Southeast Asian Fish Products

Fourth Edition, 2002



Marine Fisheries Research Department
Southeast Asian Fisheries Development Center
Singapore

SOUTHEAST ASIAN FISH PRODUCTS

Fourth Edition, 2002

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Southeast Asian Fisheries Development Center

The Southeast Asian Fisheries Development Center (SEAFDEC) is a technical organization devoted to the accelerated development of fisheries in the region. The member countries of SEAFDEC are Japan, Brunei Darussalam, Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Singapore and Thailand. SEAFDEC has four departments, viz., the Marine Fisheries Research Department in Singapore, Training Department in Thailand, the Aquaculture Department in Philippines and Marine Fishery Resources Development and Management Department in Malaysia.

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Last but not least, we would like to thank, Mr Tan Sen Min, Chief of MFRD, for his useful comments and advice.

Note: The mention of trade names in this publication does not imply endorsement of the product.

Preface

Fish is a major traditional source of animal protein in the Southeast Asian region. There are many varieties of freshwater and marine fish that is widely accepted by most people and religions. These fish are also available as traditional fish products and these are listed in this publication.

In 1976, the SEAFDEC Council requested the government of Japan to send a Survey Mission to SEAFDEC Member Countries to determine the status of fish processing and preservation in order to decide on the priorities of a research and development program. The program identified was carried out by MFRD.

In 1984, the MFRD was requested to compile an inventory of fish products in Southeast Asia. The objective of the survey was to list the fish products available in countries in the region and the technical problems and constraints in meeting market requirements. That inventory, published in 1987, was the first of a series of compilations which represents comprehensive record of fish products in the region and will be of interest to researchers, food scientists, fish technologists and administrators. It is also useful for fish traders and may be used as a reference for further improvement of the quality of these products in the region.

In 1989, a similar survey resulting in the second inventory was undertaken. The challenge to conduct the second survey was raised at the 20th SEAFDEC Anniversary Seminar on Development of Fish Products in Southeast Asia in Singapore, October 1987.

Participants at the above seminar welcomed the publication and recommended periodic updating of information of the inventory. At that meeting, a workshop was held to deliberate on the second publication and suggestions for improvements were proposed for inclusion in the third edition.

The third edition was published in 1996 to coincide with the SEAFDEC Seminar on Advances in Fish Processing Technology in Relation to Quality Management in Southeast Asia, held in Singapore, 28 October – 2 November 1996. At the same time, a workshop on the Compilation of Fish Products in Southeast Asia was held to share the experiences of coordinators in the compilation of this inventory. The third inventory included the participation of a new member country, Vietnam for the first time. It also introduced readers to various types of fish products consumed in the country.

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INTRODUCTION

The objectives of this fourth survey were to:

1. update information on existing fish products
2. to document new fish products
3. identify their quality level, and
4. identify the constraints in their marketing and promotion
5. identify popular fish products from each country

The questionnaire for the survey was sent in early 1998 to invite the member countries to participate in the survey. Efforts were made to incorporate suggestions from users of the previous inventories and attempted to be as comprehensive as possible in including all the background information on fish products.

Eight ASEAN countries participated in this survey; they were Brunei Darussalam, Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Singapore and Thailand.

The products were classified into the following categories:

a. Boiled
b. Canned
c. Comminuted
d. Cured
e. Dried
f. Fermented
g. Fish meal
h. Frozen
i. Powdered/flaked
j. Smoked
k. Others

This fourth inventory is designed as a follow up on the first three inventories and therefore has common and updated features and information. The data is updated to 2000 and NA denotes data not available. This compilation includes details of fish products from the participating countries and the problems listed by them, information on prices of both raw and finished products are documented, together with related packaging methods and materials, storage conditions and shelf life. Special features for this edition include photographs and detailed information on popular fish products from each participating countries. The information will provide readers with an overview of the fish products available in Asia. The information presented in this inventory, however, is not exhaustive.

