Physics, Chemical, And Food Safety Quality Analysis Of Shortfin Scad (*Decapterus macrosoma*) on The Distribution Chain From Fish Landing Base (FLB) Lonrae to Consumer Area

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Abstract- Shortfin scad (*Decapterus macrosoma*) is a pelagic fishery resource and has a high level of production. Fish is very easy to lose quality, so if fish are not handled properly during the distribution chain, the quality of fish is poor when it reaches consumers. This study aims to determine changes in the physical, chemical quality and food safety of Shortfin scad in each distribution chain. The research was conducted from November 2021 to February 2022. The method used in this study was observation using purposive sampling technique. The test results show the initial value of distribution in FLB Lonrae, namely pH; 6,6, TVB ; 9.3 mg-N/100g, peroxide value ; 5.06 mEq/kg, and negative formalin. The final value of distribution after arriving at the consumer area is pH ; 5,7, TVB ; 27,5 mg-N/100g, peroxide value ; 6.04 mEq/kg, and negative formalin. Overall, the quality of the shortfin scad after landing until it reaches the consumer area experiences a change in quality decline in each distribution chain. However, the shortfin scad that arrives at the end consumer area does not exceed the quality standard of fish that is not safe for consumption so that the shortfin scad is still fresh and fit for consumption.

Keywords- shortfin scad, quality, distribution chain, consumer area

I. INTRODUCTION

Shortfin scad (*Decapterus macrosoma*) is one of the pelagic fishery resources, has important economic value and is much favored by the community. This fish is a type of small pelagic fish that is available throughout the year without being influenced by the season and its high production (Mahdaniar, 2017). Based on data on the number of catches produced at FLB Lonrae in 2018, Shortfin scad is one of the most abundant and dominant types of fish landed at FLB Lonrae with the highest productionof 1,978,395 Kg (84.5%) of the total fish production of 2,342,450 Kg.

The quality of fish that has just died is at the maximum level or cannot be improved, it can only be maintained through the principles of good and correct fish handling. Fish is a commodoti that is very easy to decline in quality. So that fish that go through a long distribution chain process to reach consumers have fish quality that will decrease drastically over time if it is not handled immediately starting from post-catch handling, Paotere fish auction, until it arrives to the final consumers.

The role of distribution is very influential on the price and quality of a product to consumers. Based on Setijadi's research (2016) that fish damage is caused by several activities ranging from fish landing to being distributed to consumers resulting in losses or wasted by 35%. Where, the distribution chain process has a significant contribution to the loss of 10%. Poor quality of fish can cause disturbances to human health. Poor fish quality occurs due to physical, chemical and biological contamination (Evangelista et al. 2016). The distribution of shortfin scad landed at FLB Lonrae is also unknown so far, the quality and safety of the food when it arrives at the consumer area after the distribution process is carried out.

II. MATERIALS AND METHODS

A. *Time and Location of Research*

This research was carried out from November 2021 to February 2022. Sampling was carried out at three different locations, namely FLB Lonrae, Paotere fish auction (consumer area I), and retailer (consumer area II). Parameters of food quality and safety were analyzed at the Laboratory of the Fishery Product Quality Application Center in Makassar, South Sulawesi and the Chemical Laboratory of the Faculty of Animal Husbandry, Hasanuddin University.

B. Techique of Collecting Data

The method used in this research is observation. The object of this research is to determine the influence of distribution chain on the quality of Shortfin scad. The data taken in this research is primary data. Primary data is the observation of fish quality physically (organoleptic and temperature), chemical (pH, Total Volatile Base/TVB, peroxide value) and formalin during the distribution process to consumer areas.

Technique of collecting data in this research is purposive sampling. Purposive sampling is the determination of the sample based on the belief that the sample can represent the total sample from the existing sample (Ferdinand et al., 2012). The purposive sampling technique was used in this research with the criteria of fish, namely fish that are in the same group and taken at the beginning, middle and end of unloading.

C. Analysis Method

The data analysis used in this research is qualitative. The values obtained from the results of chemical, physical, and formalldehyde assessments were tabulated using Microsoft excel. The distribution chain assessment of fish quality is the average chemical, physical, and formalin value of fish in FLB Lonrae, Paotere fish auction (consumer area I), and consumer area 2 (retailer). The results of these observations were analyzed using descriptive analysis presented in the form of graphs.

