Effect of Extraction Time on Gel Strenght, Viscosity and Amino Acid of Gelatin Fish Bones *Pangasius hypopthalmus*

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Abstract- *Pangasius hypophtalmus* bone is a waste that can be used as raw material for gelatin. Gelatin is produced by partial hydrolysis of collagen in fish bones. This research aims to find out the best extraction time that produces high strength and high viscosity gel. The extraction time used was 5, 6 and 7 hours. The best gelatin results were obtained at 7 hours extraction time of stretch gel (173.3 bloom), viscosity (4.05) and amino acid glycine content (19.95%), proline (10.88%), alanine (8.05%)

Keyword: *fish bone gelatin, gel strenght, viscosity, amino acids*

I. INTRODUCTION

Gelatin is produced through the partial hydrolysis of animal skin and bones. During this time the manufacture of gelatin using the bones and skin of rumenants animals and pigs as the raw material. This presents a problem with halal standards for Muslims and food security. Gelatin made from these materials has the potential to contain BSE (Bovine Spongioform Encephalopathy), anthrax, swine influenza. Fish bones that still become waste can be used as a material for making gelatin that meets halal standards and food security. [1]

Changes in collagen occur due to heat which causes changes in the composition of the triple helix collagen. The process of extraction with heat causes water to be drawn in covalently collagen and bonding formation.[2] Gelatin is composed of 18 amino acids, among others, glycine, hydroxyproline, proline, alanine, isoleucine, methyonine.[3] Glycyn comprises 2/3 of total amino acids and 1/3 of amino acids are composed of proline and hydroxyproline.[4] Gelatin has hydrophilic properties that can absorb water as much as 5-10 times its weight. Gelatin dissolves in hot water and forms a gel at low temperatures and is reversible.

Characteristic of gelatine can be seen its, viscosity, gel strength, and amino acids contains. Gel strength and viscosity are important parameters of gelatin, because they can affect the application of gelatin in products. The result of amino acids are used to determine the content of essensial and non-essential amino acids.

II. MATERIALS AND METHOD

Materials with used in this study are *Pangasius hyphthalmus* bone that was obtained from PT. Mina Perkasa Tulungagung, Jawa Timur, citric acid, water, aquadest, pH paper aluminum foil and filter paper.

This study used an experimental method with 3 treatments and 6 replications. The variations of time extraction were 5 hours, 6 hours, and 7 hours. Making gelatin from *Pangasius hypophthalmus* can started by degreasing proces id done by boiling water at 80^{o}C for 30 minutes. Then meat on the fish bones is cleaned and bone about 2-4 cm. Demineralization carried out by soaked fish bones in 9% citric acid Solutions for 48 hours. Demineralization proces make bones swelling (ossein). The ossein washed in running water to neutralized the pH. Extraction gelatin doing 5 hours, 6 hours and 7 hours

III. RESULT

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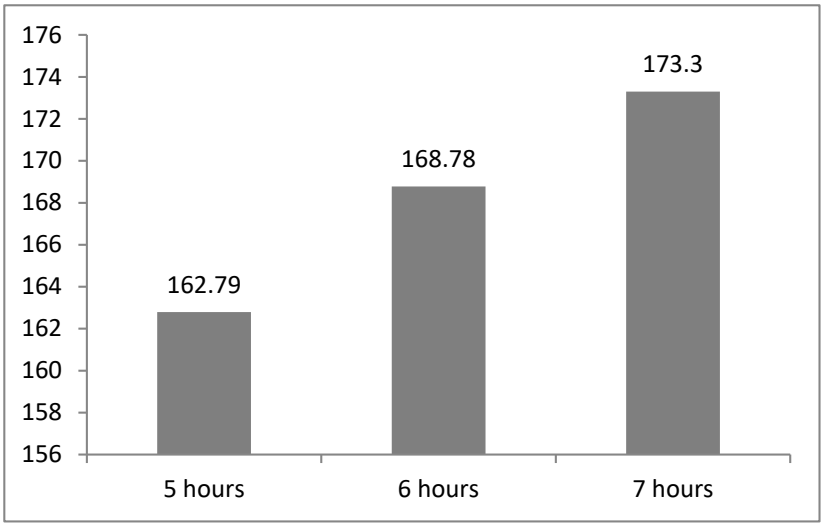

