

**EVALUATION AND IMPLEMENTATION HACCP OF FROZEN TUNA SAKU****Welma Pesulima and Ovie Ningsih**

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**ABSTRACT**

Research about evaluation and implementation HACCP document of frozen tuna saku product Focus at HACCP document evaluation, used descriptive qualitative method and quantitative test from level histamine value in fresh tuna was received and pathogen bacterium at fresh water and also presentage of level improve with audited result of implementation from revised HACCP document. Revised of HACCP document frozen tuna saku, to show two critical control point the first at phase receiving fresh tuna as raw material with a purpose to histamine eliminated, histamine value representing hazard potential by applying critical limit control at refrigeration process use ice so that center of fish temperature remain at range 0-4,4°C, and second critical control point in the butchering or dehaeding phase with a purpose to pathogen bacteria *Escherichia coli*, Coliform, and *Salmonella* spp eliminated which possible could happened from used fresh water without treatment. Audit result of revised HACCP document of frozen tuna saku implementation quantitatively its at level improve about 89% compared to HACCP document before revised that is still at level 62%, this level matter is make-up of in the case of document implementation revised by HACCP team. Level improve have to monitoring implementation HACCP document to make assurance of quality and security from frozen tuna saku, that has been export product.

Keywords: audit, critical control point(s), critical limit, frozen tuna saku, HACCP, histamine

**INTRODUCTION**

HACCP Concept represent of food security management method having the character of systematic and relied on principles which have been recognized, to be addressed to identify hazard which possibility earn happened in each step in supply chain of food, operation action placed to prevent appearance of hazard. HACCP is acronym used to preventive system by operation control of critical point able to happened during process production (hazard analysis critical control point).

HACCP also represent food security management system which have proven and relied on preventive action. Identify situation about hazard which possibly will appear in course of, required operation action will be able to be placed properly. This matter to ensure that food security is true managed effectively and to degrade depend on traditional method like examination and inspection. According to Indonesia National Standard (SNI 01-4852-1998), HACCP (Hazard Analysis Critical Control Points) is apparatus to assess hazard and specify focused operation system at prevention more than take on most test of final product only (testing to end product) or preventive system for the security of food. HACCP can be applied entire food chain primary product come up with final consumption and its applying have to be guided by evidence scientifically to risk health for human being. System

of HACCP not such a food security guarantee which without risk ( zero-risk) but designed to minimize food security from hazard risk.

Fishery product is export commodity and also marketed by home affairs require special attention in the case of handling security so that the product save to consumers . The reason of fishery product either was dumped by Europe , Japan and also America, because of carelessness and poor handling and process. First step taken is changed regulation and published regulation by Indonesia Minister of Marine Affairs and Fisheries Number. PER. 01/MEN/2007 about Operation of Best Quality System And Security Fishery Product later on innovated with regulation by Indonesia Minister of Marine Affairs and Fisheries Number . PER.19/MEN/2010 About Operation of Best Quality System and Security Fishery Product of Each regulation special to every business unit fishery of individual goodness and also company obliged to apply HACCP method better and downright so that guarantee product quality and security ( Poernomo , 2010). Prerequisite program as reference for implementation HACCP system by applying hygienic, procedure prerequisite working which confessed nationally and also international like seen on Table 1.

Table1. Prerequisite program applying hygienic, procedure for HACCP implementation system

Prerequisite program = Good Hygienic Practices (GHP)		
As conditions early in applying of HACCP at food sector becoming compulsion according to <i>Codex General Principles of Food Hygiene, the appropriate Codex Codes of Practices, and appropriate food safety legislation</i> (CAC, 2001)	Early Conditions executie which prepared condition before and during applying of HACCP because very important representing for food security (WHO, 1999)	Applying overall of procedure performed within factory ( processing unit) or recognized with Good Manufacturing Procedures (GMP) explaining operationally entire all condition which specified as reference applying HACCP system (NACMCF, 1998)

Hazard analysis and critical control point ( HACCP) system and also guidance applying which adopted from CAC / RCP 1-1969,Rev.3 ( 1997), and special for frozen tuna standard adapted by frozen tuna loin SNI01-4104.1-2006.