III. RESULTS AND DISCUSIONS

A. Rated Temperature

Temperature is the main factor causing a decrease in the quality of fish so it must be considered in maintaining the freshness of the fish by considering the time and place of storage. Fahrul and Metusalach (2014) stated that in general each type of fish has a speed of quality decline which is influenced by various factors, both internal and external. Therefore, to maintain the quality of fish, it is necessary to handle low temperatures with ice. Based on the results of the study, it was found that the average temperature of Shortfin scad at three observation locations, starting when the fish arrived at FLB Lonrae until after distribution in consumer areas, namely Paotere fish auction (consumer area I) and retailer (consumer area II) is presented in Figure 1.

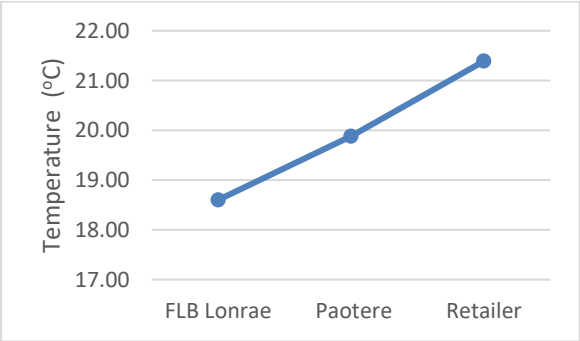

Figure 1. Graph of the temperature value of shortfin scad (*Decapterus macrosoma*) in the distribution process

Based on Figure 1 shows that the average temperature value of shortfin scad has increased by 1-2°C at each distribution location. The increase in temperature that occurs in shortfin scad is still relatively slow because based on Gang's research (2013) the temperature change in fish fillets increases by an average of 3 °C/hour.

The increase in temperature occurs due to low temperature handling techniques that are not yet ideal. The handling of low temperatures is given when the fish are about to be distributed from FLB Lonrae to Paotere fish auction (consumer area I) using bulk ice with a ratio of 1 (ice): 3 (fish). Based on the results of the interview, this was done so that one Styrofoam can contain many fish. Meanwhile, based on Mile's research (2013) that the low temperature storage of shortfin scad (*Decapterus macrosoma*) requires a ratio of 1 (fish): 2 (ice) to maintain the quality of the fish so that the temperature of the fish does not increase during sales. In addition, the shortfin scad that is distributed is directly contaminated with air and exposure to sunlight. This results in an increase in temperature at each distribution location.

B. Organoleptic Value

Organoleptic test is a very important component in analyzing fish quality and production quality (Mahdaniar, 2017). The organoleptic value of fish cannot be increased again if it has decreased because the organoleptic value can only be maintained with good handling (Sari, 2017). Based on the results of the study, the average organoleptic value of Shortfin scad was obtained at the three observation locations, starting when the fish arrived at FLB Lonrae until after distribution in the consumer area, namely Paotere fish auction (consumer area I) and retailer (consumer area II).

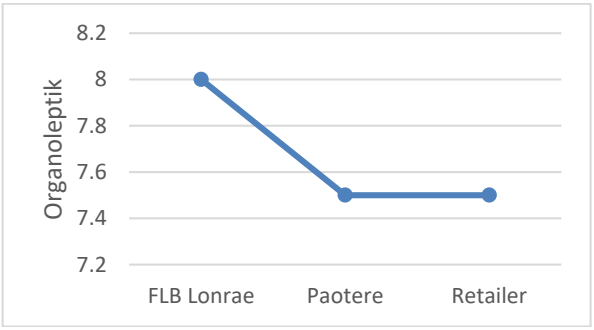

Figure 2. Graph of organoleptic value of shortfin scad (*Decapterus macrosoma*) in the distribution process

Based on Figure 2, the results of the assessment of organoleptic test observations based on 5 parameters during the distribution process to consumer areas, it can be seen that the graph of shortfin scad decreased at the beginning of distribution at FLBLonrae until it reached Paotere fish auction (consumer area I) and the organoleptic value of Paotere fish auction is constant or does not change until it reaches retailer (consumer area II). This decrease is thought to have occurred due to several factors, namely handling methods, transportation facilities, sanitation and hygiene. This is supported by Irianto and Giyatmi (2009) that the decline in fish quality is influenced by

distribution distance and time, handling methods, sanitation and hygiene of the facilities used in handling fish.

