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Round scad quality on mini purse seine boats, Rembang Regency, Central of Java

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ABSTRACT

Mini purse seine boats in Rembang are divided into two sizes. The first one, namely mini purse seines measuring 10 - 20 Goss Tonnage (GT) (short trips) with a fishing operation duration of 3 - 7 days. The second one is mini purse seines measuring 21 - 30 GT (long trips) with a fishing operation duration of 7 - 10 days. The dominant catch on this boats is round scad, which used a cooling mechanism with ice blocks and bulking systems. This research evaluates the quality of round scad caught by mini purse seine boats (based on Indonesian National Standard/SNI 2729: 2013) and the quality of ice used in handling the fish (based on SNI 4872: 2015). The sampling technique was purposive sampling. Fish samples were carried out in the first and last hold on the short trips and long trips boats, where each handle of the fish was sampled in the upper, middle, and lower layers. Data analysis for sensory evaluation were analyzed by Kruskal Wallis statistics, while the TPC value of round scad was tested by ANOVA test. The laboratory test results obtained the sensory assessment of round scad. The value of the TPC round scad and the E. coli ice blocks are still within the limits of the Indonesian national standards, but the TPC scale of the ice block exceeds the standard limit of SNI. The Kruskal Wallis statistics results showed tha the difference in fish hold, the difference in the trip, and differences in fish hold layers had a significant effect on the sensory of scad. ANOVA test showed that differences in the fish hold and trip differences had a significant impact on the TPC of scad. In contrast, the difference in fish hold layers gave a non-significant effect on the TPC of round scad.

Introduction

Purse seine is one type of fishing gear that is most widely used by fishermen in Indonesia. Mini purse seine the dominant fishing gear in Rembang regency, because are very effective for catching pelagic fish and provides a major advantage over other fishing gears. (Imron *et al.* (2020) and Tiku *et al.* (2021).

Mini purse seine boats in Rembang are divided into two sizes. The first one, namely mini purse seines measuring 10 - 20 Gross Tonnage (GT) (short trips) with a fishing operation duration of 3 - 7 days. The second one is mini purse seines measuring 21 - 30 GT (long trips) with a fishing operation duration of 7 - 10 days. According to Tanjov *et al.* (2016) mini purse seine is one of the fishing gear suitable for pelagic fish. Nugraha *et al.* (2014) and Rejeki *et al.* (2019) stated that one of the dominant pelagic fish that makes a big contribution to the mini purse seine fishing productivity in Rembang Regency is round scad. According to Irianto and Soesilo (2007), round scad is widely used as a source of energy for humans, because it has high nutritional value. The nutritional content contained in round scad is : energy (109 kcal), water (72.5%), protein (26.31%), fat (1.90%), ash (0%) (Irianto and Soesilo, 2007; Ministry of Health of the Republic of Indonesia, 2014; Hadinoto and Kolanus, 2017).

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The storage system of the catch in the mini purse seine hold in Rembang Regency is a bulking system using ice crushed cooling. This storage system can cause round scad to have a big risk of decreased quality, if the handling method is not careful, not fast, not cold and not clean (Rejeki *et al.*, 2019). According to Adawyah (2014); Husni and Putra (2015), that this storage method in large quantities can cause damage to the catch, due to pressure from fish and ice on the top. Pane (2008) adds that the damage to the quality of the fish on a one-day fishing trip is caused by the accumulation of excessive fish in the barrels used since on the boat, not because they do not use ice. Irianto (2008) said that the storage of the catch in the hold of the boats not be more than three layers of fish because it can cause the physical hazard to catch that are placed the bottom layer due to the pressure of the ice and the fish placed on it. Kurhardiyanto (2010) states that the pressure of the cacth must be avoided at the stages of fish handling activities on boats, because it can cause physical damage to the fish's body such as bruised meat. To get a good quality fish, the cacth mus be good handling (Mboto et al. 2014) and Siregar *et al.* (2020). It takes special handling to get the fish fresh. Handling of fish on boats, includes all actions against catches on boats, from early action to storage, this aims to get the fish quality conformity with the standard (Ismanto *et al.*, 2013). Quality of the cath will be better if the fishing and handling methods on boats and in port are doing with precisely, quickly and carefully (Nurani *et al.*, 2011; Tamuu *et al.*, 2014 and Rejeki *et al.*, 2019). Fish quality cannot be decreased, but can only be maintained (Tamuu *et al.*, 2014).

