Quest Journals
Journal of Research in Agriculture and Animal Science
Volume 9 ~ Issue 9 (2022) pp: 01-05
ISSN(Online) : 2321-9459
www.questjournals.org

Research Paper

Evaluation of the Quality of Fresh Tiger PrawnsWith Different Handling Methods during Low Temperature Storage

Pandit, I G S[1], Permatananda, P.A.N.K[2]
[1]*Faculty of Agriculture, Warmadewa University*
[2]*Faculty of Medicine and Health Sciences, Warmadewa University*

Abstract
Shrimp is a very popular fishery product, has a high protein content and has a delicious taste. Shrimp is a product that is very easy to experience physical, chemical and microbiological degradation. How to handle tiger prawns can be done in a whole way, how to remove the headless, and how to remove the head and skinless. To obtain a low temperature, crushed ice was added in a ratio of 1:3. The aim of the study was to evaluate the quality of fresh tiger prawns with different handling methods during low temperature storage. This study is an experimental study to evaluate the quality of day 1, 3 and 5.
The results showed that there was a significant difference in the way of handling fresh whole tiger prawns, removing the headless and removing the head and skinless on histamine levels, moisture content, bacterial count, appearance, texture, odor and non-significant on protein content, fat content and ash content during storage. at low temperatures (5-15^{o}C). There was an increase in histamine levels of fresh tiger prawns on the 1st to 5th days due to the number of bacteria due to different handling methods and the temperature of 5-15^{o}C which still allows bacteria to metabolize to grow and reproduce. This was supported by a decrease in water content, and an increase in the number of bacterial colonies. These changes cause a decrease in the organoleptic score of appearance, texture and smell. The evaluation on day 5 of how to handle fresh headless tiger prawns and how to handle tiger prawns without heads and skinless were still acceptable to the panelists, while the whole handling method on day 5 has been rejected by the panelists.
Keywords: Quality, how to handle fresh shrimp, storage

R**eceived 18 August, 2022; **R**evised 31 August, 2022; **A**ccepted 02 September, 2022 © The author(s) 2022. **P**ublished with open access at **www.questjournals.org

I. INTRODUCTION

Shrimp is a food ingredient that has high value and is popular, both domestically and abroad. The assessment is based on the commercial value and nutritional value. There are many requests for products in the form of fresh shrimp both in Indonesia and abroad, therefore how to handle it must be considered so that the shrimp are not damaged or rotten when marketed or during transportation at the processing site and at the consumer. Tiger prawns are the prima donna of non-oil and gas commodities from the fisheries sector, as well as marine products that are favored and consumed by the public, even though there are some consumers who are sensitive (allergic) to this commodity. Allergies and sensitivity due to consuming shrimp are caused by the body's intolerance to histamine content and high histamine content causes poisoning. Histamine poisoning can be characterized by red spots on the skin and itching. Shrimp is very popular in the market because of its distinctive taste, therefore the marketing of shrimp in fresh form is highly favored by consumers. One way to maintain the quality and freshness of the shrimp to be marketed is by proper handling followed by refrigeration.

Low temperature preservation is one way that can be done to inhibit microbial activity, prevent chemical reactions and enzyme activity that can damage the nutritional content of food, namely fresh shrimp [1]. Shrimp has a high nutritional content, especially protein content. In order to maintain good quality, there has been quality standardization covering shrimp raw materials, handling methods, cooling and sanitation methods, both implemented in factories and in marketing and distribution. Therefore, in the shrimp trade, it is known how to handle shrimp in whole form, headless shrimp, namely headless shrimp, and headless and skinless shrimp. Therefore, the way of handling must be considered so that the shrimp are not damaged or rotten.

