

ISSN 0216 8316

JURNAL PENELITIAN PASCA PANEN PERIKANAN
(Journal of Post-Harvest Fisheries Research)

No : 75
Tahun 1993

BALAI PENELITIAN PERIKANAN LAUT
Badan Penelitian dan Pengembangan Pertanian
Departemen Pertanian
JAKARTA



JURNAL PENELITIAN PASCA PANEN PERIKANAN
(Journal of Post-Harvest Fisheries Research)

Diterbitkan : BALAI PENELITIAN PERIKANAN LAUT
(Research Institute for Marine Fisheries)

Penanggung Jawab
merangkap Anggota
Redaksi : Nurzali Naamin

Dewan Redaksi :

Ketua merangkap
Anggota : Suparno

Anggota : Soetrisno Saleh
Suyuti Nasran
M. Saleh
Hari Eko Irianto

Redaksi Pelaksana : Th. Dwi Suryaningrum

Tata Usaha : Irma Noor

Alamat : Jl. K.S. Tubun, P.O. Box 30 Palmerah
Jakarta Pusat, Telp. : 5709157 - 5709158



JURNAL PENELITIAN PASCA PANEN PERIKANAN

(Journal of Post-Harvest Fisheries Research)

Nomor : 75 Tahun 1993

DAFTAR ISI

Content

Halaman/page

1. Penelitian Penggunaan Plastik Tahan Panas Pengganti Kaleng : 2. Daya Awet Ikan Lemuru (*Sardinella longiceps*) Dalam Kantong Plastik Hampa Udara Dengan Media Yang Berbeda, oleh : Mohammad Saleh, Ijah Muljanah, Murdinah, Tazwir dan Umi Rahayu.
Study on The Use of Heat Resistant Plastic Pouch as a Can Substitute : 2. Storage Life Oil Sardine (Sardinella longiceps) In Vacuum Plastic Pouch With Different Media, by Mohammad Saleh, Ijah Muljanah, Murdinah, Tazwir and Umi Rahayu. 1 - 10
2. Pengaruh Perebusan Terhadap Penurunan Mutu Teripang Pasir (*Holothuria scraba*) dan Teripang Batu (*Holothuria nobilis*) Rebus Pada Penyimpanan Suhu Kamar, oleh : Murniyati, Eddy Setiabudi dan Siti Rahayu.
The Effect of Boiling on the Deteriotation of Sea Cucumber (Holothuria scraba and Holothuria nobilis) at Ambient Temperature, by Murniyati, Eddy Setiabudi and Siti Rahayu. 11 - 24
3. Development of Canned Fish in Tomato Sauce Enriched With Fish Oil : I. Determination of Canned Fish Product Type, by Hari Eko Irianto, Carmen C.Fernandez and G.J. Shaw.
Pengembangan Produk Ikan Kaleng Bermedium Saus Tomat Yang Diperkaya Dengan Minyak Ikan : i. Penentuan Model Produk Ikan Kaleng yang Akan Dikembangkan, oleh : Hari Eko Irianto, Carmen C.Fernandez dan G.J. Shaw..... 25 - 33
4. Daya Awet Ikan Pelagis Kecil Hasil Tangkapan Kapal Pukat Cincin di Laut Jawa, oleh : Mohammad Saleh, Alan Reilly, Ivor Clucas dan Jamal Basmal..... 14 - 42
5. Development of Canned Fish in Tomato Sauce Enriched With Fish Oil : II. Determination of Important Factors During Processing, by Hari Eko Irianto, Carmen C. Fernandez and G.J. Shaw.
Pengembangan Produk Ikan Kaleng Bermedium Saus Tomat Yang Diperkaya Dengan Minyak Ikan : II. Penentuan Faktor-faktor Penting Selama Pengolahan, oleh : Hari Eko Irianto, Carmen C.Fernandez dan G.J. Shaw..... 43 - 53

**DEVELOPMENT OF CANNED FISH IN TOMATO SAUCE
ENRICHED WITH FISH OIL :**

I. Determination of Canned Fish Product Type

***PENGEMBANGAN PRODUK IKAN KALENG BERMEDIUM SAUS TOMAT YANG
DIPERKAYA DENGAN MINYAK IKAN :***

I. Penentuan Model Produk Ikan Kaleng yang Akan Dikembangkan

Hari Eko Irianto, Carmen C. Fernandez) and G.J. Shaw**)*

ABSTRACT : Development of canned fish with disguised fish oil was aimed to produce canned fish being nutritionally better than existing product.