Tabel 2 National quality standard frozen tuna loin (SNI 01-4104.1-2006)

	Analysis	Measure	Condition
a.	Minimum Sensory	Number (1-9)	7
b.	Microbe Contaminate		
	Total Plate Count	coloni/gram	Max. $5 \times 10^5$
	Eschericia coli	NPN /gram	Max. < 2
	Salmonella spp	NPN/gram	Negative
	Vibrio cholera	NPN /gram	Negative
c.	Chemical		
	Hg	Mg/kg	Max. 1
	Pb	Mg/kg	Max. 0.4
	Histamine	Mg/kg	Max. 100
	Cadmium (Cd)	Mg/kg	Max. 0.5
d.	Physical		
	Central temp.	° C	-18
e.	Parasit	Tail	Max. 0

Purpose of research to evaluate manual HACCP by frozen tuna saku product and how to re-design of document for implementation.

## MATERIAL AND METHODS

This research represent qualitative descriptive, with evaluating manual HACCP frozen tuna product accompanied of other supporter document in contact with standard procedure had by processing unit to export.

Method survey by conducting perception , and interview directly with employment and processing manager with 12 step how to design manual HACCP :

1. listing question accomodating needed data collecting (questionnaire comprise every step process production like in flow chart of frozen tuna saku)
2. evaluating manual HACCP with HACCP team
3. conduct and repair manual HACCP special with team HACCP of frozen tuna saku using compilation 12 step
4. conducting describe product, represent a list which comprising final product type which included in concept of HACCP, taken data cover the name of product, raw material, path process product, packaging material , storage, specification and lable, target usage of product
5. identifying and target usage of product, product to be controlled through system HACCP beforehand have to be determined by plan its use. This step done by taking second data from the form of identifying usefulness of product which there are in HACCP plan.
6. compilation by flow chart processing congelation pocket with aim to depict product operational phase or sequence start from depository acceptance phase until in chilled depository room.
7. conducting verification frozen tuna saku processing flow chart , this step conducted with checked about processing flow chart which have been produce by redesign flow chart on known HACCP team.

8. identifying and hazard analysis, step hazard analyse represent gathering process and assessment of information concerning situation and hazard earn the happening of hazared to determine such affecting reality to food security specially frozen tuna saku and have to handle in plan of HACCP. This Step conducted by identifying and hazard , taking to product security able to happened in course done production, and also needed to precaution control potential risk or hazard which hazardous.
9. identify CCP (Critical Control Point) the step where identified every process path causing the existence of real hazard have to identify furthermore for the surely of step included in CCP or not CCP . This step conducted to judge CCP by using tree decision or decision making diagram which relate at CAC 2003).
10. critical boundary is maximum value or minimum which must be controlled in each CCP.This step have conducted by taking critical boundary data which used by which there are in HACCP plan. Technique to take the data use critical boundary parameter which become CCP like temperature, time, amount of additional materials, pH, and others.
11. specifying monitoring procedure, monitoring procedure consist of perception activity, examination or measurement conducted to assess CCP stay in critical boundarys which specified or do not. This step will specifying corrective action, corrective action represent procedure which must be executed when skipped over critical boundary. This action mentioned in the table form operation of CCP.
12. verification done, that is verification action represent method, procedure, examination anA way of other assessment beside monitoring to determine as according to HACCP plan. The step conducted by making step in the form of method, procedure and or examination of which done if skipped over critical boundary.
13. Record-keeping procedure and documentation, lock efficacy the way system of HACCP that is accuracy of record-keeping system (keeping record) made conducting implementation manual HACCP of frozen tuna saku process according to result of guidance evaluation of HACCP.
14. make an audit of HACCP implementation frozen tuna product doing examination attendance of histamine raw material of content and *Escherichia coli* at used as water is supporter of procedure implementation data according to guidance document of HACCP.

Step of research will looking at the Figure 1.

