 days. The results of the further analysis showed that the storage time of 15, 20 and 30 days affected the value of frozen shrimp WHC. The results of this study are almost the same as Rostini's (2011) research stated that the value of WHC of frozen boiled shrimp in the cooking dyeing treatment with added value decreased WHC values ranging from 66.56% to 72.45%. Storage of frozen shrimp causes the value of WHC to decrease further due to the reduced ability of a protein to bind water to the material so that the water becomes free. The treatment of frozen shrimp edible coating with fish gelatin showed a decrease in the binding capacity of water which was slow compared to the treatment of frozen shrimp without being given edible coating. This shows that gelatin edible coating is able to inhibit chemical process changes in frozen shrimp during low-temperature storage so that the value of WHC can be maintained well.

Fat will be damaged during storage in the form of hydrolysis so that it produces fatty acids and the pH of meat decreases to reach the isoelectric pH range of act myosin and causes the binding capacity of water to decrease (Wahyuni, 1992). WHC is related to the contraction of myofibril proteins because the myofibril protein is responsible for binding water. The bound water is strongly influenced by the formation of molecular myofibril proteins. Three-dimensional tissue in myofibril opens space for water to be bound (Zayas, 1997). During storage, the fat component is damaged in the form of

hydrolysis resulting in fatty acids and the pH of the meat decreases to reach the isoelectric pH range of act myosin and causes the binding capacity of water to decrease (Wahyuni, 1992). According to Risnajati (2010) that the binding capacity of water can be influenced by the rate and magnitude of the pH value, the lower the pH, the lower the binding capacity of meat water.

Cooking loss

The cooking loss is the amount of weight lost during the cooking loss. The higher the temperature and cooking time, the greater the fluid content of the meat is lost to a constant level. The cooking loss is also an indicator of the nutritional value of meat that is related to the level of meat juice, namely the amount of water that is bound inside and between muscle fibers. Cooking loss is influenced by temperature and cooking time. The percentage of cooking losses in the meat is in the range of 15-40% (Soeparno, 2005). The smaller the percentage of cooking loss, the less water is lost and nutrient dissolves in water. Vice versa, the greater the percentage of cooking losses, the more water is lost and nutrients are soluble in water (Prayitno, Suryanto, and Zuprizal, 2010). The process of cooking shrimp is done at 90°C for 2 minutes 15 seconds. The results showed that the cooking losses value in the G0 treatment (control) was around 0.82-10.51%, treatment G1 (1% gelatin) around 1.48-6.58%, G2 (gelatin 2%) treatment around 2.67-6.14%, treatment G3 (3% gelatin) around 1.48-9.25%. Cooking loss analysis results can be seen in Fig. 3.