The first factor is the way of handling, based on observations in the field, the stakeholders carry out less than optimal handling. The handling of low temperatures is not carried out in proportion to the amount of fish being refrigerated, resulting in an increase in temperature. Cooling is given to the shortfin scad with a ratio of 1(es): 3 (fish) so that not all surfaces of the fish's body are covered with ice, so the cooling process on the fish is uneven. How to cool fish with ice in a good container is that all surfaces of the fish's body are covered with ice (Junianto, 2003). Temperature is the main factor in maintaining the organoleptic quality of shortfin scad according to the statement of Zhang et al. (2011) that the low quality of organoeptic is strongly influenced by the increasing temperature. The second factor is the means of transportation, the means of transportation used for the distribution of fish still use open pick-ups, so that exposure to sunlight quickly makes the temperature of the fish increase. According to Government Regulation No. 57 of 2015 concerning the Quality Assurance System and Safety of Fishery Products, the transportation used should use a refeer truck (refrigerated truck) during distribution. The choice of the type of transportation that is not considered will pose two risks when transporting the catch, namely it can reduce the price of goods and reduce the quality of goods (Prasetyo et al. 2018). The third factor is sanitation and hygiene, handling of fish at the time of unloading the catch to the time of distribution using dirty equipment so that there is still leftover excrement such as fish baskets and boxes, the floor around the Paotere also looks dirty. this can result in fish can be contaminated.

Organoleptic decline that is not much different can be influenced by the factors described previously. Although the organoleptic value of shortfin scad has decreased, the quality of shortfin scad that has reached the consumer area is still fresh and safe for consumption because it has an organoleptic value range of 7.5 – 8. Based on SNI 2729-2013 , fish that have an organoleptic value of 7-9 are included in fresh category.

C. Value of Degree of Acidity (pH)

Changes in pH in fish affect the autolysis process and bacterial attack, causing spoilage in fish (Alinti et al., 2018). Based on the results of the study, the average pH value of Shortfin scad was obtained at the three observation locations, starting when the fish arrived at FLB Lonrae until after distribution in consumer areas, namely Paotere fish auction (consumer area I) and Retailer (consumer area II). 3.

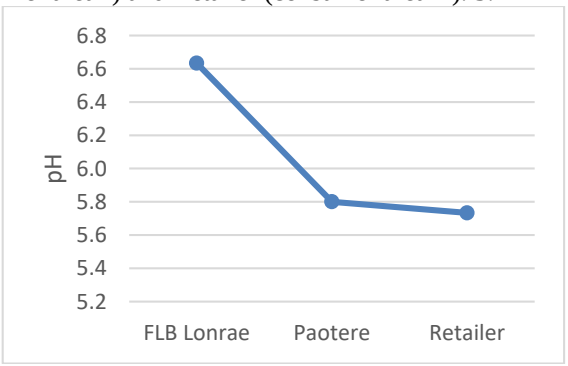

Figure 3. Graph of the pH value of shortfin scad (*Decapterus macrosoma*) in the distribution process

Based on Figure 3 shows that the average pH value of shortfin scad decreased along with the distribution process from FLB Lonrae to consumer areas I and II. The initial pH of Shortfin scad at FLB Lonrae was 6.6, decreased to 5.8 at Paotere fish auction (consumer area I) and further decreased to 5.7 when at retailer (consumer area II).

The decrease in the pH of shortfin scad is thought to be caused by the process of glycogen into lactic acid. The same thing is also explained by Fatriani (2016) that the decrease in the pH value of meat occurs due to the breakdown of glucose through the glycolysis process which will produce lactic acid which can cause a decrease in the pH of fish meat. Meanwhile, based on Nazir & Magar (1963) in Varghese & Mathew (2017) that the low pH value is thought to be due to the mechanism of accumulation of free hydrogen ions by the destruction of adenosine nucleotides and their metabolites in fish muscle accompanied by accumulation of lactate.