The sources of bacteria in shrimp are found on the skin, head and entrails. The results of the study [2], the chemical content in tiger prawns shell is 4.16% protein, 60.00% minerals, 1.10% dye, and 35.90% chitin. This area is a source of bacteria. Shrimp that have been contaminated with bacteria will cause the bacteria to survive for a long period of time in cold or frozen conditions. The most common treatment for shrimp is cooling by adding ice cubes immediately after harvesting. However, the handling is not enough to reduce the numberof bacteria content. According to [3], stated that the damage to fishery products including shrimp is mostly caused by the growing number of microbial growth, especially spoilage bacteria. The purpose of the study was to evaluate the quality of tiger prawns with different handling methods during low temperature storage.

II. METHODOLOGY

This study uses a comparative experimental method with onefactor, namely; How to handle fresh tiger prawns, which are divided into 3 levels, how to handle tiger prawns. The material used for this study was fresh tiger prawns obtained from tiger prawns traders at the Fish Market, Kedonganan Village, Badung Bali. Tiger prawns has a length of ± 12 cm, and a weight of ± 10 grams. It is confirmed that tiger prawns are shrimp that have just arrived at the shrimp traders, whole, without defects, and still fresh. Low temperature storage with the addition of ice cubes during storage. Quality evaluation of each treatment was carried out on the 1st, 3rd and 5th days including; chemical quality such as histamine content, protein content, fat content, moisture content and ash content, microbiological quality, namely total bacteria and organoleptic quality such as appearance, odor and texture.

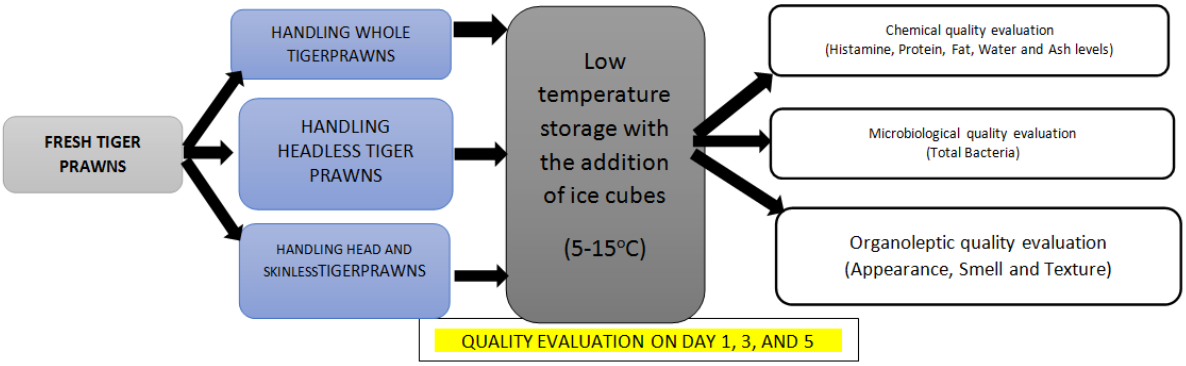

Figure 1. Research Flow

The research data were analyzed using statistical analysis, if there were differences, then continued with the BNT test. The difference is declared significant if the P value <0.05

III. RESULTS AND DISCUSSION

Evaluation of the weight of 1 fresh tiger prawns ± 30grams with a total length of 14 cm, an evaluation of fresh tiger prawns treated with different handling methods obtained results from the handling of whole tiger prawns weighing 1 kg, treated with headless handling the weight became 70 grams (30%), then the method of handling with headless and skinless the weight was obtained to be 55 grams (45%). Based on the above treatment, each treatment was stored at low temperatures with the addition of crushed ice so that the temperature reached 5–15^{o}C. Evaluation was carried out on the first day of treatment (A1B1, A2B1, A3B1) including; chemical tests in the form of water content, protein content, fat content, ash content, and histamine levels. Microbiological tests such as total microbial and organoleptic tests which include appearance, odor and texture based on the score sheet. Evaluation was continued with low temperature storage on the third day of treatment (A1B2, A2B2, A3B2). Evaluation of low temperature storage was continued on the fifth day of treatment (A1B3, A2B3, A3B3), then the following results were obtained;

Table 1. The average evaluation of the quality of fresh tiger prawns and different handling methods (A) and the duration of low temperature storage (B).