It is necessary to analyze the quality of the round scad caught by the mini purse seine and the ice block used in handling the round scad on the mini purse seine in Rembang Regency.

Materials and Methods

Location and time of research

This research was carried out in March to August 2018. Taking samples of round scad and observing the activity of unloading the catch is carried out directly by researchers on a mini purse seiner that unloads the catch at the Tasik Agung fish landing site (TPI), Rembang Regency, Central of Java. The laboratory test of the round scad and ice block was carried out at the Laboratory of the Fisheries Product Testing and Quality Assurance Center (BP2MHP) Semarang, Central of Java.

Materials and tools

The materials used in this research are round scad, ice block, chemical materials : Butterfield's Phosphate Buffered solution, oxidizing reagent, Kovact reagent. The tools used in this study were: plastic packaging, styrofoam, rulers, documentation tools, petri dishes, incubators, glass rods, wooden applicator sticks, plastic or platinum (not nichrome) inoculation needles, tryptophan broth tubes and filter paper.

Sampling methods and data analysis

The technique was purposive sampling, which determined the samples based on certain criteria, the samples of mini purse seine boats as samples (scad) were determined, 6 boats as samples i.e. 3 boats with tonnage 10 – 20 GT (short trips) and 3 boats in tonnage 21 – 30 GT (long trips). Fish samples were carried out in the first and last hold, where each hold of the fish was sampled in the upper, middle and lower layers. The number of samples of round scad on 18 sample short trips and 18 sample long trips, a total of 36 samples. A total of 36 fish samples were carried out laboratory tests, namely organoleptic test and 36 samples for Total Plate Count (TPC) test, so that the total fish samples were 72 samples. Round scads quality and ice quality was analyzed with descriptive analysis and statistical analysis, the sensory evaluation was analyzed by a Kruskal Wallis statistical test, while the TPC value of round scad was tested by Anova statistics parametric.

Organoleptic analysis of round scad

Organoleptic testing procedures at BP2MHP still use SNI 2346: 2011, and the target is to use the latest SNI, namely SNI 2729: 2013. Both of these SNIs contain instructions for organoleptic or sensory testing on fishery products.

Preparation of samples in the same container in size, shape and material. The coding of the samples presented uses numbers to eliminate the panelists' allegations of the quality to be tested. The numbers used consist of 5 digits and are taken randomly. Furthermore, an example assessment is carried out. The ready-to-test samples are served in the tasting booths. The assessment of the tested samples described in the score sheet generally includes specifications on appearance, smell, taste and texture / consistency, and other specifications that are closely related to the condition of the sample.

Total Plate Count (TPC) analysis of the round scad

The TPC testing procedure at BP2MHP still uses SNI 01-2332.3-2006, and the target is to use the latest SNI, namely 01-2332.3-2015. Both of these SNIs contain the determination of ALT for fishery products. TPC is used to determine the total number of aerobic and anaerobic microorganisms (thermophilic, mesophilic and psychrophilic). The

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procedure for determining ALT based on SNI 01.2332.3-2006 is as follows: the sample preparation stage, namely the solid sample is weighed as much as 25 g for the sample weighing <1 kg, then put in a container or sterile plastic.

Example 25 g was added 225 mL of Butterfield's Phosphate Buffered solution homogenized for 2 minutes. This homogeneity is a solution with a 10^{-1} dilution. Using a sterile pipette, as much as 1 ml of homogeneity is taken and put in 9 mL of Butterfield's Phosphate Buffered solution to obtain a 10^{-2} dilution.

A further dilution (10^{-3}) is prepared by taking 1 mL of a sample from a 10^{-2} dilution into 9 mL of Butterfield's Phosphate Buffered solution. At each dilution, the shaking was performed at least 25 times. Then the same thing is done for dilutions 10^{-4}, 10^{-5} and so on according to the sample conditions. Then the test was carried out, with the following steps: 1 mL of sample was taken with a pipette from 10^{-1}, 10^{-2}, and so on and put into a sterile petri dish.

