THE QUALITY CHANGES OF FRESH SKIPJACK (*Katsuwonus pelamis*) DURING CHIILING STORAGE

Raja B. D. Sormin[*], F. Pattipeilohy, and Abraham J. Atua

Department of Fish Processing Technology,
Faculty of Fisheries and Marine Sciences, Pattimura University,
Jl. Ir. M. Putuhena, Kampus Poka, Ambon, Indonesia 97233

*Corresponding Author: sormindolok@gmail.com

ABSTRACT

As a good source of protein and other nutrition that useful for human growth, fish is categorized as perishable food that decaying quickly without good handling. In order to prevent the fish decay and to maintain the quality and freshness of the fish as long as possible, it is need good handling and storage sanitation. Chilling and freezing are the most common technology applied to prolong the shelf life of fresh fish. Chilling is one method of handling that most widely used because it can be practiced easily and quickly. This study aimed to determine the changes in the quality of fresh skipjack (*Katsuwonus pelamis*) during chilled storage. Parameters as quality indicator measured were total plate count (TPC), total volatile bases (TVB), and pH. Chilled storage were 0, 2and 4days. TPC of fresh skipjack during chilled storage at 0, 2 and 4 days were 1.08×10^2, 8.11×10^2 and 1.06×10^3 cfu/g, respectively. TVB of fresh skipjack during chilled storage at 0, 2 and 4 days were 9.33, 16.00 and 20.00 mgN/100g, respectively. The pH of fresh skipjack during chilled storage at 0, 2 and 4 days was 4.7, 4.8 and 5.4, respectively

Keywords: *Fresh skipjack; pH; Quality; TPC, TVB*

1. INTRODUCTION

As a good source of protein and other nutrition that useful for human growth, fish is categorized as perishable food that decaying quickly without good handling. In order to prevent the fish decay and to maintain the quality and freshness of the fish as long as possible, it is need good handling and chilled storage as soon as possible after fish captured from waters.

Chilling and freezing are the most common technology applied to prolong the shelf life of fresh fish. Chilling is one method of handling that most widely used because it can

be practiced easily and quickly. The most important factor affecting the shelf life of fish and fishery product were handling practices and storage conditions (Huss, 1995).

Skipjack (*Katsuwanus pelamis*) is the most important economical fish in Indonesia. The data of Ministry of Maritime Affairs and Fisheries in 2013 mentions an export growth target of 19%, where the position of Tuna, Tongkol and skipjack were very strategic in generating foreign exchange, as well as a source of animal protein for the people of Indonesia. While in Maluku Skipjack resource potential (MSY) in Banda waters is 32,954.98 tons/year, while production is 32,905.91 tons/year (Waileruny, 2014). The big amount of this fish production should be followed by a good handling in order to maintain its quality. Based on the reason above, this study aimed to determine the changes in the quality of fresh skipjack (*Katsuwonus pelamis*) during chilled storage.

2. MATERIAL AND METHOD

Preparation of fresh Skipjack. Fresh Skipjack were obtained from fishing port in Tulehu Village, Central Moluccas Indonesia. Fish were placed in cool box then chilled by crushed ice with a fish/ice ratio of 1:1 (w/w) and stored for 4days. The quality parameters (pH, TVB and TPC) were measured by time series 0, 2and 4 days.

The pH measurement. Hanna model pH meter was used to measure the pH of skipjack muscle. An amount of 25 g skipjack muscle was blended and fill in the 100 mL Erlenmeyer tube, then homogenized by added 30 mL distilled water. The homogenizing sample then measured its pH value.

Total Plate Count (TPC). An amount of 25 gr of skipjack muscle were aseptically prepared and blended in 225 mL 0.9 %NaCl. Serial decimal dilution prepared start from initial dilution of 10^{-1} to 10^{-4} and poured it 1 mL from each dilution to an empty sterile petridish also prepared according to the number of the dilution. Then poured agar nutrient about 5 mL to each petri dish, homogenized by slow shake then were incubated in temperature of 37 °C for 24 h. The TPC was got from the number of colonies divided by serial decimal dilution (Fardias, 1993).

