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The Effect of Cool Box Insulator Type on the Temperature Characteristics and Quality of *Decapterus russelly* (Rüppell, 1830) during Chilling Preservation

Raja Bonan Dolok Sormin*, Fredy Pattipeilohy, Nicolas Koritelu

Department of Fish Processing Technology, Faculty of Fisheries and Marine Science, Pattimura University,
Jl. Ir. Putuhena, 97233, Ambon, Indonesia

Abstract

This research aimed to study the effect of the cool box insulator material ('ela sago' and styrofoam) on the temperature characteristics and the fish quality during chilling preservation. The decrease rate of fish temperature in cool box insulated by styrofoam was $0.13\text{ }^{\circ}\text{C} \cdot \text{min}^{-1}$, while the decrease rate of it in cool box insulated by 'ela sago' was $0.045\text{ }^{\circ}\text{C} \cdot \text{min}^{-1}$. The best quality of fresh fish based on the parameters pH, Total Plate Count, and Total Volatile Base was obtained by the cool box insulated by styrofoam, however, until the end of the preservation treatment, all the fresh fish were still on the good condition.

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Keywords: Chilling preservation; *Decapterus russelly* (Rüppell, 1830); insulator; temperature; quality.

1. Introduction

Maintaining the freshness of fishery product is an important factor in the sea food industry. Freshness extension of fish and fishery product allows the processors to plan and control their processing and marketing in long term as well as giving opportunities to change transport modes. The most important factor affecting the shelf life of fish and fishery product were handling practices and storage conditions (Huss, 1995).

* Corresponding author. Tel.: +62 813 4302 3983.
E-mail address: rbd.sormin@yahoo.com

Good handling practices by maintaining the low temperature from catching to consumer is an essential practicing to do, because the temperature fluctuation during handling, storage and transportation affected the freshness and the quality of the fresh fish.

Fresh fish are highly perishable products and their deterioration is mainly based on the biological reactions such as oxidation of lipids, protein degradation or decomposition that mediated by endogenous or microbial enzymes. These activities lead to a short shelf-life of fresh fish and other seafood products (Gobantes et al., 1998). Enzymatic and chemical reactions are responsible for the initial loss of fish freshness while microbial activity is responsible to spoilage (Gram and Huss, 1995).

Using coolbox is one method applied to maintain the freshness of fish during storage. Ice is used as chilling substrate to maintain the temperature of fish lower than room temperature. The good insulator will maintain the temperature of the inner coolbox in a long time. This research was studied the effect of two types of insulator used in coolbox on the temperature characteristic and the quality of fresh fish kept in that coolbox during storage.

2. Material and methods

2.1. Preparation of fresh fish

Fresh fish (*Decapterus russelly*) were obtained from fishing port in Village of Hative Besar, Ambon City, Indonesia. The fishing port take distance about 5 km from the Fish Processing Laboratory, Pattimura University. Fresh fish were placed in the plastic container. They were then washed with tap water. Fish were placed in cool boxes, which treated by two treatments were the first insulated by 'ela sago', (dried sago waste) and the second insulated by styrofoam. Then chilled by crushed ice with a fish/ice ratio of 1:1 (w/w) and stored for 12 h. The temperatures was measured every 10 min. The quality parameters (pH, TVB and TPC) were measured by time series 0 h, 4 h, 8 h and 12 h.

2.2. The pH measurement

The pH measurement was carried out using a Hanna model pH meter. Fish muscle (25 g) was blended and fill in the 100 mL Erlenmeyer tube, 30 mL distilled water was added and homogenized. The homogenizing sample then was subjected to pH determination.

2.3. Total Plate Count (TPC)

Samples were aseptically prepared an amount of 25 g and blended by adding 225 mL NaCl 0.9 %. Serial decimal dilution prepared start from initial dilution of 10^{-1} to 10^{-4} . Then poured agar nutrient about 5 mL to 15 mL in petridish, homogenized by slow shake then were incubated in temperature of 37 °C for 24 h. The total plate count (mL) was gotten from the number of colonies divided by serial decimal dilution (Fardias, 1993).

2.4. Determination of total volatile base (TVB)

The number of TVB of the sample were determined by the Conway's method as described by Suwetja (1993). About 2 g of samples were homogenized by adding 10 mL trichloroacetic acid (TCA). The homogenate sample was filtered by using a Whatman No.1 filter paper and the filtrate was prepared for the next analyses. Sample extract (1 mL) was placed in the left outer chamber ring, while in the right outer chamber ring was filled with 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, K_2CO_3 (1 mL) was mixed with the sample extract. The Conway unit was closed and incubated at room temperature for 24 h. The inner chamber ring solution was then titrated with N/70 HCl until the green color turned to be pink. TVB was determined by : number of titration multiplied by 80 mg N per 100 g fish flesh.

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