Performed in duplo for each dilution. A total of 12 mL - 15 mL Plate Count Agar (PCA) that has been cooled in a waterbath container until it reaches a temperature of 45 °C ± 1°C is added to each plate that already contains the sample. So that the samples and the PCA media were all mixed, we rotated the plates back and forth and from left to right. After the agar became solid, for the determination of aerobic microorganisms, the plates were incubated in an inverted position. Then put in the incubator at a temperature of 35 °C ± 1 °C for mesophilic bacteria for 48 hours ± 2 hours. The final stage is to read and calculate the colony on a petri dish, with the formula:

$$N = \frac{\sum C}{[(1 \times n1) - (0{,}1 \times n2)] \times d}$$

Information:

N	=	number of product colonies, expressed in colonies per mL or colonies per g.
∑C	=	number of colonies on all counted plates
n1	=	number of plates at the first calculated dilution
n2	=	number of plates at the second dilution calculated
d	=	the first dilution calculated

TPC analysis of ice block

Testing of ice block TPC in the BP2MHP laboratory uses testing procedures based on ISO 6222: 1999, not using the latest SNI standards SNI 01 - 2332. 3. 2015, but the target is to use the latest SNI procedures. The procedure for determining TPC for ice block is based on ISO 6222: 1999, as follows: sample preparation is carried out by making a dilution and injection of culture media, in accordance with ISO 8199, EN ISO 5667-3 and ISO 6887. The pour-plate method (ISO 8199) is used. The test sample (or its dilution) not exceeding 2 mL is placed into a petri dish, then 15 mL to 20 mL of liquid medium (7.3) are added and carefully mixed with gentle rotation. The time between adding the test sample (or diluting it) and adding the liquid medium should not exceed 15 minutes. Subsequently, incubation and examination were performed, as follows: the plates were incubated upside down at (37 ± 2)°C for (44±4) hours; Incubate the other device at (22 ± 2)°C for (68 ± 4) hours. The plates were examined immediately after removal from the incubator, if this was not possible then stored at (5 ± 3)°C and examined within 48 hours. The last step is to read and calculate the colony on a petri dish. For each incubation temperature, and following the procedure described in ISO 8199, the colonies present in each plate were counted and the estimated number of colony-forming units present in 1 mL sample. The results are expressed as the number of colony-forming units per ml (CFUmL) of sample for each incubation temperature. If no colony in the plate is inoculated with the undiluted test volume of the sample, then the result is revealed to be undetectable in 1 mL. If there are more than 300 colonies on the inoculated plate with the highest dilution used, then the results are expressed as i> 300 or just as an estimate.

E. coli analysis of ice block

The procedure for determining E. coli ice block is based on SNI ISO 9308-1: 2010 as follows: preparation of sample tests, namely the test samples are filtered and inoculated on isolation media, in accordance with the instructions in ISO 8199:1998 and ISO 6887-1:1999. as soon as possible after taking the test sample. If the test sample is stored at room temperature (in the dark, not exceeding 25 °C), the test shall be carried out within 6 hours of sampling. Under certain conditions, the test sample may be stored at (5 ± 3) °C for up to 24 hours before the test. The next step is filtration, which is 100 ml filtered using a filter membrane. The filter is placed on each agar medium. Ensure that no air is trapped underneath. The next step is incubation and differentiation, namely the membrane is placed in an agar plate for Lactose TTC Agar and incubated at (36 ± 2) °C for (21 ± 3) hours. The time can be extended to (44 ± 4) hours which may result in a high sensitivity to the test results, especially on plates that do not show typical colonies after incubation (21 ± 3) hours. The membranes were examined and counted for all characteristic colonies showing yellow

growth on the media under the membrane, regardless of size, as lactose-positive bacteria. For the oxidase and indole assays, subcultures of all characteristic colonies are preferred or a representative number (at least 10 colonies) each into the non-selective medium and in the tryptophan broth. Then the oxidation test is carried out, namely the incubation on the non-selective medium at a temperature of (36 ± 2) °C for (21 ± 2) hours and perform the oxidation test as follows: two to three drops of the newly made oxidation reagent are dripped on filter paper Then the colony is rubbed on the filter paper using a glass rod, wooden applicator stick, plastic or platinum (not nichrome) inoculation needle. A positive reaction is indicated by a color change from dark blue to purplish within 30 seconds. The final stage was carried out by the indole test, namely the tryptophan broth tube was incubated at (44.0 ± 0.5) °C for (21 ± 3) hours and checked for the presence or absence of indole produced by adding 0.2 ml to 0.3 ml of Kovacs reagent. The formation of a cherry red color on the surface of the broth indicates the presence of indole.