The canned fish product type which was developed was obtained by conducting consumer and cannery surveys. The results showed that most of consumers and canneries were interested in the product idea. The surveys suggested that the proposed canned fish product prefers to use sardine as raw material, tomato sauce as medium and 155 g can size as container. The product would have a good prospect on the market, since most surveyed consumers are willing to purchase the product.

ABSTRAK : Pengembangan produk ikan kaleng yang ditambahkan minyak ikan secara tersamar ditujukan untuk menghasilkan produk yang kandungan gizinya lebih baik dari produk yang ada di pasar saat ini.

Model produk yang akan dikembangkan didapat dengan cara mengadakan survey terhadap konsumen dan pabrik pengolah ikan kaleng. Hasil survey menunjukkan bahwa sebagian besar konsumen dan pabrik pengalengan tertarik terhadap gagasan tentang produk yang akan dikembangkan. Hasil survey menyarankan bahwa produk yang akan dikembangkan sebaiknya menggunakan lemuru sebagai bahan mentah, saus tomat sebagai medium dan kaleng berukuran 155 g sebagai pengemas. Produk tersebut mempunyai prospek yang baik, karena sebagian besar konsumen yang disurvei bersedia membelinya bila tersedia di pasaran.

1. INTRODUCTION

Fish oil has been known to have therapeutic effects due to the presence of polyunsaturated fatty acids (PUFA), especially the omega-3 fatty acids contained in the oil. Incorporating fish oil disguised in tomato sauce in canned fish was aimed at developing a product which is nutritionally better than existing products. The canned fish was selected for delivering fish oil to consumer, since the product shows the possibility of incorporating a high amount of fish oil without affecting product acceptability. The use of fish oil for the medium in the canned fish production has been introduced by Pillai (1974) and Barlow *et al* (1990).

Product type to be developed was explored by conducting consumer and cannery surveys. The consumer survey was also used to obtain the consumer response to the product idea. The possibility of technology being developed to be adopted by canneries was also investigated during the survey.

*) Senior Lecturer at the Food Technology Department, Massey University, New Zealand

***) Researcher at the Crown Research Institute, Palmerston North, New Zealand

2. METHODOLOGY

2.1. Consumer Survey

The specific aim of the survey was to reveal consumer preference in buying canned fish and consumer attitude towards the proposed product idea. Some questions relating to those aims were listed in the form of questionnaire and the questionnaires were distributed to 225 consumers in Jakarta and Semarang. Before, distributed in Indonesia, they were tested by Indonesian residing in New Zealand. The required changes in the questionnaire were made thereafter.

2.2. Canneries Survey

Questionnaire used for cannery survey listed some questions about fish species and medium in canned fish production, canned fish marketing and cannery opinion to the proposed product idea.

Sixteen canneries were surveyed. They were 7 factories in Muncar, 8 factories in Bali and 1 factory on Bitung Island. Direct interview survey was undertaken for factories in Muncar and Bali. A survey was mailed to the factory on Bitung Island.

3. RESULTS AND DISCUSSION

3.1. Consumer Behaviour Toward Canned Fish Product and New Product Idea

Of the 225 questionnaires distributed, 50 questionnaires (38%) were returned from Jakarta and 80 questionnaires (62%) were returned from Semarang. Demographic characteristic of respondents is shown in Table 1.

