



REVIEW ARTICLE : CANNING ON FISH

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ABSTRACT

This article aims to review the manufacture of cans for fish canning, the process of canning fish or other products, the application of HACCP in the process of canning fish, and heavy metals that are contaminated in canned packaging. Based on the literature review obtained information that generally the process of making cans consists of printing/coating, slitting/shearing, pressing, and assembly. The process of canning fish or other products consists of preparation, blanching, charging-exhausting, and closing of cans and continued with sterilization. Critical control points (CCP), in the canning process, generally occur at the receiving, metal detector, double seaming, and retorting stages. Heavy metals that often contaminate fish canning or other products are iron (Fe), lead (Sn), and lead (Pb).

KeyWords

Packaging, cans, heavy metals, HACCP

INTRODUCTION

Fish is one of the most potent sources of animal protein. Therefore, efforts are needed to improve the quality and storage of fishery products through processing and preservation which also aims to diversity processed products so that the use of fish as a source of protein is more maximal.

Packaging can prevent or reduce damage, protecting the materials in it from pollution

as well as physical disturbances such as friction, impact, and vibration (Triyanto et al. 2013). Packaging is also one way to inhibit environmental water vapor absorbed by dry food products. Packaging can extend shelf life and maintain material quality for longer.

Siracusa (2012) states that the use of packaging is one way to minimize the damage to foodstuffs after production. To extend the shelf life of the product can be longer, the use of packaging can be combined with cold temperature storage.

The processing of fishery products is a commodity that is easily damaged or quickly experiencing quality improvement so that to maintain the product and extend the shelf life of fishery products need to be done a process of preservation and processing of fish. Canning is one of the modern forms of processing that is hermetically packaged through thermal processes aimed at preserving and diversifying fishery processed products.

Cans are sheets of steel covered by tin (Sn) or some containers made of steel and coated with a thin white tin with a content of no more than 1.00 - 1.25% of the weight of the can. Meanwhile, steel is the main alloy metal, alloy maker. The main advantage of canned packaging is that the sterilization process can be done so that the food it stores becomes sterile, not easily damaged and durable. Other advantages of packaging fish in can include practical for consumers in cooking, can be stored longer and can minimize contamination from the outside such as bacteria, but in its use need to be wary because in canned food there can be heavy metal contamination from the packer (Rahayu 1992). The purpose of this article is to review the manufacture of cans for fish canning, the process of canning fish or other products, the application of HACCP in the process of canning fish, and heavy metals that are contaminated in canned packaging.

Method

The method of reviewing articles used is to study and interpret articles that have been published in national and international journals.

Fish Canning

Fish canning is the act of preserving fish by putting fish into a closed and heated container that aims to kill or inhibit the growth of microorganisms such as bacteria, fungi, and mold, as well as enzymatic decomposition. The commercial sterilization process of canning is designed to keep food products from decaying microorganisms that can result in economical losses. In general, the process of making cans consists of printing/coating, slitting/shearing, pressing, and assembly.

Table 1. The chemical composition of some types of cans based on the results of previous research

Chemical Elements	Canned Type (gram)				
	Tipe L	Tipe MS	Tipe MR	Tipe MC	Bir
Carbon	0,05-0,12	0,05-0,12	0,05-0,12	0,05-0,12	0,15
Mangan	0,25-0,60	0,25-0,60	0,25-0,60	0,25-0,60	0,25-0,70
Sulfur	0,05	0,05	0,05	0,05	0,05
Pospor	0,015	0,015	0,012	0,07-0,11	0,1-0,15
Silicon	0,010	0,010	0,010	0,010	0,010
Copper	0,06	0,1-0,2	0,2	0,2	0,2
Nickel	0,04	0,04	-	-	-
Khromium	0,06	0,06	-	-	-
Molybdenum	0,05	0,05	-	-	-
Arsen	0,02	0,02	-	-	-

(Syarif *et al.* 1989)

