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CUPRINS

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BONE DEPROTEINIZATION SKIPJACK *(Katsuwonus pelamis* L) WITH NaOH IN CONCENTRATION AND TIME DIFFERENCE HYDROLISIS

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INTRODUCTION

In tuna fish processing business is handled in large and small scale industrial waste generated both solid waste and liquid waste that has not been fully utilized, and the wastes can cause environmental pollution. Tuna has around 61.79% as edible portion, the part that can be eaten, while the remaining 38.21% are waste including bone parts (Prih *et al.* 1982). According to Lengkey, et al (2011), even there are indicated that skipjack tuna gill meal in ration has no significantly effect on broiler carcass, but it can replace the function of fish meal in the ration.

Tuna fish bone *(Katsuwonus pelamis* L**)** as well as animal bones in general, containing intercellular substance (about 70%) and the 30% remains, as inorganic salts of organic matrix. 95% of the organic component is formed from collagen, the basic substance of the remainder consists of proteoglycan and non-collagen molecules that appear to be involved in the regulation of bone mineralization. Collagen in the bone is approximately half of the total body collagen, and its structure is similar to the collagen in other tissues binder. Almost all of it, is type I fiber. Three-dimensional space on the structure called hole zones, are home to deposits of minerals.

The contribution of the basic substance of proteoglycan in bone has much smaller proportion than in the cartilage, mainly composed of chondroitin sulphate and hyaluronic acid. The basic substances that controlling water content in the bone, and possibly involved in regulating collagen fiber formation. Non-collagen organic material consists of osteocalcin (osla proteins) involved in the binding of calcium during the mineralization process, osteonectin that serves as a bridge between collagen and mineral components, sialoprotein (rich in salicylic acid) and some other proteins. Inorganic matrix is minerals which consists mainly of calcium and phosphate in the form of hydroxyapatite crystals. The crystals are arranged along the collagen fibers. Bone hardness depends on the concentration of inorganic material in the matrix, while the strength depends on the organic materials, particularly collagen fibers.

Collagen is part of the protein fibers or fibrous proteins that have multiple polypeptide chains linked by a variety of crosslinking to form *a triple helix.* Collagen is the protein part of the stromal type. These proteins can not be extracted with water, diluted acid, alkali or salt solution at a concentration 0.01 to 0.1. Collagen can expand because of its molecular tissue structure weakened because of the treatment given when the pH below 4 or increased to 10.

In the manufacture of bone gelatin or the use of bone as a source of minerals then the fat and non-collagen protein should be reduced to the minimum, deproteinization is a process that aims to eliminate or dissolve the protein as much as possible from the substrate, usually done by using a chemical solution that is alkaline (Suryani *et al*., 2005).

MATERIALS AND METHOD

Materials

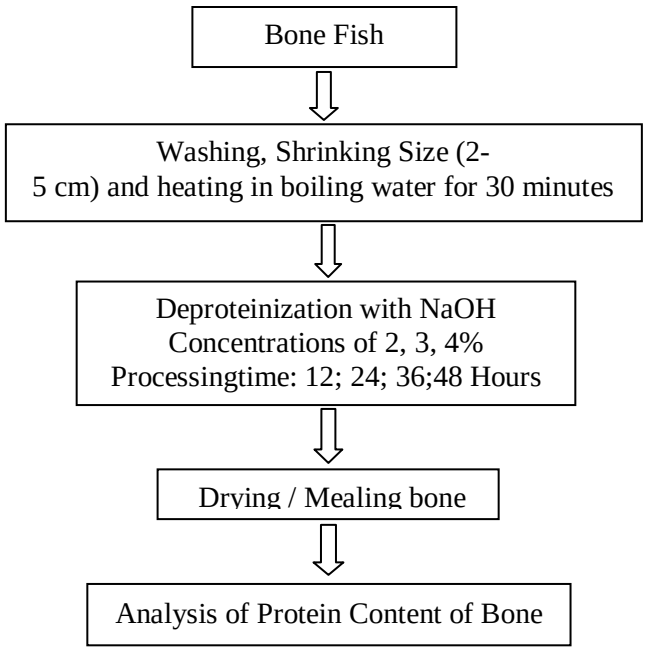
Materials are solid waste processing tuna fish bone in the form of components, and the chemicals used were NaOH solution. The tools are: scales, knives, waste container.

Research Procedure

Deproteinization carried out with sodium hydroxide solution, at various concentrations and longer processing time. Before deproteinization with NaOH washing, reduction of bone size and cooking in boiling water to facilitate spending on the remnants of meat (non-collagen protein), and the layers that contain fat deposits. Removing of fat from the bone tissue (degreasing), conducted at a temperature between the melting point of fat and bone albumin coagulation (between 32-80^{0}C) to produce an optimum fat solubility (Junianto, *et al*, 2006).