Table 1. Demographic characteristics of respondents

	Number	%
Income Brackets		
high income (>Rp. 500,000/month)	40	30.8
middle income (Rp. 150,000-500,000/month)	56	42.1
low income (<Rp. 150,000/month)	34	26.2
Ages (years)		
20-29	79	60.8
30-39	30	23.0
40-49	14	10.8
>50	7	5.4
Occupation		
private sector	103	79.2
civil servant	27	28.8

3.1.1. Respondent Preference in Buying Canned Fish

Most of the respondents stated that they selected a certain fish species and medium in buying canned fish. This indication was supported by the same tendency in all income brackets, age levels and occupation types, as shown in Table 2.

Table 2. Respondents preference for a certain fish species and medium in buying canned fish

	Choose a certain				Not to choose a certain			
	fish species		medium		fish species		medium	
	No	%	No	%	No	%	No	%
Income brackets								
high income	30	75.0	32	80.0	10	25.0	8	20.0
medium income	44	78.6	52	92.9	12	21.4	4	7.1
low income	28	82.4	32	94.1	6	17.6	2	5.9
Age (years)								
20-29	62	78.5	71	89.9	17	21.5	8	10.1
30-39	23	76.7	28	93.3	7	23.3	2	6.7
40-49	12	85.7	12	85.7	2	28.6	2	14.3
> 50	5	71.4	5	71.4	2	28.6	2	28.6
Occupation								
privete sector	85	82.5	92	89.3	18	17.5	11	10.7
civil servant	17	63.0	24	88.9	10	37.0	3	11.1

Table 3. Fish Species and Medium Chosen by respondents in buying canned fish

	Number*)	%
Fish species :		
Sardine	77	59.2
Mackerel	18	13.8
Tuna	33	25.8
Others (squid, shrimp, crab, milk fish and small tuna)	8	6.1
Medium :		
Tomate sauce	67	51.5
Vegetable oil	14	10.8
Brine	8	6.1
Vegetable oil added with salt and water	16	12.3
Others ("bumbu rujak", etc)	21	16.1

Note : *) each respondent could choose more than one fish species and medium

As shown in Table 3, the fish species and medium which respondents are most like to purchase are sardine (59.2%) and tomato sauce (51.5%) respectively. Few respondents chose canned fish having other fish species (mackerel, tuna, squid and others) and other medium types (vegetables oil, brine, vegetable oil added with salt and water, and others).

3.1.2. Attitude of respondent towards the product idea "canned fish with disguised fish oil"

Over 84% of the respondents were interested in the product idea of canned fish with disguised fish oil. Most of the respondents from each income bracket, age level and occupation type also showed interest in the proposed product idea, as shown in Table 4. Thus, the product idea was well accepted by all groups of respondents.

Table 4. Respondent attitude to the idea of canned fish with disguised fish oil

	Product idea				Buying trend			
	Interested		Not interested		Willing to buy		Not willing to buy	
	No	%	No	%	No	%	No	%
Income brackets								
high income	32	80.0	8	20.0	28	70.0	12	30.0
medium income	47	83.9	9	16.1	50	89.3	6	10.7
low income	31	91.2	3	8.8	27	79.4	7	20.6
Age (years)								
20-29	69	87.3	10	12.7	63	79.7	16	20.3
30-39	25	83.3	5	16.7	25	83.3	5	16.7
40-49	12	85.7	2	14.3	13	92.9	1	7.1
>50	4	57.1	3	42.9	4	57.1	3	42.9
Occupation								
private sector	57	83.8	11	16.2	82	79.6	21	20.4
civil servant	53	85.5	9	14.5	23	85.2	4	14.8

As shown in Table 5, 56.9% of respondents suggested the use of tomato sauce to disguise the fish oil as a medium for the proposed canned fish product. Some other respondents suggested disguising fish oil in vegetable oil (16.1%), brine (6.1%) and vegetable oil added with salt and water (12.3%).

Most of respondents with respects of income brackets, age level and occupation type as shown in Table 5 are willing to buy the proposed canned fish product, if the product becomes available. This shows that the developed product has a good prospect in the market. In recent years the relationship between diet and health has received much publicity. This would help the proposed product to acquire consumer are now far more aware of how diet affects health (Conning, 1990 and Dennis, 1990).