Treatment	Water content (%)	Protein (%)	Fat (%)	Ash (%)	histamine (mgN/100g)	Bacterial count (koloni/g)	Appearance	Smell	texture
A1B1	79.30 ^{a}	15,67 ^{a}	1,24 ^{a}	2,54 ^{a}	2.95 ^{c}	1.0x10^{3} ^{d}	9.0 ^{a}	9.0 ^{a}	9.0 ^{a}
A1B2	79.14 ^{a}	15,13 ^{a}	1,20 ^{a}	2,36 ^{a}	3.00 ^{c}	1.2x10^{4} ^{b}	8.0 ^{b}	7.0 ^{c}	8.0 ^{b}
A1B3	76.34 ^{d}	15,02 ^{a}	1,09 ^{a}	2,33 ^{a}	6.56 ^{a}	1.7x10^{5} ^{a}	5.0 ^{d}	5.0 ^{d}	5.0 ^{d}
A2B1	78.06 ^{b}	14,62 ^{a}	1,19 ^{a}	1,69 ^{a}	0.63 ^{ef}	6.7x10^{2} ^{e}	9.0 ^{a}	9.0 ^{a}	9.0 ^{a}
A2B2	77.19 ^{c}	14,62 ^{a}	1,10 ^{a}	1,30 ^{a}	1.92 ^{d}	4.5x10^{2} ^{f}	8.0 ^{b}	9.0 ^{a}	8.0 ^{b}

A2B3	75.52 [e]	14,47 [a]	1,00 [a]	1,15 [a]	4.64 [b]	$2.6x10^{3}$ [c]	7.0 [c]	8.0 [b]	7.0 [c]
A3B1	77.32 [c]	12,14 [a]	0,97 [a]	0,94 [a]	0.23 [f]	$1.2x10^{1}$ [i]	9.0 [a]	9.0 [a]	9.0 [a]
A3B2	75.12 [e]	12,00 [a]	0,90 [a]	0,88 [a]	1.20 [e]	$2.3x10^{1}$ [h]	8.0 [b]	8.0 [b]	9.0 [a]
A3B3	73.92 [f]	11,81 [a]	0,85 [a]	0,88 [a]	2.61 [cd]	$1.5x10^{2}$ [g]	7.0 [c]	8.0 [b]	8.0 [b]

Notations with different letters represent significant differences

Based on the data above, it is clear that the evaluation of the quality of fresh tigerprawnstreated with different handling methods and low temperature storage has a significant effect on water content, histamine levels, bacterial count, appearance, odor and texture, this is due to the development of the number of bacteria in the water. each treatment is different caused by different handling methods, namely the whole handling method, removing the head and removing the head and skinless which is a source of microbes that cause the decay process during storage at a temperature of 5-15^{o}C which is a temperature that still allows bacteria to grow and develop. While the effect on protein content, fat content and ash content, there was a decrease in protein content, fat content and ash content and statistically not significant. This is because the microbes have not been able to perform metabolism optimally at a temperature of 5-15^{o}C. Based on the temperature range of activity, bacteria are divided into 3 groups, namely psychrophilic bacteria live at a temperature of 0-30°C with an optimum temperature of 15°C, mesophilic bacteria live at a temperature of 15-55°C with an optimum temperature of 25-40°C, and thermophilic bacteria. live at high temperatures between 40-75°C with an optimum temperature of 50-65°C. If the temperature is not in accordance with the needs of the bacteria, it can cause cell damage [4].