Principle of Canning of Fish

Food preservation in cans is defined as a way of processing using sterilization temperatures (110°C – 120°C) which aims to keep the food from spoilage (Moeljanto 1982). In food canning, foodstuffs are hermetically packaged in a canned container. Hermetic packaging is interpreted by its closure being very tight, so it cannot be penetrated by air, water, microbes, or other foreign materials. Heat treatment for low-smoked foodstuffs is designed to inactivate large amounts of Spores of *C. botulinum* organisms. According to Winarno (1994), in addition to the application of high temperatures, the acidity (pH) level of a product has a role in the inhibition of the growth of pathogenic bacteria. *Clostridium botulinum* is one of the bacteria that easily grow well on substrates or food products that have a pH range of 4.6 – 7.5.

Canning Process

The process of canning food in general according to Julianti (2013) includes the following procedures:

- a. Cleaning and preparation of raw materials.
- b. Blanching, which aims to inactivate enzymes by dyeing in boiling water or using hot steam, in addition, can remove air bubbles trapped in food to facilitate the filling process and facilitate the sterilization process.

- c. Charging and exhausting. Clean open cans are filled with food automatically. After that, the can is moved after filling to the gas exhaust box, so that inside the can will form a vacuum state.
- d. Closure and sterilization.

Application of HACCP in the Fish Canning Process

HACCP (Hazard Analysis Critical Control Point) is a quality assurance system that bases on the awareness or perception that hazards (hazards) can arise at certain points or stages of production but can be controlled to control these hazards. According to Winarno (2004), the main key to HACCP is the anticipation of hazards and identification of surveillance points that prioritize preventive measures rather than relying on testing the final product.

Based on the results of previous research that examined the HACCP process in the process of canning fish in PT. Sinar Pure Foods International has four parts that become Critical Control Points (CCP), namely at the receiving stage, metal detector, double seaming, and retorting. Each CCP has a critical limit. These four points are the point at which dangers may occur from all production processes. With surveillance at this point can minimize the contamination of hazards. The hazards here can be caused by microbiological contamination, chemicals, or foreign substances. In addition, it serves to find out the cause and improve the way food is produced if the product produced is not following standards. Quality supervision is carried out on products using physical, chemical, and microbiological parameters.

Heavy Metals

Heavy metals are metals that have a density greater than 5 gr/cm^3 (Dufus 1980). The presence of heavy metals in the environment is related to environmental pollution which should be of serious concern. Metal toxicity in humans can cause some negative consequences, but the main thing is the onset of tissue damage, especially detoxification and excretion networks (liver and kidneys). According to Connel and Miller (1996), the toxicity of metals is influenced by several things, namely the level of metal consumed, length of consumption, age, species, sex, physical condition, certain eating habits, and the ability of the body to accumulate metal.

The presence of this metal can come from the can that is done in the process of connecting between the two sides of the tin plate to form the body of the can or between the body of the can and the lid that is pegged. In addition, the high contamination of heavy metals in canned food can also be caused by the length of time food storage, corrosion of packing cans, types of fish, and the area of origin of fish catches. Analysis of the levels of heavy metals

can be seen in table 2.

Table 2. Results of analysis of iron, lead, and lead levels in canned sardines samples based on previous research

Sample code	Metal content (mg/Kg)		
	Iron (Fe)	Tin (Sn)	Lead (Pb)
A1	4,046	105,54	2,379
A2	3,347	69,38	0,519
B1	3,800	80,55	1,487
B2	3,100	64,90	0,817
BPOM/BSN metal pollutant limit (mg/Kg)	30,0	250,0	0,3

Conclusion

Based on literature review obtained information that generally the process of making cans consists of printing / coating, slitting / shearing, pressing and assembly. The process of canning fish or other products consists of preparation, bleansing, charging-exhausting and closing of cans and continued with sterilization. Critical control points (CCP), in the canning process generally occur at the receiving, metal detector, double seaming, and retorting stages. Heavy metals that often contaminate fish canning or other products are iron (Fe), lead (Sn) and lead (Pb).

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