Measurement of total volatile base (TVB). Conway's method was used to measure the number of TVB of fresh skipjack (Suwetja, 1993). The first step, 2 g of fresh skipjack

muscle was homogenized with10 mL trichloroacetic acid (TCA). The homogenate sample was filtered by using a Whatman No.1 filter paper. The filtrate was prepared for the next analyses. The second step, as much 1 mL sample was placed in the left outer chamber ring, while in the right outer chamber ring was filled 1 mL K_2CO_3 solution for initiate the reaction. In the inner chamber was filled with 1 mL of boric acid solution and 2 drops to 3 drops the Tashiro indicator. To initiate the reaction, 1 mL K_2CO_3 was mixed with the sample extract. The Conway unit was closed and incubated at room temperature for 24 h. The third step, the solution in inner chamber was titrated with N/70 HCl until the green color turned to pink color. TVB was determined by multiply the number of titration by 80 mg N per 100 g skipjack muscle.

3. RESULTS AND DISCUSSION

Total Plate Count of Fresh Skipjack during Chilled Storage

Total colony forming unit of bacterial called TPC is one of important parameters of fresh fish quality decreased. Total colony forming unit tended to increase during chilled storage (Figure 1). The average of TPC during chilled storage 0, 2 and 4 days was 2.03(log cfu/g), 2.91 (log cfu/g) and 3.02 (log cfu/g) respectively.
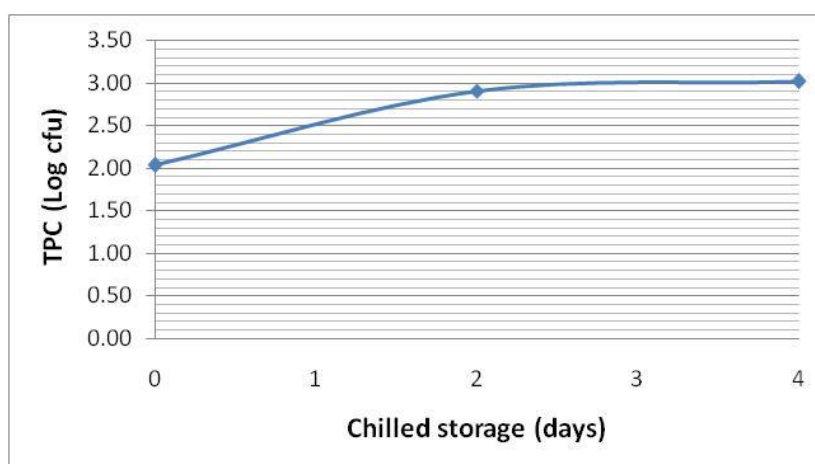

Figure 1. TPC of Fresh Skipjack during Chilled Storage.

Ilyas (1983) mentioned thatbacterial is the main cause of fish quality decreased. While Junianto (2002) mentioned that chilling and freezing technology could retard the quality decreased, because itwill retard the growth of bacteria. Afrianto and Liviawaty (1993) added that chilling temperature can detain the microbe and enzyme activity. The

TPC score of fresh fish during storage for 12 h on cool box insulated by Styrofoam was 1.325×10^3cfu/g (Sormin *et al*., 2015). The maximum number of TPC score of fresh fish allowed by SNI (01-2729-3-2006) is 5×10^5 cfu/g (or up to 5.7 log cfu/g).

Total Volatile Bases Nitrogen of Fresh Skipjack during Storage

Since the deteriorated fish find to have a higher Total Volatile Base (TVB) value, TVB indicated the one of the parameters of the fresh fish quality (Hadiwiyoto, 1993).The TVB valueof fresh skipjack during chilled storage at 0, 2 and 4 days was 9.33mgN/100g,16.00mgN/100g and 20.00mgN/100g respectively. As the storage increase, the freshness of the chilled skipjack tent to decrease (Figure 2).
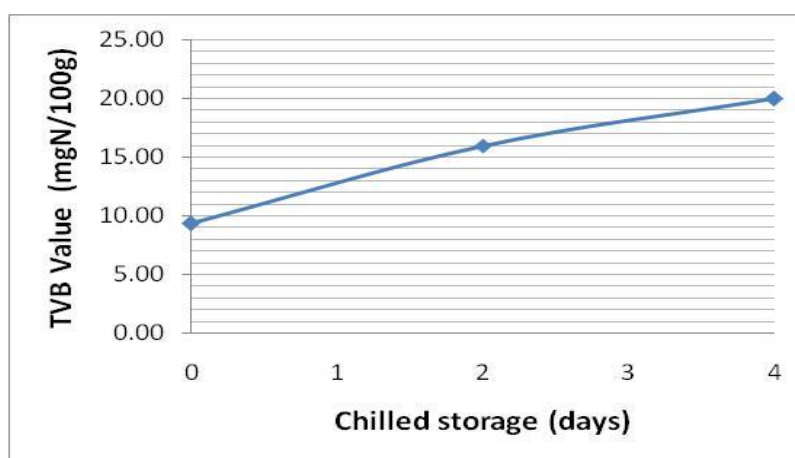