At the initial stage of the evaluation on the first day, the water content of tiger prawnswith intact handling was 79.30%, the head was removed, the water content was 79.14% and the head and skinless were removed 76.34%. The evaluation on the third day experienced a decrease in water content, and the evaluation on the fifth day the water content became 77.32%, 75.12% and 73.92%. This is due to the effect of different treatment methods for handling tiger prawns, then after storage at low temperatures there is a decrease in the water content of tiger prawnsdue to dehydration, this is in accordance with the results of the study [5]. The protein content of fresh tiger prawnsby whole handling, cutting of heads and cutting of heads and skins (Table 1) above, there are differences, in the form of a decrease in protein levels to the treatment method of handling and during low temperature storage, but statistical analysis showed non-significant. Statistical analysis showed that after storage at low temperatures (5–15^{o}C) the evaluation of the first day to the evaluation of the fifth day there was no significant difference in the decrease in protein content. At the initial stage of the evaluation on the first day, the protein content of tiger prawnswith intact handling was 15.67%, the head was removed the protein content was 15.13% and the head and skinless were removed 15.02%. The third day evaluation decreased protein content, and on the fifth day evaluation the protein content became 12.14%, 12.00% and 11.81%.

This is due to the effect of different treatment methods for handling tiger prawns, then after storage there is a decrease in the protein content of tiger prawnswhich is not significantly different due to the protein content of tiger prawnslocated mostly in the meat, while in the head and skinless the protein content is not so large. Based on the results of research [6], the meat of tiger prawnshas a protein content of 18.35%. The decrease in protein levels of fresh tigerprawns during storage is due to the growth of microbes which causes the reshuffling of macromolecules into micromolecules such as proteins, fats and minerals which are lysed into amino acids, fatty acids and minerals out with melted ice. This is supported by the results of research that the liquid waste from the fish processing process contains 0.32% protein, 10.95% fat, 83.44% water, 0.18% crude fiber, Ca 2 ppm, P 0.02 ppm and salt. others by 12.08% [7].

Histamine levels of tiger prawnswith whole handling methods have 0.23 mgN%, the fat content of the heads is 1.20 mgN% and the heads and skins are removed 2.61 mgN%. This shows the histamine levels of tigerprawns are still very fresh. On the third day of evaluation, there was a slight increase in histamine levels, and on the fifth day, histamine levels increased to 2.95 mgN%, 3.00 mgN% and 6.56 mgN%. This is because the effect of different treatment methods for handling tiger prawnscauses the amount of histamine levels to also differ, then after storage there is an increase in histamine levels of tigerprawns which are significantly different due to histamine levels caused by the breakdown of histidine amino acids by bacteria into histamine. Histamine is one of the biogenic amine compounds which is considered the main cause of food poisoning from fish, especially from the scombroid group. Furthermore, it is said that the results of the study showed that there were 15 types of histamine-forming bacteria in the meat and 11 types in the stomach contents. During the fermentation process, when histamine was produced intensively, the bacteria in peda fish was dominated by *Enterobacter* spp. and *Staphylococcus* spp. *Enterobacter* spp. already in the raw materials, both in the meat and in the stomach contents, while *Staphylococcus* spp. are bacteria that contaminate during the processing [8].

The number of bacterial colonies of tiger prawnswith intact handling methods has a number of colonies of $1.2x10^{1}$ colonies/g, the number of tiger prawnsremoved is $2.3x10^{1}$ colonies/g and the heads and skins are removed to $1.5x10^{2}$ colonies/g. This shows the number of tiger prawnsbacteria is still very fresh. According to SNI, fresh tiger prawnshave a bacterial count of $5.0x10^{5}$ colonies/g. The third day evaluation experienced a slight increase in the number of bacteria, and the fifth day evaluation the number of bacteria increased to

$1.0x10^3$ colonies/g, $1.2x10^4$ colonies/g and $1.7x10^5$ colonies/g. This was due to the effect of different treatment methods for handling tiger prawnscausing the number of bacterial colonies to also differ, then after storage there was an increase in the number of tiger prawns bacteria which was significantly different because bacterial colonies were still able to grow and reproduce at a temperature of $5\text{-}15^0$C. The results of the study [9] showed that temperature and storage time affected the growth of bacteria and fungi in milkfish. Freezing temperatures (-60°C) and cold temperatures (10°C) for 24 hours storage of bacteria were still able to grow and develop and the optimum growth temperature for bacteria occurred at room temperature (30°C) storage. Histamine levels after storage increased to 59.73 mgN% for belly meat, 131.10 mgN% back meat, and 96.04 mgN% tail meat [10].