Data analysis

Organoleptic of round scad

Organoleptic result from the test results from the BP2MHP laboratory, then look for the standard deviation value and the value of the confidence interval. The results of the calculation of the organoleptic value, then carried out a descriptive analysis and compared with the standard limit for the organoleptic value of fresh fish contained in SNI 2729: 2013 concerning the quality requirements and safety of fresh fish. Furthermore, the data normality test was carried out using the Kolmogorov Smirnov (using SPSS 19), and the results showed that the data were not normally distributed. Then the Kruskall Wallis non-parametric statistical test was performed (using SPSS 19).

TPC of round scad

TPC result from the test results from the BP2MHP laboratory, then carried out descriptive analysis and compared with the standard limit for the TPC value of fresh fish contained in SNI 2729: 2013. Next, the data normality test was carried out using Kolmogorov Smirnov (using SPSS 19), and the results were that the data were normally distributed. Then the ANOVA parametric statistical test was performed (using SPSS 19).

TPC of ice block

The TPC result for ice cubes were tested from the BP2MHP laboratory, then a descriptive analysis was carried out and compared with the ice TPC value limit standards contained in SNI 4872: 2015 concerning ice quality requirements for fish handling.

E. coli of ice block

E. coli ice block from the test results from the BP2MHP laboratory, then carried out a descriptive analysis and compared with the standard limit values for E. coli ice block contained in SNI 4872: 2015.

Result

Organoleptic test of round scad

Organoleptic test results of round scad on mini purse seine boats 10-20 GT (short trip = 5 days) and mini purse seine boats 21-30 GT (long trip = 9 days) are shown in Table 1.

Table 1. Organoleptic test results for round scad

Boats	Layer	Specification											
		The First Hold						The Last Hold					
		Eye	Gills	Mucus	Fish (Flesh)	Odor	Texture	Eye	Gills	Mucus	Fish (Flesh)	Odor	Texture
Short Trips													
	T	8,50±0,50	8,00±0,58	7,70±0,75	7,33±0,47	7,33±0,47	7,50±0,50	8,00±0,58	1,33±0,47	7,67±0,47	7,83±0,37	7,83±0,69	7,67±0,47
	M	8,00±0,82	7,83±0,69	7,67±0,75	7,33±0,47	7,00±0,00	7,33±0,47	8,17±0,37	8,17±0,37	7,50±0,50	7,83±0,37	7,67±0,47	7,67±0,47
	B	7,33±0,47	7,50±0,50	7,00±0,00	7,17±0,37	7,00±0,00	7,00±0,00	7,83±0,69	7,17±0,37	7,17±0,37	7,50±0,50	7,00±0,00	7,33±0,47
	T	8,00±0,82	7,83±0,69	8,00±0,82	8,00±0,82	7,33±0,47	7,50±0,76	8,33±0,75	8,00±0,82	8,00±0,58	8,00±0,82	7,33±0,47	7,83±0,90
	M	8,17±0,90	8,00±0,82	7,67±0,75	8,00±0,82	7,33±0,47	7,67±0,94	8,17±0,90	8,00±0,82	7,83±0,69	8,00±0,82	7,33±0,47	7,83±0,90
	B	7,83±0,90	7,17±0,37	7,00±0,00	7,17±0,37	7,00±0,00	7,33±0,75	8,00±0,82	7,50±0,50	7,50±0,50	7,67±0,47	7,67±0,47	7,83±0,69
	T	7,67±0,47	7,33±0,47	7,17±0,37	7,50±0,50	7,00±0,00	7,50±0,50	8,33±0,47	8,17±0,90	7,33±0,47	7,83±0,69	7,33±0,47	7,83±0,69
	M	7,33±0,47	7,17±0,37	7,00±0,00	7,17±0,37	7,00±0,00	7,17±0,37	8,33±0,47	8,17±0,90	7,33±0,47	7,67±0,75	7,33±0,47	7,83±0,69

	B	7,17± 0,37	7,17± 0,37	7,17± 0,37	7,17 ±0,37	7,00± 0,00	7,00± 0,00	7,33± 0,47	7,83± 0,90	7,50± 0,50	7,67±0,7 5	7,33± 0,47	7,67± 0,47