The exchange rate was arbitrarily fixed as at Sept 2000:

US$ 1= Rp 8669.35 = Peso 50.4602 = Ringgits 3.80 = S$ 1.76 = B$ 1.76 = Baht 41.82 = Kyats 6.47 = Riels 3815.80

One of the problems indicated in this inventory is the lack of quality control during processing and the need to improve on packaging. Problems in the production and marketing of fish products recorded in previous inventories are again listed by the participating countries in this fourth inventory. This shows, unfortunately that improvements have not been made fast enough. The problems listed include short storage life and packaging of products, poor hygiene and sanitation of processing areas. In the case of the traditional products – dried, fermented and smoked – the problems listed also included poor handling of rawmaterials and processing methods resulting in inconsistent quality of the final products.

ISSUES FACING THE TRADITIONAL FISH PRODUCTS INDUSTRY IN SOUTHEAST ASIA

In Southeast Asian countries, traditional fish products represent a significantly large part of total fish utilization accounting for approximately 30-45% of the landed catch. They are a major source of animal protein for the local population and the production of traditional fish products is an important means of preserving fish. They include products that are boiled, dried, salted, smoked, marinated, fermented, minced and powdered. Many products are unique to each country, but the technology underlying their production is similar in all countries. With a few exceptions, traditional fish products are usually of low value and meant for the domestic market only. However, some specialty products may be of high-value and other products such as fish sauce are now being exported. The traditional fish products industry is generally comprised of household producers and small and medium-size enterprises (SME), which are family-owned operations with little mechanization.

Due to the low value of most traditional fish products, fish utilized for these products are usually of low quality or of a species difficult to utilize fresh. But as the quality falls so does the value of the product and too low a quality may make the product unacceptable for human consumption. In any case, whatever the final quality, these products must still meet minimum food safety requirements.

Some of the issues faced by the industry are the availability and low quality of raw materials, the lack of appropriate infrastructure, education, standard processing methods, research and development, safety and hygiene, financial assistance and marketing know-how. There are also post-harvest losses (physical and economic) in traditional product processing involving spoilage before processing, fragmentation, moldiness and insects. Improving traditional products is one of the factors in improving the utilization of fish within a country, as it will stimulate demand for more and better quality fish for human consumption.

ISSUES

Poor quality raw materials

While some traditional products are produced from low quality raw materials, too low a quality will lower the quality and subsequently the price of the traditional product further. In some cases, the fish species cannot be used at all for processing and are used for fish feed or fish meal instead. The greatest difficulty in improving the situation is the inherently low value of the traditional fish products. To address this, Governments need to stimulate the industry, which in turn will stimulate a demand for better quality.

Lack of supply of raw materials

In some countries, there is a lack of supply of raw materials. As demand and utilization have changed, fish that had in the past been utilized for traditional products are now being utilized for fresh fish and value-added products (e.g. surimi). This diversion often results in a raw material shortage for traditional products. Government assistance is needed to search for new resources or to set up an appropriate fisheries management system to ensure a consistent supply of raw material in order to balance food security with the economic gains from the alternative uses of the fish. Work also has to be carried out on better utilization of the resources available so that more fish landed can be turned into products for human consumption.

Lack of appropriate infrastructure

Infrastructure and landing sites in many areas need to be improved. Infrastructure improvements include chilled distribution channels of fish to markets and processing centres with the provision of relatively cheap ice to harvesters. Hygiene and sanitation, including potable water at the sites and improved handling and storage of the products are also necessary.

Lack of incentives to improve quality and the processing enterprise

Fish enters into the traditional processing sector because it cannot find a higher value elsewhere. Thus traditional products and processes are generally of low value. However, even for low value products, prices vary and unless the value of the traditional product is high enough, there will be no incentive to improve quality or the processing enterprise. Governments should consider the need for incentives to support and upgrade this industry so that it continues to play a vital role in the region's economy.

Lack of know-how in processing

In general, processors have a low education level and there is a lack of know-how in processing and marketing and a lack of standardized processing techniques. This, along with poor quality raw materials results in inconsistent quality of products. Training and education should be conducted for trainers as well as processors at national levels. Work should also be conducted to improve/standardize processing techniques and improve packaging and distribution of the products so that producers can realize optimal prices for their products. This would also include investigations into product diversity, value-adding and market promotion. This is the most important issue to resolve as the industry itself will cause changes in demand, but without knowledge these changes will take longer. Governments will need to strengthen their extension services, R & D activities and market promotion activities in relation to these products.

