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ARTICLE REVIEW: THE USE OF CANNED PACKAGING IN PROCESSED FISHERY PRODUCTS

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ABSTRACT

Indonesia is a maritime country rich in marine resources, especially fish. Fish include perishable or quickly damaged products so that appropriate processing is needed to maintain the quality of fish. Examples of processed products from fisheries that are known by many people are sardines and canned packaged mackerel. Every product packaged with certain packaging certainly has advantages and disadvantages related to the length of storage. Therefore, it is necessary to review the use of canned packaging against heavy metal levels in sardines and mackerel canned packaging based on the length of storage time so that it can be known the impact it causes. The review method is done by doing citations from various primary sources in the form of related articles published in various journals. Based on the results of research in several articles that have been reviewed, there are differences in the influence of storage time on the use of canned packaging in processed fishery products related to the levels of heavy metals in processed fish in cans. This can happen because of differences in the quality of cans used in all brands of canned fish to affect the levels of heavy metals that dissolve into the product.

Introduction

Indonesia has abundant marine and terrestrial fishing resources. Fish is one of the sources of animal protein that is needed by the body. Fish that include perishable products need to get handled so that the quality of fish is maintained and the shelf life of fish becomes longer. Handling of fresh fish can be done with further processing. Fish processing can be done by means of salting, fumigation, freezing, salting-boiling, and canning [1]. Processed fish products have a good taste and storage is easy and durable which reaches up to two years [2].

Sardines and mackerel are generally processed by canning. Packaging with canned packaging becomes one form of fish handling to maintain the quality of fish and increase fish storage. The process of canning fish is carried out through several stages, namely container preparation, filling, vacuum packing, container closure, sterilization/processing, cooling, labeling, and storage [3]. The advantages of packaging with canned packaging is that it can provide practicality for consumers in cooking it, facilitate in transportation, increase fish storage, minimize contamination from the outside such as bacteria and other microorganisms, and keep foodstuffs against changes in unwanted water concentrations. Lack of packaging with canned packaging is the process of canning fish can allow the occurrence of metal contaminants into the fish. A direct relationship between a fish and a tool or container during the canning process can lead to the entry of metal into the fish. The occurrence of metal contaminants into fish can also be caused by corrosion in the can. pH of foods that are acidic during the processing process can cause corrosion in canned packing materials. In addition to pH, other corrosion factors in cans are corrosion accelerators such as nitrates and sulfur, residual oxygen in food, can type, can coating type, type of corrosion retaining coating, and heating temperature. This can speed up the process of matter and the release of metal ions into food.

Metal contaminants that are often found in canned foods are iron ions (Fe^{2+}) and lead ions (Pb^{2+}) [4]. In SNI 01-7387-2009, the government has regulated the amount of metal contaminants in permissible foods, namely Fe 10 mg/kg and Pb 0,3 mg/kg [5]. If the Pb^{2+} ions in the body accumulate in large quantities it can cause disturbances in the nervous system and if the excess Fe^{2+} ions in the body can cause impaired liver function [6]. Thus, in this review will be discussed about the effect of the use of canned packaging on processed fishery products with examination of fish packaged in can containers related to the or absence of metal contaminants and relationship between storage time with the large amount of metal accumulated in fish.

Method

The review method is done by doing citations from various primary sources in the form of related articles published in various journals.

Discussion

Table 1. Metal Concentrations of Cu and Pb in Sardines Samples (*Sardinella* sp.) Canned Packaging [7].

No.	Sample Name	Concentrations of Cu (mg/L)	Concentrations of Pb (mg/L)
1.	Sardines (*Sardinella* sp.) 36 months after production (A)	2,718	0,807
2.	Sardines (*Sardinella* sp.) 18 months after production (B)	1,996	0,512
3.	Sardines (*Sardinella* sp.) 06 months after production (C)	1,240	0,387

Maximum limit of metal contamination in canned packaged foods based on BPOM Director General Decree No. 03725/B/SK/VII/89 for Cu 5 mg/L and Pb 0,3 mg/L.

The concentrations of Cu metals found in sardines sampled A, B, and C were 2,718 mg/L, 1,996 mg/L, and 1,240 mg/L, while the metal concentrations of Pb samples of sardines A, B, and C were 0,807 mg/L, 0,512 mg/L and 0,387 mg/L. The highest concentration of Cu and Pb metals to the lowest is from sample A, then B, and finally C. This is because of the storage time of sardines (*Sardinella* sp.) in the packaging of the can so that the acid contained in ketchup will dissolve the metal Cu and Pb in the packaging of the can, then the metal content of Pb and Cu will increase. Hydrogen ions from ascorbic acid contained in ketchup in sardines can oxidize the inner layer of the can packaging thus affecting the high concentration of metal Cu and Pb.