Boats	Layer	Specification											
		The First Hold						The Last Hold					
		Eye	Gills	Mucus	Fish (Flesh)	Odor	Texture	Eye	Gills	Mucus	Fish (Flesh)	Odor	Texture
Long Trips													
	T	7,83± 0,90	7,33± 0,47	7,00± 0,00	7,33±0,4 7	7,00± 0,00	7,67± 0,75	8,17± 0,90	8,00± 0,82	7,83± 0,69	8,00±0,8 2	7,17± 0,37	7,67± 0,94
	M	7,83± 0,90	7,33± 0,47	7,00± 0,00	7,33 ±0,47	7,00± 0,00	7,50± 0,76	8,50± 0,76	7,67± 0,75	8,00± 0,82	7,83±0,6 9	7,50 ±0,76	7,33± 0,75
	B	7,83± 0,90	7,33± 0,47	7,00± 0,00	7,17±0,3 7	7,33± 0,75	7,17± 0,37	7,83± 0,90	7,33± 0,47	7,00± 0,00	7,33 ±0,47	7,33± 0,75	7,17± 0,37
	T	7,33± 0,47	7,50± 0,50	7,00± 0,00	7,17±0,3 7	7,00± 0,00	7,00± 0,00	8,50± 0,50	8,00± 0,58	7,33± 0,47	7,33±0,4 7	7,33± 0,47	7,50± 0,50
	M	7,50± 0,50	7,33± 0,47	7,17± 0,37	7,00±0,0 0	7,17± 0,37	7,00± 0,00	7,50± 0,50	7,33± 0,47	7,17± 0,37	7,00 ±0,00	7,17± 0,37	7,17± 0,37
	B	7,50± 0,50	7,17± 0,37	7,17± 0,37	7,00±0,0 0	7,00± 0,00	7,00± 0,00	7,33± 0,47	7,50± 0,43	7,00± 0,00	7,17 ±0,35	7,00± 0,00	7,00± 0,00
	T	7,50± 0,76	7,50± 0,50	7,00± 0,00	7,33±0,4 7	7,00± 0,00	7,33± 0,47	8,17± 0,69	7,83± 0,90	8,00± 0,82	7,83±0,6 9	7,33± 0,47	7,50± 0,76
	M	7,83± 0,90	7,33± 0,47	7,00± 0,00	7,17±0,3 7	7,00± 0,00	7,17± 0,00	8,33± 0,75	7,83± 0,90	8,00 ±0,82	7,83 ±0,69	7,33± 0,47	7,17± 0,37
	B	7,00± 0,00	7,00± 0,00	7,00± 0,00	7,00±0,0 0	7,00± 0,00	7,00± 0,00	7,00± 2,38	7,67± 0,75	7,00± 0,00	7,33±0,4 7	7,00± 0,00	7,00 ±0,00

Information : T = Top, M = Midel, B = Buttom

Table 2. TPC value of round scad on mini purse seine boats on short trip and long trip

Boats	TPC (CFU/g)					
	The First Hold			The Last Hold		
	Top	Midle	Buttom	Top	Midle	Buttom
Short Trips						
1	5,20 x 10^2	7,00 x 10^2	4,80 x 10^2	5,00 x 10^2	6,80 x 10^2	9,50 x 10^2
2	5,00 x 10^2	4,00 x 10^2	8,70 x 10^2	1,50 x 10^2	2,40 x 10^2	5,00 x 10^2
3	3,00 x 10^2	4,50 x 10^2	5,60 x 10^2	1,00 x 10^2	2,32 x 10^2	4,00 x 10^2
Average	4,00 x 10^2	5,17 x 10^2	6,37 x 10^2	2,50 x 10^2	3,84 x 10^2	6,17 x 10^2

Boats	TPC (CFU/g)					
	The First Hold			The Last Hold		
	Top	Midle	Buttom	Top	Midle	Buttom
Long Trips						
1	1,10 x 10^3	1,45 x 10^3	2,50 x 10^3	9,90 x10^2	1,05 x 10^3	1,20 x 10^3
2	5,70 x 10^3	6,85 x 10^3	7,38 x 10^3	1,20 x 10^3	1,37 x 10^3	1,50 x 10^3
3	6,95 x 10^3	7,98 x 10^3	9,10 x 10^3	1,75 x 10^3	2,26 x 10^2	4,95 x 10^3
Average	4,58 x 10^3	6,66 x 10^3	4,05 x 10^3	1,31 x 10^3	1,56 x 10^3	2,55 x 10^3