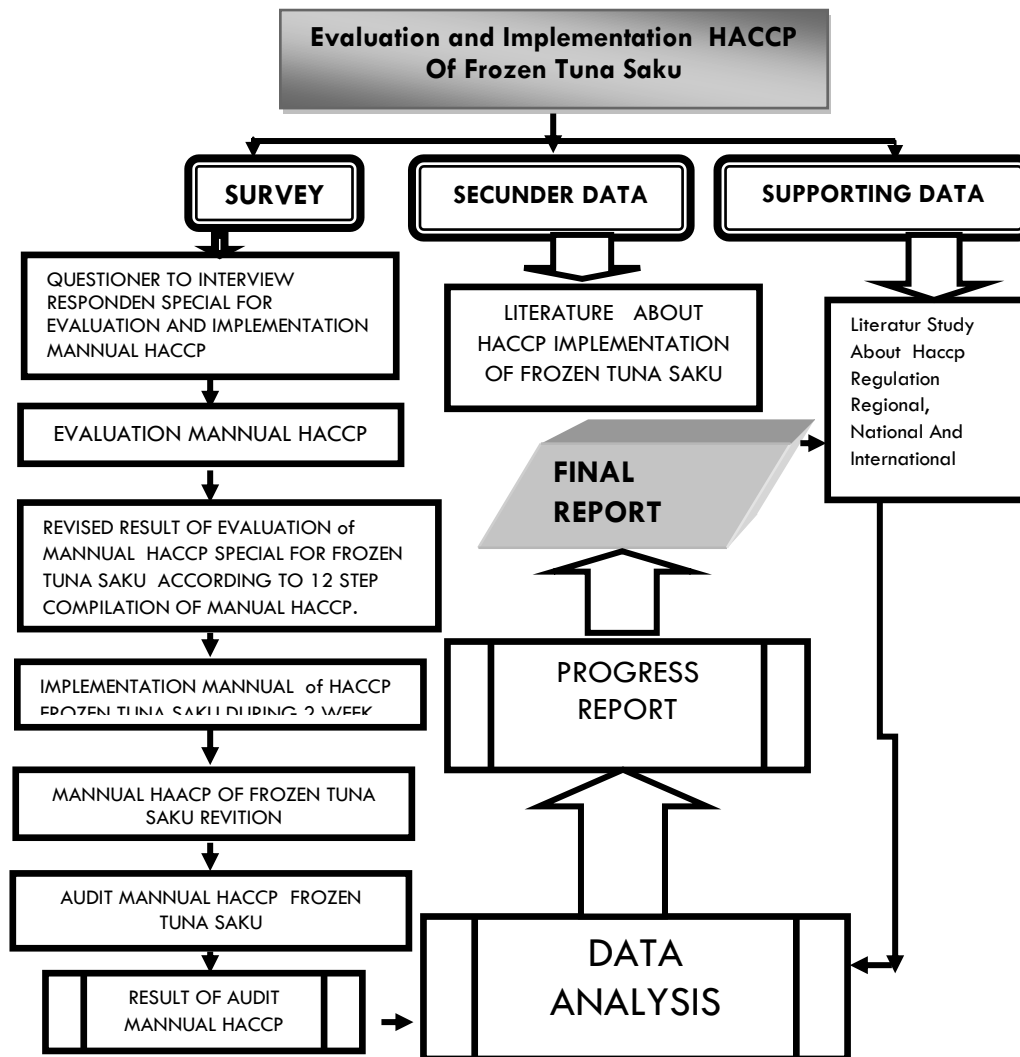


Figure 1 Roadmap of Research

## RESULT AND DISCUSSION

### 1. Frozen Tuna Saku

Frozen tuna saku product which yielded from tuna raw material (Yellow fin tuna or *Thunnus albacore*) with size 20 kgs up, AAA quality with red flesh color (description sensory) fresh, texture elastic, aroma of typical fresh fish, coherent tail and fin of strength at fish body, sweet taste, hereinafter fish head off, gill and gutted then fish cutting become 4 or part of loin, skinless, boneless, dark meat off, formed to become "saku" product (product of the size: 12-18cm x 5-8cm x 2,5-3cm), weight 0,5 - 1lbs (277gr - 454gr per pieces) packaging in

vacuum plastic by IVP (packed vacuum individually), arranged in pan later then frozen in air blast freezer (ABF)  $-40^{\circ}\text{C}$  during 6-8 hour so that temperature center fish  $-18^{\circ}\text{C}$  or below.