Research Methods

This study uses Factorial Completely Randomized Design Patterns 3 X 4 replications 3 times where the factors are : A = the concentration of alkali (given the symbol K) and B = processing time (given the symbol W). Factor A: the concentration of NaOH (K_1 = 2%, K_2 = 3%; K_3 = 4%) Factor B: Processing Time (W_1 = 12 hours; W_2 = 24 hours; W_3 = 36 hours; W_4 = 48 hours).



RESULTS AND DISCUSSION

Research on the use of NaOH as a source of lye to changes in bone protein content of tuna *(Katsuwonus Pelamis* L) shown in Figure 1.

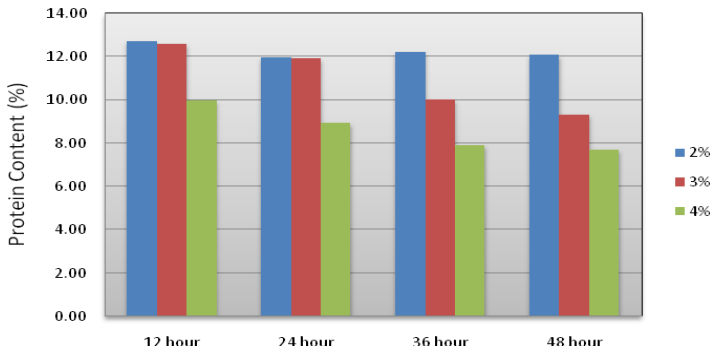


Figure 1. Effect of treatment on protein content (%)Skipjack Bone *(Katsuwonus pelamis* L).

In Table 1, shows that the combination treatment of K_4W_4 (NaOH concentration of 4% with hydrolysis time 48 h) gives the most highly hydrolyzed protein as indicated by the lowest protein content of 7.71%, while the protein hydrolyzed the most. The lowest is a combination treatment of K_1W_1 (concentration of 2% NaOH with hydrolysis time of 12 hours) that still contains the highest protein of 12.70%.

Table 1.Duncan Test Results (Effect of NaOH Concentration on Protein Levels of Bone Skipjack *(Katsuwonus pelamis* L).

Treatment	The average protein content	Significance (0.05)
	... ...%	
K_1	12:24	a
K_2	10.97	b
K_3	8.64	c

Information.: Different letters indicated significance in columns (P <0.05)
K_1 = Concentration of NaOH 2%, K_2 = concentration of NaOH 3%; K_3 = Concentration of NaOH 4%.

By analysis of variance, showed that the concentration of NaOH and the duration of hydrolysis time, has significant (P <0.01) effect on protein content of tuna fish bone, means that protein content changes because the concentration and the duration of hydrolysis by NaOH. Furthermore, to know the difference between treatments is using Duncan's test, are presented in Table 2.

Based on Duncan's test data in Table 2, K_3 treatment (concentration of NaOH 4%) gives lowest bone protein content (8.64%). This means that the higher concentration of NaOH will cause more hydrolizable Skipjack (*Katsuwonus pelamis* L) bone protein. The results are consistent with the opinion of Stevens and Verhe (2004) that the protein

components in the form of bone collagen will be hydrolyzed if the pH is increased up to pH 10.

Table 2. Duncan Test Results of Hydrolysis Time with NaOH against Skipjack *(Katsuwonus pelamis* L) Bone Protein Levels.

	... ...%	
W $_1$	11.76	a
W $_2$	10.94	a
W $_3$	10:05	ab
W $_4$	9.70	b

Information : Different letters indicated significancy in columns (P <0.05)
W $_1$ = 12 Hours Hydrolysis, W $_2$ = 24 Hours Hydrolysis, W $_3$ = 36 Hours Hydrolysis;
W $_4$ = 48 Hours Hydrolysis

In Table 2, according to Duncan test, W_4 (48 hours) has the lowest levels of bone protein (9.70%) this means that the length of hydrolysis time, would result more hydrolizable Skipjack *(Katsuwonus pelamis* L) bone protein. This results are similar with Bagau (2010), that using of 4% NaOH solution concentration for 24 hours at room temperature, dried and milled, processed tuna bone still has 10.29% protein content.

CONCLUSION

Results and discussion indicated, the influence of concentration and time of deproteinization NaOH hydrolysis, as measured by the levels of hydrolizable bone protein, can be concluded that the concentration of NaOH 4% with 48 hours hydrolysis time, give the lowest of bone proteins tuna *(Katsuwonus pelamis* L).

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