TPC and E. Coli of ice block

Cardozo *et al.* (2018), stated that E. coli is not a natural microbe in fish, it can be isolated from the intestine and its presence in contaminated water from the environment. According to Pelczar and Chan (1986), the bacteria most widely used as an indicator of sanitation is E. coli because these bacteria are commensal bacteria in the human intestine and are generally not disease-causing pathogens. The results of TPC and E. coli of ice block used in handling round scad are shown in Table 3.

Discussion

Organoleptic of round scad

Organoleptic values obtained values 7 - 8, this indicates that all samples of round scad mini purse

seiner short trip and long trip are still in accordance with the SNI 2729: 2013 standard, where the minimum organoleptic value is 7 (score 1 - 9). The organoleptic value in this study was better than the results of the study by Hastrini *et al.* (2013), that the organoleptic test results of round scad caught by mini purse seine boats 49 GT and 96 GT with ice cooling preservation, obtained values of $6.87 \leq \alpha \leq 7.04$ and $6.88 \leq \alpha \leq 7.07$, but from the results of these two studies the round scad is still fit for consumption.

The organoleptic value of round scad in the first hold (from 7.00 to $7.66 \leq \alpha \leq 7.95$) was lower than the organoleptic value of the last hold (from $7.06 \leq \alpha \leq 7.28$) up to $7.55 \leq \alpha \leq 8,07$), it means that the quality of round scad in the last hold is better than the quality of round scad in the first hold. The difference in organoleptic values is due to differences in the storage period for fish in the hold. The first hold is the catch of the first fishing operation, while the last hold is the catch of the last fishing operation. The first hold has a longer shelf life than the last hold.

The organoleptic value of round scad on short trip boats ($7.05 \leq \alpha \leq 7.23$ to $7.55 \leq \alpha \leq 8.07$) is higher than the organoleptic value for long trip boats (from 7,00 to $7.53 \leq \alpha \leq 8,03$), it means that the quality of round scad on a short trip boats is better than the quality of round scad on a long trip boats. This is because short trip boats have a shorter shelf life (5 days) than long trip boats (9 days).

According to Nielsen *et al.* (2005); Geen-Petersen and Hyldig (2010) stated that time and temperature are very important factors for organoleptic quality because loss of freshness is a major contributor to organoleptic quality. Andersen *et al.* (1995), Sveinsdottir *et al.* (2002) and Geen-Petterson *et al.* (2006), stated that the organoleptic value and texture decreased during storage in ice. Farmer *et al.* (2000) reported that not only species but also treatment and storage conditions greatly influence the characteristics of fish products.

Based on the data in Table 1, it shows that the fish placed at the bottom have the lowest organoleptic value of 7.00. And the highest value is found in the upper layer hold, namely $7.55 \leq \alpha \leq 8.07$. The low organoleptic quality of round scad at the bottom is due to the presence of pressure from the upper layers (fish and ice) above it during storage in the hold with the bulking system. This is linear with the results of research from Ekasari *et al.* (2017) and Rossarie *et al.* (2017). In fish storage, the height of the floating fish pile in the mini purse seine hold is around 1.5 - 1.9 meters, this is not in accordance with existing literature, which according to Murniyati and Sunarman (2000), Adawyah (2014) and Suprayitno (2017), the height of the fish and ice piles should not be more than 50 cm. If the fish are stored in large numbers, it is preferable to provide horizontal, easy-to-disassemble screens made of wood, to hold the second layer and so on and make it easier to assemble or unload. Pane (2008) adds that the damage to the quality of the fish on a one-day fishing trip is caused more by the accumulation of excessive fish in the barrels used since on board, not because they do not use ice. Irianto (2008) explained that the storage of fish in the hold should not be more than three layers of fish because it can cause physical damage to fish that are placed on the bottom layer due to the pressure of the ice and the fish placed on it. Kurhardiyanto (2010) physical stress and collision of fish must be avoided at the stages of fish handling activities on the boat, because it can cause physical damage to the fish's body such as bruised flesh, wounded body and broken stomach.