In general, the pH of the shortfin scad distributed from FLB Lonrae to consumer areas I and II is in the acidic pH range, so the fish is still fresh and safe for consumption. One of the indicators of fish freshness is pH and the standard pH value for fresh fish is neutral 7 and a decrease in fish pH until it reaches a value of 5.5 (Fahrul, 2019). As long as the pH value does not increase beyond neutral pH, the fish is still considered edible because it has not entered the decay phase, namely pH > 7 (Alamsyah, 2014).

D. Total Volatile Base (TVB) Value

Determination of Total Volatile Base (TVB) aims to determine the amount of volatile base compounds formed due to protein degradation. Fish freshness according to Liviawaty and Afrianto (2010) stated that the limit of the TVB value of fresh fish ranged from 30-35 mg TVB-N/100mg. In addition, the statement of Hardianto, et al. (2013) regarding the maximum limit of TVB value is an indicator of fish quality with a value of 30 mg N/100 g.

The results of the Shortfin scad TVB test at three observation locations, starting when the fish arrived at FLB Lonrae until after distribution in consumer areas, namely Paotere fish auction (consumer area I) and Retailer (consumer area II) are presented in Figure 4.

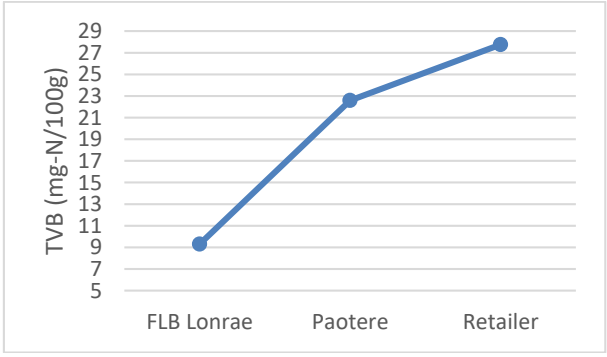

Figure 4. . Graph of the TVB value of shortfin scad (*Decapterus macrosoma*) in the distribution process

Based on the results of the research, it shows that the average value of the TVB value of shortfin scad increased along with the distribution process from FLB Lonrae to consumer areas I and II..The initial TVB value of shortfin scad at FLB Lonrae was 9.3 mg-N/100g, increased to 22.59 mg-N/100g at Paotere fish auction (consumer area I) and increased again to 27.75 mg-N /100g when in Retailer(consumer area II). Overall, the TVB value obtained shows that the fly fish is still fresh and has not exceeded the maximum limit for fish that is not fit for consumption, as stated by Liviawaty and Afrianto (2010) that the limit for consumer acceptance of fresh fish TVB is around 30-35 mg TVB-N/100g. The TVB value for the freshness of fish and fish products grouped into 4 (four) categories is very good, with 25.00 mg/100g or less; good, contains 30.00 mg/100g; salable, at 35.00 mg/100g; spoilage, TVB-N content above 35.00 mg/100g (Kietzman et al., 1969; Alparslan et al., 2014).

E. Peroxide Number Value

Peroxide number is one of the chemical parameters which is characterized by a change in the rancid odor of fish. According to Fahrul and Metusalach (2014) the peroxide value is characterized by an increase in primary oxidation that occurs in fats. The higher the peroxide value, the higher the level of fat breakdown.

The results of testing the peroxide value of Shortfin scad at three observation locations, starting when the fish arrived at FLBLonrae until after distribution in consumer areas, namely Paotere fish auction (consumer area I) and Retailer (consumer area II) are presented in Figure 5.

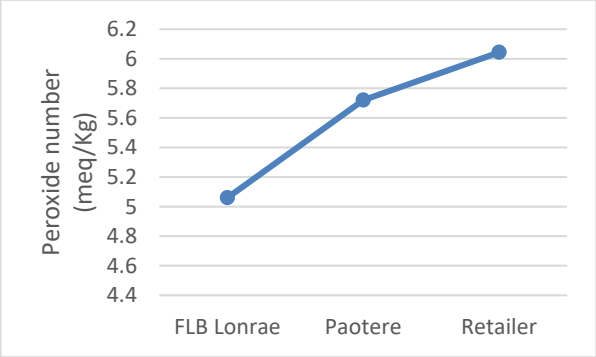

Figure 5. Graph of the peroxide value of shortfin scad (*Decapterus macrosoma*) in the distribution process