## **2. Before Evaluation HACCP Document**

Before HACCP document evaluated in this research, have owned document of HACCP to made for one manual HACCP for a few product for example fresh loin, frozen tuna saku, frozen tuna "saku" CO, compiled in one manual HACCP document, admission filling of checklist to every step in HACCP have been conducted even guidance of HACCP have experienced to revise. Fishery processing unit result have owned with B value (GOOD) from Certificate Eligibility of Processing from Indonesia Minister of Marine Affairs and Fisheries. One Flow chart for several fishery product before audited manual HACCP as look at Figure 2.

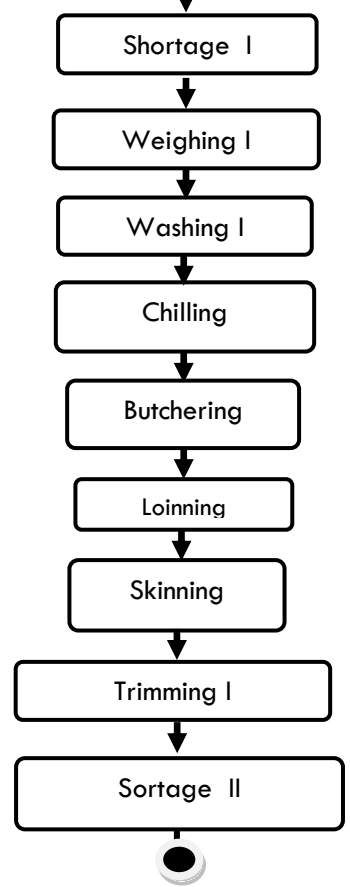
## **3. After Reviced HACCP Document.**

After manual HACCP document to improve by flow chart processing frozen tuna saku product, verification which have and analyzed to use tree decision (CAC,2003). Found 2 CCP that acceptance standard fresh tuna upon which and usage of water at the time of butchering, because using water which direct contact with tuna fish (raw material).

First CCP (critical control point's) acceptance raw material closely related with temperature center fish suspected if exceeding  $4,4^{\circ}\text{C}$  hence will influence histamine rate which mounting at tuna which fish type of scombroidae, in general highest histamine there are at meat dark at depository condition of fish above temperature  $4^{\circ}\text{C}$ , so that expenditure of depository and dark meat with temperature below  $4^{\circ}\text{C}$  matter which must be conducted in the case of handling of standard fresh tuna upon which frozen tuna saku

Histamine is a naturally occurring endogenous substance in the human body which is derived from the decarboxylation of the amino acid histidine. Histamine may also be present in certain foods containing free histidine, and is generated by certain bacteria during spoilage and fermentation of fish. Endogenous histamine has important physiological functions related to local immune responses, gastric acid secretion, and neuromodulation. Histamine-rich foods may cause food intolerance in sensitive individuals and histamine contamination in fish and fish products may cause food poisoning (Taylor 1986). Histamine rate at fresh fish reside in  $0,1\text{ mg}/100\text{ gram}$  and will mount sharply till reach  $90-100\text{ mg}/100\text{ gram}$  during 12 hr when let at room temperature, when let at temperature  $20-25^{\circ}\text{C}$  during 10 day will mount till  $95.000\text{mg}/100\text{gr}$ . At temperature  $0^{\circ}\text{C}$  tuna still dined competent till 15 day because rate of histamine not yet mounted from  $5\text{mg}/100\text{gram}$  (Anonymous 2000).

Receiving Raw Material (receiving fresh tuna )