Lack of safety standards and information (laws/regulations, nutritive value, scientific data) on the products, including a potential threat to the authenticity of traditional products in relation to economic progress

Some traditional processes are unhygienic, use additives improperly and use poor quality raw materials. As a result, these products may be unsafe. Many existing laws/ regulations/ guidelines do not include food safety for traditional products. There is a general lack of information regarding the safety, social, economic, cultural and nutritive importance of traditional products; and with the development of improved traditional products, there is a fear that technology and standardization may destroy indigenous industry. Thus promotion and documentation of such products is essential. Research and development, along with extension, activities need to be carried out on product development, product identity, standards, safety and nutrition. Additionally, GMP, HACCP and QC requirements for the products need be established along with standard methods of analysis/ audit as related to national, regional and Codex requirements.

CONCLUSIONS

Traditional fish products are an important component of the diet for people in Southeast Asian countries, especially in the marginalized sectors of some populations. Considering the important role of these products in the diet of the people and the importance of a safe food supply to food security, it is imperative that the quality and safety of these products be improved. However, in improving traditional products consideration must be given to their unique nature and their cultural and social importance.

RECOMMENDATIONS

I. Promote and preserve production and use of the diversity of traditional fish products by:
   a) Securing a stable supply of quality raw materials;
   b) Assisting processors to improve their processing and operational capabilities; and
   c) Assessing the importance of social, economic and cultural implications on the traditional fish products

II. Strengthen research and training activities to improve the quality and safety of traditional fish products

III. Improve the marketing of traditional fish products

IV. Promote exchange of information on traditional fish products with emphasis on their processing, identity, nutritive value, standardization and safety

V. Take measures to ensure that the traditional products meet food safety requirements taking into account traditional methods of processing, storage and distribution

OVERVIEW OF FISH PRODUCTS

In this overview, information gathered from the survey on 11 categories of fish products are summarized. They are arranged to facilitate comparison of the similar products found among Southeast Asian countries.

1. BOILED FISH PRODUCTS

Boiled products are generally described as salted and boiled fish products by most countries. They are produced either by cooking in boiling water or in steam. They can be eaten either plain, with chili paste or curry, or consumed with rice or porridge. Their retail prices range from US$ 1.50 - US$ 4.00/ kg.

TABLE 1. COST OF RAW MATERIALS AND BOILED FISH PRODUCTS

Product	Local Name	Country	Cost (US$/kg)	
			Raw Material	Boiled Product
Mackerel	*Trey cham hoy*	CAM	NA	NA
Fish	*Ikan pindang badeng/paso*	IND	0.50	2.30
Fish	*Ikan pindang naya*	IND	0.30	1.50
Shrimp paste	*Sambal petis*	IND	NA	NA
Fish	*Ikan rebus*	MAL	NA	NA
Cooked crab	*Gananather*	MYA	1.14	4.00
Cooked fish	*Sek-hu*	SIN	NA	NA
Steamed fish	*Pla nung*	THA	0.75 - 1.00	1.50

Pelagic fish are the most commonly used ingredients for boiled products. The examples of the species used are Indian mackerel (*Rastrelliger kanagurta*), horse mackerel (selar), scad (*Caranx* spp.) and anchovy (*Stolephorus* spp.).

During the processing of boiled fish products, fish is cleaned and arranged on the bamboo basket or ceramic basin. Salt is added in between the layers of fish or spread on the fish surface to prevent the skin from peeling during boiling. The fish is then cooked by steaming or by immersing the basket of arranged fish into the boiling brine. It is then prepared for selling.

Most boiled fish products are consumed in the local market. Table 2 indicates the production and export volume of boiled fish products in Southeast Asian countries.