Table 3. Results of TPC and E. coli of ice block

Microbiological test	Unit	Result	Quality Standard Limit	Method of Analysis
TPC	CFU/g	(22^{0}C) 2,10 x 10^3 (37^{0}C) 1,15 x 10^3	(22^{0}C) 1,00 x 10^2 (37^{0}C) 2,0 x 10^1	ISO 6222: 1999
E. Coli	CFU/g	0 kol/100 ml	0	SNI ISO 9308-1: 2010

The results of the Kruskal Wallis statistical test, the effect of the trip on the organoleptic value, obtained P (0.01) < α (0.05), meaning that the difference in boats trips (operation time) had a significant effect on the organoleptic value of round scad. The results of the test for the effect of the hold on the organoleptic value, obtained the value of P (002) < α (0.05), meaning that the difference in the hold has a significant effect on the organoleptic value of round scad on short trips and long trips. The results of the coating effect test on the organoleptic value, obtained P (0.021) < α (0.05), meaning that the difference in the hold layer has a significant effect on the organoleptic value of round scad. This is linear with the results of research from Rossarie *et al.* (2017).

TPC of round scad

It was found that the TPC value of round scad on boats with short trips and long trips, ranged from 1.0

x 10^2 - 9.1 x 103 CFU/g. This value is still within the standard threshold of SNI 2729: 2013, which is the maximum TPC value of 5 x 10^5 CFU/g. This shows that the round scad is still safe for human consumption. The number of bacteria in round scad is still below the standard limit, because the cooling process of the catch in the hold is quite good. Wibowo et al. (2014) revealed that the use of a low temperature of 0 °C after the fish died can prolong the rigor mortis phase, reduce enzymatic, bacterial and chemical activity and minimize physical changes in fish.

The TPC value of round scad on the short trip boat ranged from 1.0 x 10^2 - 9.5 x 10^2 CFU/g, while the TPC value of the fish on the long trip was 9.9 x10^2 - 9.1 x 10^3 CFU/g. This shows that the TPC value of round scad caught on short trips is lower than the TPC for long trips. This means that the quality of the round scad on the short trip ship is better than the quality of the round scad on the last hold trip. Cosansu et al. (2011), stated that the activity of microorganisms can cause fish spoilage and is used to measure fish quality.

The TPC value of the round scad in the first hold (short trip and long trip) ranges from 3.0 x 10^2 - 9.1 x 10^3 CFU/g, while the TPC value for the last hold is 1.0 x 10^2 - 4.95 x 10^3 CFU/g. This shows that the TPC value of round scad in the first hold is higher than the TPC in the last hold. This means that the quality of round scad in the first hold is lower than the quality of round scad in the last hold. This is because the storage period for fish in the first hold is longer than the last one. Siburian *et al.* (2012) emphasized that fresh fish that has just been caught is given crushed ice so that the fish is in good condition when it is marketed to inhibit or stop the activity of destructive substances and microorganisms. Cold and freezing storage can also destroy spoilage microbes.

The highest TPC value is found in long-trip boats, the first hold is lower layer, which is 9.1 x 10^3 CFU/g, due to the pressure of fish and ice from the layer above which causes physical damage to the fish (scuffed or squashed), where injuries it is an entry point for microbes. In addition, the presence of melted ice and mucus from the layer above which contains many microbes can accelerate the process of decay. Murniyati and Sunarman (2000), stated that the liquid formed due to melting ice in one layer will drip or flow to the layer below it, because this liquid contains a lot of impurities and can accelerate the process of decay. The process of food spoilage can occur due to the growth of rotting microbes. According to Afrianto and Liviawaty (2010), the condition of the fish is greatly influenced by the number of rotting microbial populations, physical damage to the fish's body in the form of bruises, due to collisions and wounds with sharp objects, which are the entry points for rotting microbes to break down fish meat.

The sample of round scad on the long trip, the first bottom layer of the hold, had the highest TPC value (9.1 x 10^3 CFU/g) and the lowest organoleptic was obtained (the lowest interval was 7.00). While the lowest TPC value (1.00 x 10^2 CFU/g), the highest organoleptic value was obtained (confidence interval $7.55 \leq \mu \leq 8.07$). This shows that there is a correlation between the TPC value and the organoleptic value.