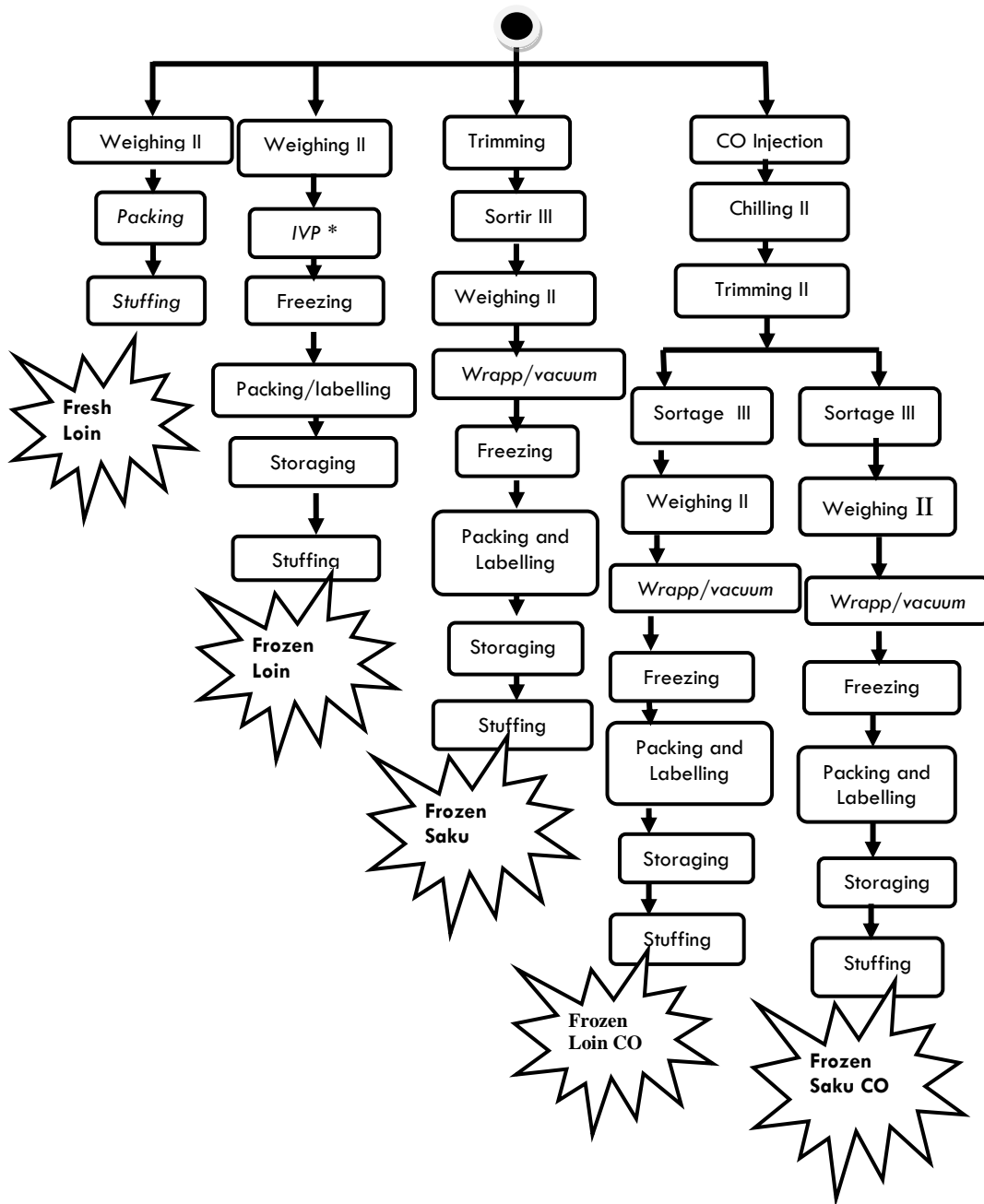


Figure 2. Flow chart frozen product



Example checklist CCP before revised HACCP Document

PT. PELABARAN KUSANTARA (P) CABANG AMBON	Division / Unit : Telephone / Nomor : Fax Number : Location No :	Kontak Person / Contact Person : Job Title : No. Handphone / Cell Phone :
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**PERMITS TO RECEIVE**

TARGET Date :  
 Tanggal Pengiriman / Date of Dispatching :  
 Tanggal Terima / Date of Receiving :  
 Asal Bahan Baku / Source of Raw Material :  
 Nama Supplier / Supplier Code :

No.	Uraian / Description	Lokasi / Lokasi				Suhu / Suhu Temp (°C) / Temp (°C)	Suhu Basah / Suhu Basah (°C) / Moist Temperature	Kebersihan / Kebersihan		Kondisi dan Kondisi / Kondisi / Kondisi	Keterangan / Catatan Keterangan / Catatan
		A	B	C	D			Pass	Fail		
1							Pass	Fail			
2							Pass	Fail			
3							Pass	Fail			
4							Pass	Fail			
5							Pass	Fail			

Verified by :
Checked by :

Figure 3. Checklist CCP before revised HACCP Document

Bacterium producer enzyme of histidine decarboxylase earned inactivated immediately degrade temperature below/under 4°C when freezing direct and dead fish, this matter that happened bacterium pursued by propagation it but when product melted by hence activities bacterium will still going on. In the reality not merely histamine representing single factor in the case of cause of poisoned but is also influenced by another biogenic so that strengthen its toxin effect, poisoned earned happened at dose 50 gram / kg or 50 ppm.