The evaluation of the first day of the appearance of fresh tiger prawnswith different handling methods, there was no difference, namely having an appearance score of 9.0. This shows that the appearance of tiger prawnsis still very fresh, namely intact, clear and between segments is still solid according to the SNI score sheet for fresh tiger prawns. Evaluation on the third day of appearance decreased slightly to a score of 8.0, and the evaluation of the fifth day also saw a very sharp decrease to a score of 5.0. Different things on the fifth day of appearance in the treatment of cutting the head and the treatment of cutting the head and skinless to a score of 7. This is due to the effect of the treatment. Different ways of handling tiger prawnscause the number of bacterial colonies to also differ and an increase in the number of colonies. The growth of bacterial colonies causes the reshuffling of complex compounds into simple compounds, namely proteins into amino acids and other compounds [11]. This overhaul was followed by a decrease in the score of clear appearances to fade. The smell of tiger prawnswith intact handling on the first day evaluation has a different odor score, with an odor score of 9.0, which is a very fresh odor specific to the species. The tigerprawns that had their heads removed got a score of 9.0 and the smelly heads and skins were removed, the score was 9.0. This shows that the smell of tiger prawnsfor all treatments was still very fresh, in accordance with the SNI score sheet for fresh tiger prawns. The evaluation on the third day of the smell decreased slightly to a score of 7.0, and the evaluation on the fifth day also saw a very sharp decrease to a score of 5.0 The difference in the smell of evaluation on the fifth day on the treatment of cutting the head and the treatment of cutting the head and skin became a score of 8. This was due to the effect of different treatment methods for tiger prawns causing the number of bacterial colonies centered on the head and entrails of whole tiger prawns. The growth of bacterial colonies causes the reshuffling of complex compounds into simple compounds, namely proteins into amino acids, fats into fatty acids as well as other compounds. This reshuffle was followed by a decrease in the odor score from a specific fresh smell to a foul smell of ammonia. The texture of tiger prawns, the way of handling intact, on the first day of evaluation, had a texture score of 9.0. Tiger prawnsthat were removed from the head texture became a score of 9.0 and removed the head and skin, the texture score became 9.0. This shows that the texture of tiger prawnsfor all treatments still has a very fresh tiger prawnstexture, according to with the SNI score sheet for fresh tiger prawns. On the third day of evaluation, the texture decreased slightly to a score of 8.0, and on the fifth day of evaluation there was also a very sharp decline to a score of 5.0. The difference in the texture of the evaluation on the fifth day was the treatment of cutting the head with a score of 7.0 and the treatment of cutting the head and skinless to a score of 8.0. This is because The effect of different treatment methods for tiger prawnscauses the number of bacterial colonies centered on the head and entrails of whole tigerprawns. The growth of bacterial colonies with a temperature that is still possible for bacteria to grow and develop causes a reshuffle of complex compounds into simple compounds, namely proteins into amino acids, fats into fatty acids and other compounds. The same thing was also conveyed [12], stating that there was a reshuffling of complex organic compounds such as macromolecules of carbohydrates, proteins and fats into simpler forms by the reshuffling of proteins into amino acids and other amine compounds, which caused the tiger prawnsto become soft in texture. This reshuffle was followed by a decrease in the texture score, from an elastic and dense texture to an inelastic and non-compact texture (Figure 1).