Based on Figure 5, it shows that the average value of the peroxide value of shortfin scad increased along with the distribution process from FLB Lonrae to consumer areas I and II. The initial peroxide value of shortfin scad at FLB Lonrae was 5.06 mEq/kg, increased to 5.72 mEq/kg at Paotere fish auction (consumer area I), and increased to 6.04 mEq/kg when in Pagandeng /Retailer (consumer area II). The increase in the value of the peroxide value means that there is a process of decreasing the quality of the shortfin scad distributed from FLB Lonrae caused by the fat oxidation process. The content of peroxide value in consumer regions II (Retailers) is very high because the fat in Shortfin scad has undergone a lot of oxidation processes compared to Shortfin scad at the beginning of the distribution of FLB Lonrae and consumer areas I (Paotere fish auction). This is also because the fat content in pelagic fish is much higher than other types of fish. Pelagic fish such as shortfin scad, tuna, tuna, skipjack, mackerel and mackerel have a higher fat content (2-4 times) compared to demersal fish (red fish, snapper and grouper) (Metusalach, et al., 2014) .

According to Eyo (2001) the peroxide value of fresh fish is usually between 20 – 40 mEq oxygen/kg sample. According to Pearsons (1976) the standard for peroxide value in food is 20-40 mEq/kg. So that the peroxide value content of shortfin scad distributed from FLB Lonrae to consumer areas I and II shows that the fish is still fresh and suitable for consumption with values ranging from 5.06 mEq/Kg – 6.04 mEq/Kg. The peroxide content of shortfin scad distributed from FLB Lonrae was not significantly different from one point of location to the location of the distribution chain. This confirms that the fat oxidation that occurs is small in the shortfin scad until it reaches the consumer area. It is suspected that this occurred because the handling given from the beginning of the distribution used low temperature handling by giving a pile of ice to the fish. Based on Fahrul's research (2019) that early spoilage in fresh fish can be minimized by controlling cold temperatures using ice with a long storage time of fish on ice under eight hours. This research is in line with Kasim's research (2014) that the peroxide value of Shortfin scad is in the range of 12.87 mEq/kg – 16.47 mEq/kg, so that there is no significant effect of peroxide content on Shortfin scad which is marketed in retail around the length of time of sale. and marketed fish are still in fresh condition.

F. Formalin Value

Formalin is a formaldehyde compound found in water with an average concentration of 37%, methanol 15%, and the rest is water and has a pungent smell. Formaldehyde has the ability to preserve food because the aldehyde group in formalin is very reactive when it meets protein to form methylene compounds (-NCHOH). When protein foods are watered or soaked in a formalin solution, the aldehyde and formaldehyde groups will bind to the protein. The bound protein is difficult to be degraded by spoilage bacteria, so that the food added with formalin will last longer (Santhi, 2017). Foodstuffs commonly found with formalin added are fish. Not a few found the content of formalin in fish as in the study of Mardiyah and Jamil (2020) the identification results were 8 out of 10 types of fish that were positive for formalin.

The results of the shotfin scad formalin testing at three observation locations, starting when the fish arrived at FLB Lonrae until after distribution in consumer area. Based on the research that has been carried out, no formalin content was found in the shortfin scad during the distribution process from FLBLonrae to consumer areas I (Paotere fish auction) and consumer areas II (Retailers). This is because the shortfin scad that has arrived at FLB Lonrae is directly distributed to consumer areas and directly marketed without requiring a long time to be stored, so that traders do not need formalin to preserve fish. This study has the same results in the study of Marantika, et al. (2017) that there is no formalin content in fresh Shortfin scad in traditional markets (Banyuasri Market and Anyar market) for the period June-July 2017.

IV. CONCLUSION

Overall the results obtained are the influence of the

distribution chain on the quality of Shortfin scad during distribution from FLB Lonrae to consumer areas. The quality of the shortfin scad immediately after landing until it reaches the consumer area has changed, both from chemical indicators. In each distribution chain of shortfin scad shows a decline in quality. However, the shortfin scad that arrives at the end consumer area does not exceed the quality standard of fish that is not safe for consumption so that the Shortfin scad is still fresh and fit for consumption.

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