Furthermore, in a different study, the determination of iron and lead levels in canned mackerel fish was carried out using atomic *absorption spectrophotometer* (AAS) instrument. Sample preparation is an important step in the analysis of micro-elements using AAS measurements. The selection of sample preparation methods greatly affects the results to be obtained. At the sample preparation stage, the organic ingredients present in the sample must be destroyed first. The function of the destruction is to break the bond between the organic compound and the metal to be analyzed. The determination of the levels of iron (Fe) and lead (Pb) in mackerel samples packaging cans using AAS flame, namely with acetylene as fuel and air as oxidants. The ideal condition for an analysis using the ASS flame method is that the sample solution to be analyzed must meet the provision that the sample solution must be in a matrix identical to the standard solution.

Table 2. The results of the calculation iron (Fe) and lead (Pb) levels in mackerel canned packaging [8].

Sample	Length of storage time	Iron levels (mg/kg)	Lead levels (mg/kg)
A	05 months	3,332	TTD
B	09 months	5,207	TTD
C	19 months	3,402	TTD
D	27 months	3,055	TTD
E	33 months	2,707	TTD

Max levels according to BPOM (mg/kg): Fe = 10 mg/kg and Pb = 0,3 mg/kg
Note: TTD = Undetectable

Based on the results of the analysis that has been done that in mackerel canned packaging for samples A, B, C, D, and E against the length of storage time obtained the result that the content of iron (Fe) levels all samples have not exceeded the threshold of Director General Decree of BPOM SNI 01-7387-2009 which is 10 mg/kg. For the levels of lead (Pb) in mackerel samples packaging cans according to the data obtained undetected. This can be possible because the can as a container of mackerel does not contain Pb metal at the time of the connecting or desoldering process at the time of can processing.

Furthermore, based on the results obtained, the effect of storage time on the high and low levels of iron in each brand of canned mackerel shows different results. This is evidenced by samples of canned mackerel with a storage time of only 9 months iron content (Fe) is higher than samples of canned mackerel fish whose storage time is 5, 19, 27, and 33 months. The occurrence of differences in the heavy metal content of iron and lead in canned fish products can be caused by differences in the quality of cans used in all brands of canned fish thus affecting the levels of iron and lead that dissolve into the product [9].

Conclusion

Based on the results of research in several articles that have been reviewed, there are differences in the influence of storage on the use of canned packaging in processed fishery products related to the levels of heavy metals in processed fish in cans. This can happen because of the difference in the quality of cans used in all brands of canned fish to affect the levels of heavy metals that dissolve into the product.

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References

[1] Adawyah, R. 2007. Processing and Preservation of Fish. Earth Script.

[2] Irawan, Swastha Basu. 1997. Modern Marketing Management. Fifth Print. Yogyakarta: Liberty.

[3] Winarno, F. G. 2004. Food Chemistry and Nutrition. Jakarta: Gramedia Pustaka Utama.

[4] Vina, A. 2007. Analysis of Content of Sn, Zn, dan Pb in Sweetened Condensed Milk Packaging Cans Spectralally Uptake Atom. Thesis. Department of Chemistry. Islamic University of Indonesia. Yogyakarta.

[5] Indonesian National Standards. 2009. SNI 7387:2009. Maximum Limit of Heavy Metal Contamination in Food. National Standardization Agency. Jakarta.

[6] Lu, F. C. 1995. Basic Toxicology, Target Organs, and Risk Research. UI Press. Jakarta.

[7] Refilda, Shulhan Zhalil Aliju, and Indrawati. 2020. Effect of Long Storage of Canned Packaged Sardines on Pb and Cu Levels. *Chempublish Journal* Volume 5 No. 2 (2020) 130-139.

[8] Karlina, D., Alimuddin, and Chairul S. 2019. Analysis of Iron Ion Levels (Fe^{2+}) dan Lead Ion (Pb^{2+}) in Mackerel Fish Canned Packaging Based on Length of Storage Time. *Journal of Chemistry Mulawarman* Volume 16 No. 2.

[9] Vera. 2011. Analysis of Iron Metal (Fe), Lead (Pb), Tin (Sn) in Canned Longan Fruit by Atomic Absorption Spectrophotometry. Thesis. Faculty of Mathematics dan Natural Sciences, Pharmacy Study Program, Depok.