Figure 1. The texture of the tiger prawnssegments becomes flexible and mushy

IV. Conclusion

Evaluation of the quality of fresh tiger prawnsincludes chemical tests, microbiological tests and organoleptic tests according to SNI by handling whole tiger prawns, during low temperature storage (5-15^{o}C) only has a shelf life of < 5 days, and handling fresh tiger prawnsby removing the headless, has a shelf life of 5 days, while the method of handling fresh tiger prawnsby removing the head and skinless has a shelf life of > 5 days.

REFERENCES

[1]. Nurul. A., Cempaka, L., Ramadhan, K., Matatula, S.H. 2020. Basic Principles of Storage of Foodstuffs at Low Temperatures. NasMedia Pustaka Publisher. Macassar. https://slims.bakrie.ac.id/repository/b0b22df7fbccc16bf9a25b960f6b1c16.pdf

[2]. Tanasale, M. F., Telussa, I., & Sekewael, S. J. 2016. Extraction and characterization of chitosan from tiger prawn shells (*Penaeus monodon*) and the depolymerization process of chitosan with hydrogen peroxide based on variations in heating temperature. Indonesian Journal of Chemical Research, 3(2), 308-318.

[3]. Hadiwiyoto. 1993. Technology for processing fishery products. Publisher. Liberty. Yogyakarta.

[4]. Wardhani, A. K. Jacob, Uktolseja, L.A. Djohan. 2020. Identification of Morphology and Bacterial Growth in Fermented Liquid Fish Feed Silage. Parallel Papers Articles. https://publikasiilmiah.ums.ac.id

[5]. Gustina, N., Yuliati. K. Lestari, S.D. 2015. Honey as Wet Batter in Breaded Shrimp Products. FishtecH – Journal of Fishery Products Technology. http://ejournal.unsri.ac.id/index.php/fishtech. Vol. 4, No.1: 37-45.

[6]. Verdian, A.H., Witoko, P., Aziz, R. 2020. Chemical Composition of Vanamei Shrimp and Windu Shrimp with Floating Cage Cultivation System. https://doi.org/10.25181/peranan.v1i1.1479

[7]. Yunitasari, F., Mahfudz, L.D., and Mangisah, I. 2018. The Effect of Using Fish Waste Liquid Waste in the Feed on the Efficiency of Use of Protein in Peking Mojosari Crossed Ducks Growth Phase. Indonesian Journal of Animal Science. Volume 13 Number 4. https://ejournal.unib.ac.id/index.php/jspi/index

[8]. Indriati, N. Rispayeni., Heruwati, E.S. 2006. Study of Histamine-forming Bacteria in Peda pufferfish during processing. Journal of Postharvest and Marine and Fisheries Biotechnology. Vol 1, No. 2 https://www.bbp4b.litbang.kkp.go.id/jurnal-jpbkp/index.php/jpbkp/article/view/394/225

[9]. Theresia, P. E. Siburian., Dewi, P., Kariada, N. 2012. Effect of Temperature and Storage Time on Bacterial and Fungic Growth of Milkfish. Unnes J Life Sci 1 (2) Unnes Journal of Life Science http://journal.unnes.ac.id

[10]. Wodi, S.I.N., Trilaksani, W., Nurilmala, M. 2018. Histamine and Identification of Histamine-forming Bacteria in Bigeye Tuna (*Thunnus obesus*) Journal of Fisheries and Marine Technology Vol. 9 No. 2:185-192

[11]. Fitriana, N., and Asri, M.T. 2022. Proteolytic Activity of Protease Enzymes from Rhizosphere Bacteria of Soybean Plants (*Glycine max* L.) in Trenggalek. LanternBio, 2022; Volume 11, Number 1: 144-152 https://journal.unesa.ac.id

[12]. Rinto. 2018. Functional Benefits of Indonesian Fishery Products Fermented Products. Sri Wijaya University Palembang. UNSRI Press.