Figure 2. TVB of Fresh Skipjack during Chilled Storage.

Although TMA and TVB was not always suitable for determination of fresh fish decay, there is a relationship between these parameters with the rate of fish nitrogen component decomposition as a result of enzymatic breakdown and bacterial activity (Pastoriza *et al*., 2008).The content of TVB is an alternative for measuring TMA; including ammonia, dimethylamine and trimethylamine (Margeirsson *et al*., 2010).

The pH Value of Chilled Skipjack during Storage

The pH value of fresh skipjack during chilled storage 0, 2 and 4 days was 4.73, 4.80and 5.43 respectively. The pH of fresh skipjack tend to increase during storage, it was caused by the microbes activity that composed the amino acid to be bases so that the pH will increase (Figure 3). Hadiwiyoto (1993), mentioned that pH decreased in fresh fish was due to physiology, salt compound and enzyme activity of fish. Generally, the damaged fish have a pH value higher than that of fresh fish. The pH standard of fresh fish ranged from 6.8-7.0.
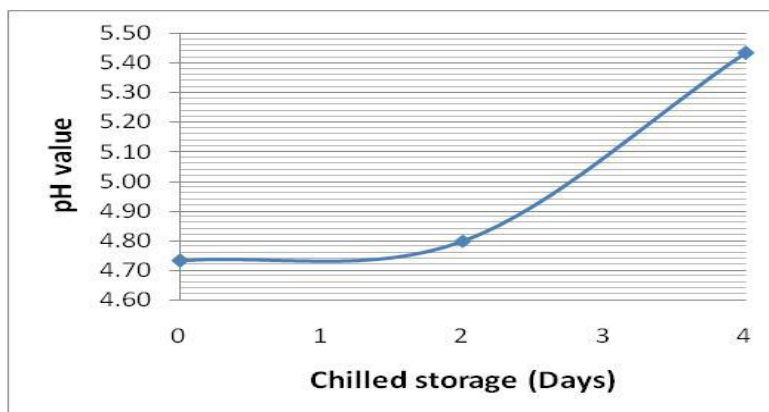
Figure 3. Changes of pH Value during chilled storage.

Gandotra *et al*., 2012, mentioned that cooling storage at temperature 4 °C caused the increased of pH 6.8 to pH 7.4 for 21 days. The increase of pH was associated with the increased TVB by enzymes and bacteria decomposition. The pH value varies depending on the fishing time. There is no significant difference in pH between pH control and samples on the first day in which the value of pH < 7. The pH will decline as soon after death, because of the presence of lactic acid from glycogen hydrolysis (Pastoriza *et al*., 2008). Post mortem glycolysis obtained the lactic acid accumulation, it lead to pH decreased lower than the initial pH about pH 6.8 to pH 6.1. At certain species such as skipjack and mackerel, the pH on the point of rigormortis was pH 5.4, moreover, the certain animals can reach a pH 5.1. The amount of lactic acid is highly depend on carbohydrate reserves (glycogen) in the tissues of fish muscle. Generally, the fish muscle contains a glycogen relatively smaller than that of the mammals, so that it produced less lactic (Anacleto *et al*., 2011). Furthermore, the pH of fish muscle increase progressively. The pH increasing associated with the decomposition of protein networks, deamination process and the establishment of basic decomposition products such as ammonia and trimethyl amine produced by endogenous enzymes and microbes during decomposition.

4. CONCLUSION

Based on the value of TVB, TPC and pH of skipjack during cooling still on the standard limit allowed by the Indonesia National Standard (SNI), it is recommended that chilling becomes the good storage technologies of fresh fish before further processing and consuming.

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