Figure 1. The Result of Gel Strength

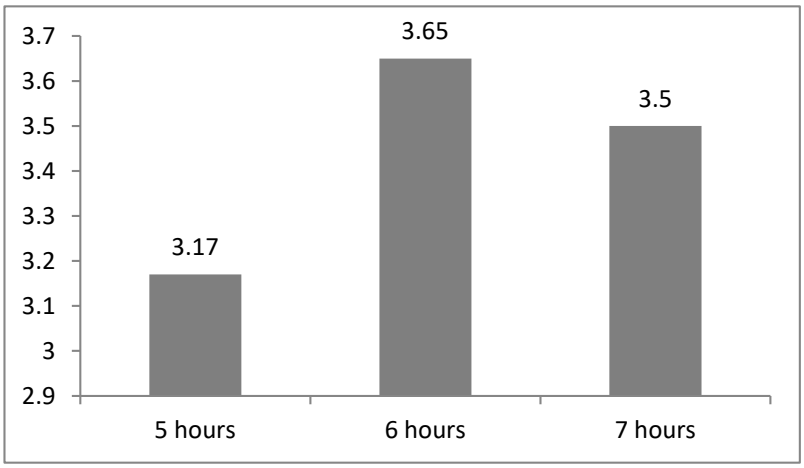

Figure 2. The Result of Viscosity

Table 1. Amino Acids Profile

No	Parameter	Unit	Result
\1	L-Serin	%	3,04
2	L-Asam Glutamat	%	8,23
3	L-Fenilalanin	%	1,65
4	L-Isoleusin	%	1,26
5	L-Valin	%	2,18
6	L-Alanin	%	8,05
7	L-Arginin	%	6,30
8	Glisin	%	19,95
9	L-Lisin	%	2,60
10	L-Asam Aspartat	%	4,13
11	L-Leusin	%	2,55
12	L-Tirosin	%	0,37
13	L-Prolin	%	10,88
14	L-Thereonin	%	2,21
15	L-Histidin	%	0,56

IV. DISCUSSION

The results of gel strength gelatin extracted from *Pangasius hypuphtalmus* bone showed differences in each extraction time. At 5 hours extraction, gel strength was 162.79 bloom, 6 hours extraction was 168,78 boom, and 7 hours extraction was 173,3 bloom. Gel strength has increased with the treatment of extraction time. The strength of the gel produced is in accordance with the standards set by the *Gelatin Manufactures Institute of America* , which is 50-300 g / bloom. Based on ANOVA, the gel strength of gelatin extracted from *Pangasius hypophtalmus* bone was found to be significantly different ($P < 0.05$), so it can be said that the difference in extraction time affected the gel strength of gelatin extracted from *Pangasius hypophtalmus* bone. Based on Tukey's advanced test, the gel strength of gelatin with differences in extraction time of 5 hours, 6 hours, and 7 hours showed significantly different results. The strength of gel gelatin depends on the length of the amino acid chain. The collagen hydrolysis process depends on the right phase in the polypeptide chain where hydrogen bonds are broken, cross covalent bonds and also as peptide bonds, the gelatin structure is produced with higher peptide chains for higher gel production.[5]

The results of gelatin viscosity of *Pangasius hypophtalmus* bone showed differences in each treatment extraction time. At 5 hours extraction, a viscosity was 3,17 cP, at 6 hours extraction was 3,65 cP, and 7 hours extraction was 4,05 cP. Low viscosity values can be caused by the extraction process, where extraction has not been able to hydrolyze and break down the peptide bond structure in the skin of the protein.[6] Based on ANOVA results, the gelatin viscosity of *Pangasius hypophtalmus* bone was found to be significantly different ($P < 0.05$) so that it can be concluded that extraction time affected the viscosity of gelatin in *Pangasius hypophtalmus* bone. Based on Tukey's advanced test, the gelatin viscosity of snapper skin with extraction duration was 5 hours, 6 hours, and 7 hours indicating that it was significantly different. Viscosity values have a relationship with molecular weight, molecular distribution, and average gelatin. Molecular weight is related to the amino acid chain produced. The longer the amino acid chain, the higher the viscosity value. In the 7-hour extraction treatment the highest gel strength value was obtained. This shows that collagen protein is completely hydrolyzed.

Amino acid values with a 7 hour extraction treatment showed that amino acid content has different values where L-Serine was 3.04%, L-Glutamic Acid was 8.23%, L-Phenylalain was 1.65% , L-Isoleucine was 1.26%, L-Valine was 2 .18%, L-Alanine was 8.05%, L-Arginine was 6.3%, Glycine was 19.95%, L-Lisine was 2,6%, L-Acid Aspartate was 4.13%, L-Leusin was 2.55%, L-Tyrosine was 0.37%, L-Proline was 10.88%, L-Threonin was 2.21%, L –Histidine was 0.56%. The highest value is glycine at 19,95%, this is because glycine is the most found amino acid in gelatin. This type of amino acid accounts for 23% of the total amino acids. It is known that thermal stability is influenced by the number of amino acids. Gelatin is made from the partial hydrolysis of collagen.[7]

V. CONCLUSION

The best treatment for making gelatin in *Pangasius hypophtalmus* bone is extraction time of 7 hours with a gel strength value of 173,3 bloom. Viscosity of 4,05 cP, and the highest amino acid was 19.95% by glycine and the lowest was 0.37% in L-Tyrosine

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