IMPLEMENTATION OF FOOD SAFETY ON FROZEN SHRIMP PRODUCT

Tara Haryanti*

Agribusiness Study Program Faculty of Science and Technology
Universitas Terbuka (INDONESIA)

**Corresponding author: taraharyanti3@gmail.com*

Abstract

Indonesia is a country with extraordinary natural wealth, especially in marine products. Especially shrimp, which are widely spread throughout Indonesia. Seafood is one of the foods that are prone to causing food poisoning if the processing is not done properly. Therefore, food safety is needed as a standard to control and recognize the potential hazards in seafood. Shrimp is Indonesia's leading export commodity that requires quality and safe raw materials. To obtain appropriate raw materials for shrimp, all supply chain members must apply the requirements for quality assurance and safety of fishery products in accordance with Ministerial Decree No. 52A/KEPMEN-KP/2013. To analyse the application of food safety in shrimp starting from receiving, storing, preparing, and serving seafood products. The process of each stage must also be considered from the start of fish cultivation, processing or freezing process flow to the final product must also be considered because quality safety is the most important. So, the demand for frozen shrimp supplies has been certified and guaranteed quality and safety for consumption. Food safety in frozen shrimp aims to identify or ensure the exact frozen shrimp product and ensure that the frozen shrimp product is safe for consumption. The purpose of frozen shrimp products is to maintain the quality and quality of the shrimp so that the shrimp are safe for consumption. The system analyzes the quality control of frozen shrimp that can affect product quality improvement. Improving the quality of

frozen shrimp products by comparing the basic unit and system evaluations based on the HACCP concept. Meanwhile, the frozen shrimp food safety strategy is to pay attention to Critical Control Points (CCP) to ensure food quality and safety to remain safe. The results show that the production of frozen shrimp products requires Critical Control Points (CCP) control to create quality and food-safety of frozen shrimp that are safe for consumers.
Key Words: Food safety, Frozen shrimp, HACCP, GMP

1 INTRODUCTION

Prawn has a great contribution to the fisheries sector. Shrimp and Prawn caught from inland water bodies were 28.99 Metric tons (MT) in 2009-10. The fishery export earning stood at US$ 477 million in 2008-09 financial years by exporting 72,888 MT Shrimp and other fishery products. Shrimp alone contributed 85% of the total export despite severe price fluctuations in the international market. Macrobrachiumrosenbergii is a perishable product and needs quick storage, but long-time storage may lose the quality of the product. Prawn is a valuable exportable product in our country. Spoilage of any food product is attributed to microbial growth due to improper handling, inadequate processing, and frozen storage. Prawn products of Indonesia face many qualities control challenges throughout the product range particularly in export markets. The lack of proper freezing, quality management and modern technological investments during processing, distribution, and storage, especially the insufficient application of Hazard Analysis Critical Control Points (HACCP), continues to lead to hazardous infection in final products. The EU has rejected several shrimp consignments from Indonesia because the products were found to have metabolites of banned nitrofurans and other health hazardous chemicals contaminants. This incident undoubtedly affected the image of Indonesia's frozen foods and threatened up growing international export market along with economic severe setbacks to the concerned exporters; the nature of complaints made by the frozen food safety issue is different than that

occurred in 1995-97. The previous food safety issues were primarily concerned with microbiological contamination in post-harvest shrimp due to improper harvesting, handling, transport, processing, and preservation. But the new complaints are associated with the presence of nitrofurans (antibiotics) and some other health hazard chemicals in the shrimp, which found an entrance from the environment or any source of contamination in the production chain. Some poisonous substances (Hg, Pb, Cr, Cu, As, Mn, Zn etc.) may present in the prawn due to the water quality and careless handling, improper quality control and preservation process cause the content of microorganisms. The main purpose of this study to observe the quality of prawn in frozen condition and to indicate the timeline of the consumable quality exists for the prawn. It also helps us to know the Assessment of the Quality and Safety aspects of frozen Prawn and Prawn products and aware of the health hazard, and minimize loss [2].