Table 5. Respondent preference to medium type, can size and price for proposed canned fish product

	Number	%
Medium Type :		
Tomato sauce	74	56.9
Vegetable oil	21	16.1
Brine	8	6.1
Vegetable oil added with salt and water	16	12.3
Others ("bumbu rujak")	39	30.0
Can Type :		
155 g	43	33.1
185 g	41	31.5
215 g	33	25.4
415 g	10	7.7
Product Price :		
Rp. 400 - 999,-	44	33.8
Rp. 1000 - 1799,-	48	36.9
Rp. 1800 - 2599,-	28	21.5
Rp. 2600 - 3400,-	6	4.6

*) each respondent could choose more than one medium and can size type

Respondents suggesting to use can type of 155 g, 185 g, 215 g and 415 g are 33.1%, 31.5%, 25.4% and 7.7% respectively, and this result indicated that 155 g can was more favourable. Approximately 37% of respondents suggested a purchase price of Rp. 1000 - 1799. Other respondents are willing to buy the product if priced at Rp. 400 - 999 (33.8%), Rp. 1800 - 2599 (21.5%) and Rp. 2600 - 3400,-

3.2. Production Information for Canned Fish and Developed Product from Canneries

3.2.1. Fish species used for canned fish production

Fish species and total volume for each species used for canned fish production in all canneries surveyed are shown in Table 6.

Most canneries used sardine as raw material for production of canned fish for the local market. In terms of quantity, tuna and skipjack were consumed in greater quantity than other fish species. However, most of the tuna and skipjack were canned for export purposes. Mackerel and seals were also canned, but in small quantities only.

3.2.2. Medium used for canned fish production

It was found that six types of mediums were used in the production of canned fish as shown in Table 7. Tomato sauce was the common medium, and was used by 14 canneries. Vegetable oil and brine were used as a medium by 7 and 5 canneries respectively. Other mediums reported were vegetable oil added with salt and water, vegetable broth and *sambal goreng*.

Table 6. Fish species used for canned fish production

Fish species	Fish weight (ton/year) to be processed into :			Number of factory using*)
	Product for local market	Product for export	Total	
Sardine	24,210	600	24,810	13
Mackerel	550	-	550	3
Tuna	2,350	61,200	63,550	5
Skipjack	600	46,350	46,950	3
Scad	100	-	100	1

Note : one factory could use more than one fish species

Table 7. Medium used for canned fish production

Medium	Number of factory using*)
Tomato sauce	14
Vegetable oil	7
Brine	5
Vegetable oil added with salt and water	1
Vegetable broth	1

Note :*) one factory could use more than one medium

3.2.3. Canned fish marketing by canneries

Five canneries export canned tuna and skipjack. Four factories export almost all their production of canned tuna and skipjack. One factory exported 25% of its canned sardine product. Referring to the products marketed locally, the most fish species and medium used were sardines and tomato sauce respectively as shown in Table 8.

3.2.4. Canneries opinion to the idea "fish oil disguised in canned fish"

Thirteen producers commented that the idea of disguising fish oil in canned sardine was interesting one. Three canneries were not interested, because their product were mostly for export. Among 13 canneries producing canned sardine, 10 were interested in the proposed product. Of the 14 canneries using tomato sauce as medium, 11 were interested. In general, most of the canneries (10 canneries) indicated that disguising fish oil in tomato sauce medium was an interesting idea as shown in Table 9.

Fourteen canneries requested information about the technology for production, if the technology can be developed. Some of these canneries stated they would produce this product on condition that the product was acceptable to the market and had low production costs.

Table 8. Fish species used canned fish production for local market

	Number of factories using *)
A. Fishing species	
Sardine	13
Mackerel	3
Tuna	2
Skipjack	1
Scad	1
B. Medium	
Tomato sauce	14
Vegetable	2
" Sambal goreng"	1

Note : *) One factory could use more than one fish species and medium

As shown in Table 9, 10 canneries are interested in using the technology for 1-10% of their total present production. Although, one factory did not market its product locally, it planned to enter the market if the use of fish oil addition created a promising market. One cannery intends to produce this product as 21-30% of total production. Two canneries plan to produce the canned fish with disguised fish oil up to 40% of total production. One producer requested technological and product information before any decision is taken.