Histamine fresh fish tuna content at the most 1mg/100gram, above temperature 10°C or room temperature ( 25-30°C) rate of histamine leap till 1 gram/100 gram. For decrease opportunity to histamine rate increase at tuna raw material to yield tuna saku frozen hence designed by procedure in the form of checklist in the case of usage ice periodically to take care of fish center temperature. While second point critical at usage of controlled water by giving chlorine at source of used water with correct concentration so that growth of *Escherichia coli* can be pursued. For the food security product hence standard of *E.Coli* according to SNI 2006 frozen tuna loin product do not exceed 2 APM/100 ml or according to FDA for product result fishery do not exceed 100 colony/ml usage of water the cleanness have experienced process of treatment use and also chlorine of ozonisation very suggested by doing phase produce where product come into contact with direct with water, and or at sanitizing process equipments and room and also employees remain to be paid attention better and good record-keeping so that easy to traced.

Result of implementation all manual HACCP document made an audit of during 2 week give picture which positive enough, where entire employees which commit there one HACCP execute operation to critical point able critical unsafely frozen tuna saku product which yielded. Result of implementation and evaluation decanted in flow chart Figure 3 and result of examination to *E. coli* of used water direct than 3 well exist in processing unit location and

content of Histamin before and after evaluation can be seen at Tables 1, 2,3. Result of the Test of Histamine within measure consume human being while for *E.Coli* is negative.

Audit result revised manual HACCP document of frozen tuna saku implementation quantitatively at level improve about 89% compared to manual HACCP document before revised that is still at level 62%, this level matter is make-up of in the case of document implementation revised by HACCP team. Level improve have to monitoring implementation manual HACCP document to make assurance of quality and security from frozen tuna saku, that has been export product.

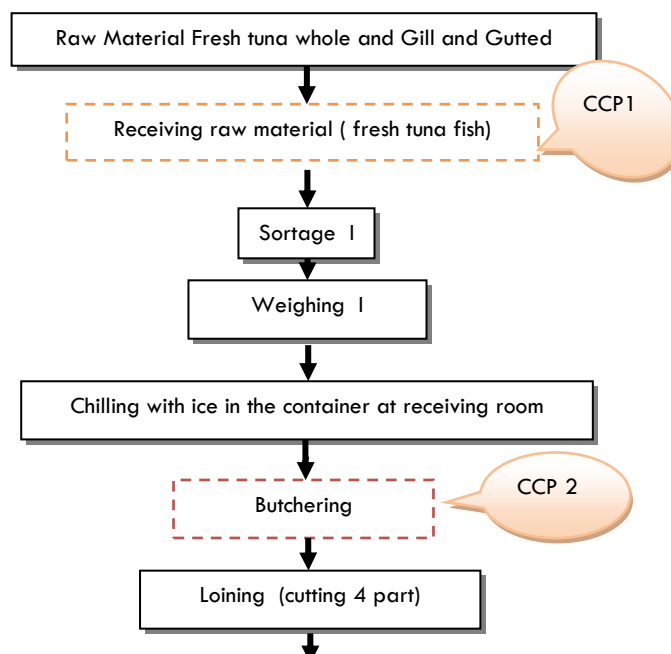
Table 3 Histamine content at raw material ( fresh tuna fish ) and frozen tuna saku

Product	Value Histamine (ppm) before revised manual HACCP	Value Histamine (ppm) After revised manual HACCP
Fresh tuna yellow fin	11.8	12
Frozen tuna saku (Center Temp. -19°C)	7	6,4

Table 4 Water quality in processing frozen tuna saku before revised manual HACCP document