2 METHODOLOGY

The study was conducted from January to June 2012, and the prawn (Macrobrachiumrosebergii) was collected. Transportation to the BAU laboratory: The Collected prawn species were transported to the laboratory of fisheries Technology, Indonesia Agriculture University, Mymensingh with ice in insulated box. Storage of experimental material: The prawn species were divided into three portions packed individually. One packet was used to test the quality of fresh prawn and another two were put into a deep freeze at -20°C to study the quality changes in prawns during frozen storage [1].

Organoleptic assessment: The organoleptic assessment is a simple and widely used method in selecting quality of fish in the industry. Sensory assessment is using one or more of the five senses to judge, or form an opinion on, some aspect of quality. The senses in question are sight, smell, taste, touch and hearing. Sampling procedure: The frequency was monitored once a week up to 12 weeks. Frozen prawn was thawed and then water on fish skin (i.e. surface) was soaked with tissue paper. Only fish muscle was collected for examination. Then

the muscle was chopped and finally ground with a blender for homogenous mixture [3].

Biochemical analysis: Proximate composition: AOAC method was followed for proximate composition of the fresh and frozen prawn. Moisture: The loss of moisture was calculated with the Equation (1).

$$\text{Moisture content } (\%) = \frac{weight\ of\ wet\ material - weight\ of\ dry\ material}{weight\ of\ wet\ material} \quad (1)$$

(100)

Detection of unwanted materials: Collected tissues were weighed by electronic balance and 5 ml of diacid mixture (5 ml conc. HNO3: 3 ml 60% HClO4) were added to each sample. The content mixed for overnight. Samples were then digested, initially at 80°C and later at 150°C for 2 hours. The completion of digestion was indicated by almost colorless material. The samples were analyzed using the Atomic Absorption Spectrophotometer method of Clesceri et al. The Equation (2) calculated the concentration of heavy metal.

$$\text{Metal concentration} = \frac{ppm\ concentration\ observed\ x\ final\ volume\ of\ sample\ (mL)}{weight\ of\ tissue\ taken\ in\ gm} \quad (2)$$

3 RESULTS

Change in physical characteristics during fresh and frozen storage: ***Table. 1*** shows the change in organoleptic qualities on prawn (Macrobrachiumrosenbergii) during frozen storage at -20°C. It was organoleptically in acceptable condition for 8 weeks. During observation up to 4th weeks it was in excellent condition with natural odour and flavour. The characteristics of bright appearance, soft and firm texture also present. During 8th week of observation there was little deterioration apart from some loss of natural odour and still the off flavour was not introduced. During 12th weeks of observation there was loss of bright appearance, loss of natural odour, the loss of natural flavour was observed, and the experimental agent was in rejected condition [4]. The quality of prawn was acceptable up to 4 hours in all case according to organoleptic assessment, but this score gradually decreases.

Table 1. *Change in physical characteristics of prawn (Macrobrachiumrosenbergii) During frozen storage.*

Weeks of observation	Organoleptic quality	Defect point	Overall quality
0	Fresh, bright appearance; soft and firm texture with characteristics of fresh odor	1	Excellent
4	Fresh, bright appearance; slightly soft and firm texture with characteristics of fishy odor	2	Excellent / acceptable
8	Slightly loss of bright appearance, slightly loss of odor and eyes were slight dull	3	Acceptable
1	Loss of bright appearance, loss of odor, off- flavor expressed and eyes were fully dull	5	Rejected

Reported that shrimp in ice maintained good quality for 0-2 days as judged by organoleptic quality was acceptable up to 7 days and rejected after 9 days without frozen storage. Biochemical change in fresh and frozen storage: The result of this study showed the biochemical change in prawn (Macrobrachiumrosenbergii) during frozen storage. Moisture: The initial moisture content of fresh prawn was 61.8%, for the 4th week it increased to 67.38%, in the 8th week the moisture content was increased to 70.52% and at the 12th week the moisture content showed 75.23% value respectively. Peplow et al.