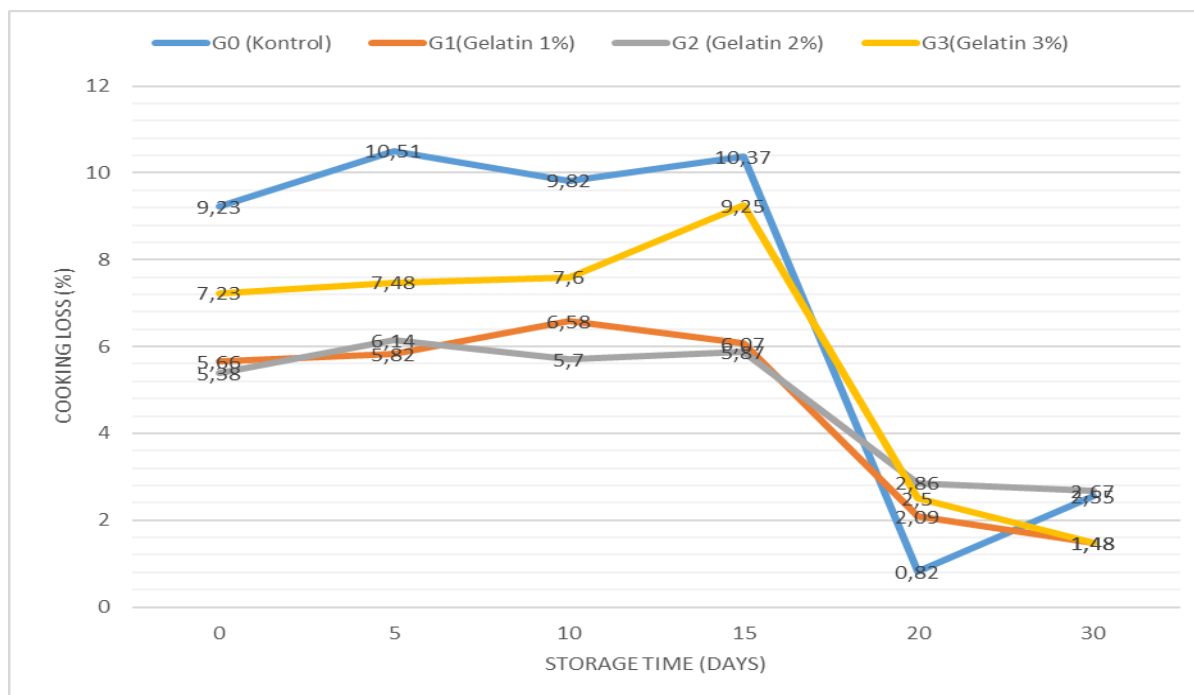


Fig 3. Cooking loss analysis results

Based on Fig. 3 shows that the cooking loss results in shrimp with G0 (control), G1 (Gelatin 1%), G2 (2% gelatin) and G3 (3% gelatin) with a storage time of 30 days showed a decrease in cooking loss. The ANOVA results showed that the cooking loss values in treatments G0, G1, G2 and G3 had a significant effect on the retention days of 0, 5, 10, 15, 20 and 30 days. The results of further test analysis revealed that the treatment of G3 (3% gelatin) was significantly different from the treatment of G0 (control), G1 (Gelatin 1%) and G2 (gelatin 2%). This shows that all treatments of frozen shrimp treated without fish gelatin and fish gelatin which are kept longer will reduce the cooking loss value.

The results of this study indicate that the cooking loss value with treatment without gelatin and gelatin decreased with storage time until the 30th day compared to the results of Indrajaya (2011) which stated that the cooking loss value in shrimp with polyphosphate administration was around 11.92-13.54%, where the value of cooking loss is greater than it is not good for the company because it can reduce the weight of the product from the target to be achieved. This indicates that the concentration

of fish gelatin during immersion greatly affects the value of cooking loss produced. According to Zulkarnain (2008) that the value of the cooking loss at cooking can be inhibited by the presence of fat in the meat. Meat that has a low cooking loss has relatively better physical quality compared to the higher cooking loss. The difference in cooking loss is closely related to the binding capacity of water in the meat. The lower the binding power of the water the higher the value of cooking losses (Soeparno, 2005). According to Lawrie (2003), cooking loss or fluid losses at the cooking time are influenced by pH, temperature and cooking time.

Testing Organoleptic

Organoleptic testing on the application of fish bone gelatin as an edible coating on frozen shrimp using a scoring test method. Organoleptic testing performed on frozen shrimp products include color changes, appearance, and texture. The results showed that the organoleptic values in the treatment of G0 (control) were around 6.0-8.33, treatment of G1 (1% gelatin) around 7.0-8.24, treatment of G2 (gelatin 2%) around 7.0-8.33, treatment G3 (3% gelatin) around 7.1-8.33. Testing organoleptic analysis results can be seen in Fig. 4.