Sample code	Type of Test					pH	T°C
	TPC	Coliform	<i>E.coli</i>	<i>Salmonella</i>	<i>V.cholera</i>		
	Method Test SNI 01-2332.3-2006	Method Test SNI 01-2332.3-2006	Method Test SNI 01-2332.3-2006	Method Test SNI 01-2332.3-2006	Method Test SNI 01-2332.3-2006		
Source 1	< 2500	<2.0	<2.0	Negative	Negative	7.19	28
Source 2	< 2500	<2.0	<2.0	Negative	Negative	7.11	27
Source 3	< 2500	<2.0	<2.0	Negative	Negative	7.40	28

### Flow chart and verification



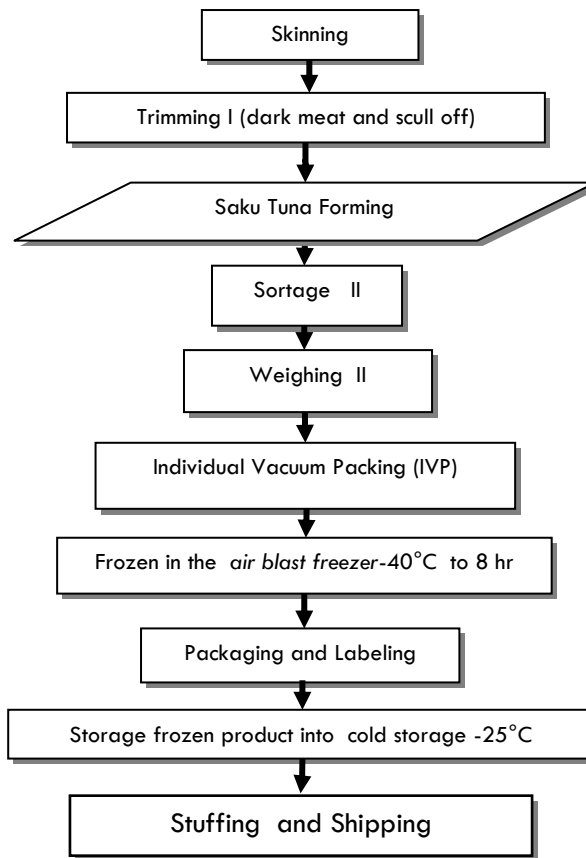


Table 5 Water quality in processing frozen tuna saku after revised manual HACCP document

Sample Test	Type of Test					pH	T°C
	TPC	Coliform	E.coli	Salmonella	V.cholera		
	Method Test	Method Test SNI	Method Test	Method Test SNI	Method Test SNI		
	SNI 01- 2332.3- 2006	01- 2332.3- 2006	SNI 01- 2332.3- 2006	01- 2332.3- 2006	01- 2332.3- 2006		
Source 1	< 2000	<2.0	<2.0	Negative	Negative	7.18	27
Source 2	< 2000	<2.0	<2.0	Negative	Negative	7.05	27
Source 3	< 2000	<2.0	<2.0	Negative	Negative	7.30	28

Compared standard quality of fresh water in the package as Nasional Indonesia Standard or SNI 01-3553-2006:

TPC :Max 1.0x10<sup>5</sup>coloni/ml  
*E.coli* : Max < 2.0 NPN /100ml  
*Salmonella spp* : Negative per 100 ml

## CONCLUSION

Result evaluation of manual HACCP document show entirety 12 phase compilation HACCP for frozen tuna saku product of revised found by CCP ( Critical Control Points) phase acceptance fresh tuna fish for raw material because relating to attendance histamine as source of hazardous which must eliminated and at butchering phase because washed fresh fish was direct than well, so that opportunity of crossed contamination as source of hazard

have to be controlled. Result implementation and audit manual HACCP document frozen tuna saku product revised show applying manual HACCP have always watched so that do not happened mistake or misunderstanding in the case of admission check and write available checklist as a whole and special checklist for the operation critical point at every step conducted process.

Frozen tuna saku product with quality hence suggested every processing unit obliged to provide treatment water to get the quality best water, and manual HACCP document to every yielded to be product to be dissociated to facilitate monitoring various arising out hazardous during production process because that is relation with food security and quality export fishery product.

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