indicated that in 0 days moisture content of shrimp was 77.6%, in 7 days it increased to 81.3% and after 14 days the moisture was increased to 83.5%. The increase of moisture was similar to present study over the range of time. At 24th hours prawn was without frozen prawn is near unacceptable.

prawn muscle decreased considerably with storage period. A slight decrease in crude protein with the laps of storage period was entirely due to the formation of free drip accompanied by loss of some sarcoplasmic protein. Peplow et al. indicated that in 0 days protein content of shrimp was 19.6%, in 7 days it was increased to 16.5% and after 14 days it was increased to 14.7%. The author found certain difference but the decrease of protein happened similarly. The initial lipid content of fresh prawn was slightly increased to 1.42×10^4 cfu/g respectively. Shrimp collected from Bagerhat, Khulna, and Satkhira and from all the points (Gher, Depot, Agent, and Processing Plant) indicated value within 10.5cfu/g, which was within the acceptable limit. De Silva reported that there was a gradual loss in quality of shrimp as stored at four different temperatures (0°C, 10°C, 20°C and 30°C). The highest spoilage rate was observed in shrimp stored at 30°C. The APC of freshly harvested Gulf of Maine shrimp ranged from <100 to $1.6\times10_2$ cfu/g. These data are comparatively lower than data reported on shrimp harvested in other areas of the United States. In Gulf of Mexico shrimp, Green reported APC of 4.2×10^4 cfu/g and Vanderzant et al. found APC of 2.1×10^5 cfu/g. Harrison and Lee reported on Pacific shrimp and found APC ranging from 3×10^5 cfu to 1.3×10^6 cfu/g. Iced shrimp as purchased. by the firm had a plate count of 4.8×10^6 cfu/g. The author's present the result in fresh condition is similar to that result though there is some dissimilarity in frozen condition. Total bacterial load (Aerobic Plate Count) of raw freshwater prawn was 4.37×10^5 cfu/g whereas in frozen freshwater prawn was 1.42×10^5 cfu/g was reported by Khan et al. Present study showed similar result.

Detection of unwanted chemical in prawn (Macrobrachiumrosenbergii): The concentration of Cd, Cu, Mn, Zn and Pb were 0.179µg/g, 0.517µg/g, 6.935µg/g, 11.288µg/g and

0.133µg/g found in the study. WHO suggested the Maximum limits Mn, Cu, Zn, Pb and Cd for prawn are 1 µg/g, 30 µg/g, 100 µg/g, 2 µg/g, 1 µg/g and FAO suggested the Maximum limits Cu, Zn and Cd for prawn are 10 µg/g, 1000 µg/g and 0.2 µg/g.

4 CONCLUSION

It is necessary to give more attention to the quality and safety aspects of prawn products related to the harvesting, handling, processing and packaging. Now-a-days the freshwater prawn is creating a good market as a new product and test to the foreigner. This exportable product has a great chance to earn a lot from international market. Freshwater prawn (Macrobrachium rosenbergii) prefers for its taste, size and color. Lack of proper knowledge, negligence about sanitation and quality related factors at different stages of handling, transportation and processing results low graded frozen prawn and huge qualitative and quantitative losses. So, we should concern about the quality and safety aspects of fresh and frozen prawn. Low quality Prawn products are not only a great concern of food security and public health but also of serious national economic loss. If the defects and hazards of Prawn are controlled, then export of Indonesia would be increased.

REFERENCES

[1] Bennion, M., Scheule, B. (2004). Introduction food, New jersey: Precentive Hall.

[2] McSwane, D., Rue, N. R. (2005). Food safety Guide and sanitation, New jersey: Pearson Education.

[3] Marzuki (2002), food safety sanitation & hygiene.

[4] Codex, (1997). HACCP & GMP frozen shrimp