TPC data for round scad, the results show that the difference in trips has a significant effect on the TPC value of round scad (0.00 <0.05). The difference in the hold has a significant effect on the TPC value of round scad (0.004 <0.05). The difference in the layers did not have a significant effect on the TPC value of the round scad (0.450> 0.05), this indicated that the cooling temperature in the hold was quite good, there was no significant difference in temperature. Another factor that causes no significant difference in the number of TPC bacteria is the crew routinely discharges melted ice in the hold, which is done every 3 hours, besides that it is because the hold that is stored in fish is sufficient to meet the ideal hold requirements, for example the hold walls are already insulated, the hold has a drain (drainage), the hold is easy to clean, it is not made of corrosive material. In addition, the regular disposal of melted ice water is always carried out, there by reducing the length of time the fish is submerged in melted ice water, which increases the number of rotting microbes. According to Sahubawa (2016), the ideal hold requirements are to meet technical requirements and sanitation and hygiene requirements. Technical requirements include: insulated hold walls, not fixing metal tools through the hold walls, adequate hold lighting conditions. Sanitary and hygienic requirements include: the hold must be easy to clean before and after use, not made of corrosive material, the hold has a drain to remove melted ice, mucus and blood that has collected at the bottom of the hold.

TPC of ice block

The test results show that the TPC value for ice block exceeds the standard limits of SNI 4872: 2015, where the TPC test results at 22 ^{0}C are 2.10 x 10^3 CFU/g, the standard is 1.00 x 10^2 CFU/ml, while the TPC test results ice at 37 °C is 1.15 x 10^3 CFU/ml, the standard is 2.0 x 10^1 CFU/ml. One of the causes of the high TPC value for ice is the implementation

of low sanitation and hygiene in handling ice block. The condition when the research was carried out, the transport of ice from the ice maker to the TPI was using an open truck, where the parts of the back of the truck, both the base and the walls of the body, were made of wood which was not sanitized. The bottom of the truck body is not provided with a base and the tarp cover the truck body is not sanitary. According to Firlieyanti (2006), the poor microbiological quality of ice cubes is influenced by several factors, including the quality of water used as raw material, types of freezing and the application of sanitation and hygiene in handling ice cubes during the manufacturing, transportation and storage processes. The high number of bacteria on the surface of ice cubes can be caused by contamination during delivery and storage of block ice. Several sources of contamination on block ice on the delivery and storage lines. Transportation does not use mats or packaging, contact with the ground, unsanitary tools, use of raw water to wash ice cubes, use hands without gloves, wrapping that is not clean, and no packaging.

Things that need to be done to overcome the high value of TPC for ice block include: it is necessary to conduct continuous socialization and guidance by the Rembang Regional Government regarding the ice quality requirements for fish handling in accordance with SNI 4872: 2015, it is necessary to conduct socialization and guidance on how to produce ice according to SNI, it is necessary to improve sanitation and hygiene (personnel, equipment and environment) starting from the production process, storage, transportation.

E. coli of ice block

The E. coli ice block test results obtained a value of 0 CFU/100 ml, where this value is still within the SNI 4872: 2015 standard limit, which is 0 CFU/100 ml, but because the results of the ALT test for ice block exceed the standard, the block ice is not suitable for the handling process of round scad. According to Djaafar and Rahayu (2007), the presence of E. coli in ice block indicates that the ice block are made using unclean water. Meat that contains E. coli in an amount that exceeds the stipulated standard will become slimy, foul smelling, and will have decreased shelf life. The results of research by Saraswati (2010) showed that E. coli bacteria did not die in the freezing process so that they could become active again when the ice was melted.

Conclusion

The laboratory test results obtained the sensory assessment of round scad. The value of the TPC round scad and the E. coli ice blocks are still within the limits of the Indonesian National Standards (SNI), but the TPC scale of the ice block exceeds the standard limit of SNI. The Kruskal Wallis statistics results showed that the difference in fish hold, the difference in the trip, and differences in fish hold layers had a significant effect on the sensory of scad. ANOVA test showed that differences in the fish hold and trip differences had a significant impact on the TPC of scad. In contrast, the difference in fish hold layers gave a non-significant effect on the TPC of round scad. In general, the quality of mini purse seine flying fish in Rembang district is still in accordance with Indonesian National standards (SNI)

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