3.3. Product Type to be Developed

The market demand, exhibited by consumer survey results, revealed that most consumers chose canned sardine over the other species when buying canned fish. In addition, the cannery survey indicated that more canned sardine was produced for the local market than other canned fish product. The significantly lower price of canned sardine was probably the reason for the consumer preference (Irianto, 1992). Producers could provide canned sardine at a lower price than other canned fish product, because the price of the raw material was significantly lower. As stated by one of the surveyed canneries, the price of sardine, mackerel, skipjack and tuna were Rp. 200 - 300,-/kg, Rp. 500 - 800,-/kg, Rp. 700 - 900,-/kg and Rp. 1100 - 1300,-/kg respectively. Another advantage in using sardine as raw material is that sardine is the most potential Indonesian fish to be used as omega-3 fatty acid source. Thus the proposed canned fish product needed to use sardine as raw material, to enable the product to compete in the market.

The consumer survey indicated that more than 50% of respondents purchased canned fish with tomato sauce medium. Meanwhile, more than 55% of consumers suggested the use of fish oil disguised in tomato sauce as a medium for the proposed product. As a response to market demand, most of the canneries produced canned fish in tomato sauce medium for the local market. The canneries also suggested the use of tomato sauce for the proposed product. The above results clearly indicate that the proposed canned fish product must use tomato sauce with disguised fish oil as medium.

The developed canned fish product should use 155 g tall tube can, in which the consumer survey informed that more respondents were willing to buy the product packed in 155 g can.

Table 9. Response of canneries to the idea "canned fish with disguised fish oil"

	Number of factory
1. Comment of canneries to the idea "canned fish with disguised fish oil" :	
a. interested	13
b. not interested	3
	<hr/>
	16
2. Comment of canned sardine producers to the product idea "canned fish with disguised fish oil ":	
a. interested	10
b. not interested	3
	<hr/>
	13
3. Comment of canneries producing canned fish using tomato sauce medium to the idea "canned fish with fish oil":	
a. interested	11
b. not interested	3
	<hr/>
	14
4. Medium suggested by canneries to be disguised with fish oil :	
a. tomato sauce	10
b. vegetable oil	4
c. Vegetable oil added with salt and water	2
	<hr/>
	16
5. Canneries requesting to be informed with the technology to produce this product	
a. YES	14
b. NO	2
	<hr/>
	16
5. Percentage of the product which was going to be produced (based on - the percentage of total production):	
a. 1 - 10%	-
b. 11 - 20%	2
c. 21 - 30%	-
d. 31 - 40%	2
	<hr/>
	13

4. CONCLUSIONS

Both consumer and cannery surveys indicated the same tendency about the canned fish product which should be developed, in which the proposed product has to use sardine as raw material, tomato sauce as medium and 155 g tall tube can as container.

The survey also revealed that the proposed product had a good prospect in the market, since the idea received a positive response from the consumer. However a consumer test for the final product was still necessary to assess exact consumer acceptance.

REFERENCES

- Barlow, S.M., Young, F.K.V. and Duthie, I.F., 1990. Nutritional recommendations for n-3 polyunsaturated fatty acids and the challenge to the food industry, *Proceeding of the nutrition society* 49 (2) : 13-21.
- Conning, D., 1990. Towards 2000 : nutrition and consumer expectation, *Fd. Sci. Tech. Today* 4 (1) : 26-28.
- Dennis, C., 1990. Processing to provide consistent quality for the consumer, *Fd. Sci. Tech. Today* 4 (1) : 28-32.
- Irianto, H.E., 1992. *Fish oil : refining, stability and its use in canned fish for the Indonesian market*, PhD Dissertation, Massey University, New Zealand.
- Pillai, V.K., 1974. Utilization of sardinella resources in India, In *Fishery product* ed. by Kreuzer, R., Fishing News Books, Surrey.