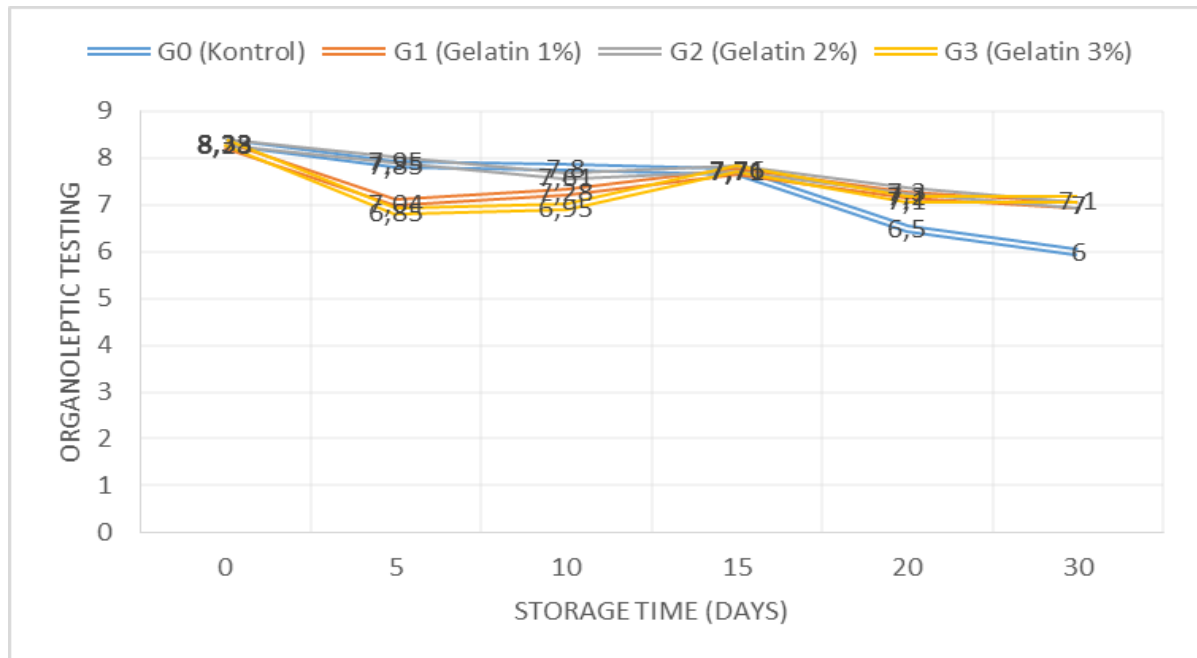


Fig 4. Testing Organoleptic analysis results

Based on the results of the study that the organoleptic value of frozen shrimp with treatment G1 (Gelatin 1%), treatment G0 (control), G2 (gelatin 2%) and G3 (gelatin 3%) with a storage time of 0 to 30 days showed around organoleptic values 6.0-8.33. This shows that the organoleptic value of frozen shrimp with gelatin treatment with a storage time of 0 days to 30 days. Still meets the requirements of frozen shrimp standards of at least 7 (SNI 01-2705.1-2006) and can still be accepted longer by consumers, while the treatment of frozen shrimp without gelatin can only be received with the storage time of the 15th day.

The appearance value produced by frozen shrimp with fish gelatin treatment from storage day 0 to day 30 showed that the color of shrimp meat had not undergone discoloration and had not shown physical defects in the shrimp. This shows that the edible coating with fish gelatin is able to maintain the appearance of frozen shrimp products during cold storage until the 30th day. Color change in food is one of the parameters of the deterioration in the quality of the material. Shrimp with conditions that experience deterioration in quality, will experience discoloration in the flesh which becomes duller (Herliany, 2011). The results showed that at the 0th to 30th-day storage, the texture of frozen shrimp was still elastic. The texture of shrimp meat which has experienced a decline in quality will change

from solid and compact to soft so that it is easily destroyed and deformed (not intact). Shredding shrimp meat by enzymes and microbial decay can cause changes in the texture of shrimp meat. Shrimp with good quality have an elastic, solid and compact texture. When it has experienced a setback in quality, the texture becomes soft and destroyed (Herliany, 2011).

CONCLUSION AND SUGGESTION

The physical and chemical quality of the quality of gelatin from toman fish bone, which is the water content produced still meets SNI standards, while this ash value does not meet SNI standards. The value of the absorbency of the resulting water is lower and the yield produced from the gelatin of the toman fishbone is slightly higher at 9.45%. Organoleptic results showed that gelatin powder from toman fish bone still met SNI 06-3735-1999 standards that the color of the gelatin produced was colorless to yellowish and the aroma did not smell. Dyeing of frozen shrimp with gelatin treatment produced moisture content, WHC, cooking shrinkage and organoleptic which decreased from the storage of day 0 to day 30, while immersion of frozen shrimp with treatment without gelatin resulted in moisture content, WHC, cooking shrinkage and organoleptic which increases from the 0th to 30th-day storage. The best treatment results in the treatment of G2 (2% gelatin) gave a value of water content of around 33.71-82.99%, the value of WHC around 11.65-82.34%, the value of cooking losses around 2.67-6.14% and the organoleptic value is around 7.0.

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