TABLE 2. PRODUCTION AND EXPORT VOLUME OF BOILED FISH PRODUCTS

Product	Country	Production Volume (MT)							Export Volume (MT)						
		1994	1995	1996	1997	1998	1999	2000	1994	1995	1996	1997	1998	1999	2000
Mackerel	CAM	469	872	1,229	940	929	513	458	NA	NA	NA	NA	NA	NA	NA
Fish	IND	128,096	112,548	131,400	139,421	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish	IND	128,096	112,548	130,680	33,715	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish	MAL	402	506	1,658	337.67	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cooked crab	MYA	NA	NA	4	4	NA	7	NA	NA	NA	4	4	NA	7	24.75
Cooked fish	SIN	NA	NA	NA	NA	NA	NA	NA	0	0	0	0	NA	NA	NA
Steamed fish	THA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA



SOURCE: MFRD, SINGAPORE

Boiled silver fish

In some countries, boiled fish is packed in polyethylene bag before being sold. The shelf life of these products varies from a few days to several months depending on the storage condition (see Table 3). The short shelf life of boiled fish products is the main problem encountered by most Southeast Asia countries, which is caused by poor hygiene and sanitation (Indonesia), post cooking contamination (Singapore), poor water quality (Myanmar) and need-for-improvement processing method (Thailand).

TABLE 3. STORAGE CONDITIONS AND SHELF LIFE OF BOILED FISH PRODUCTS

Product	Country	Storage Conditions	Shelf Life
Mackerel	CAM	Frozen	NA
Fish	IND	Room temperature	7 days
Fish	IND	Room temperature	3 days
Fish	MAL	Cool dry place of (-4 to 2)°C	3- 4 months
Cooked crab	MYA	Frozen at -20°C	6 months
Cooked fish	SIN	Room temperature	1 day. Up to 3 days if refrigerated
Steamed fish	THA	Refrigerated	7 - 8 days



SOURCE: DIRECTORATE FISH, INDONESIA

Packed boiled fish product sold at the supermarket in Indonesia

1.1 Examples of Popular Boiled Fish Products in Southeast Asia

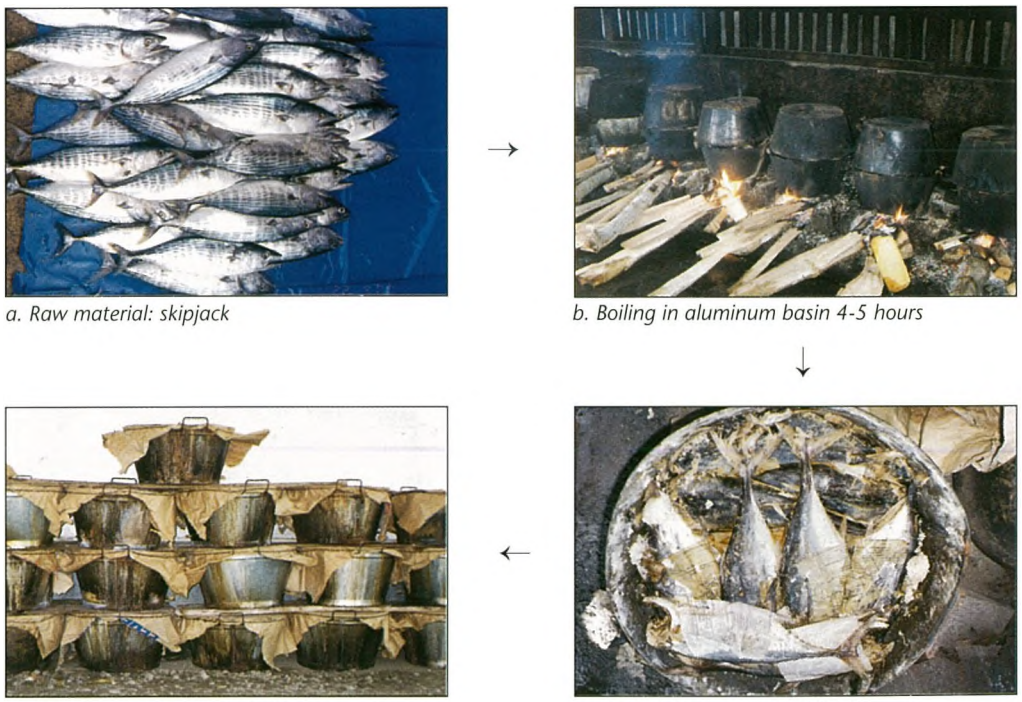
Product name : *Pindang badeng* (boiled fish)
Country of origin : Indonesia
Product description : Boiled and salted fish
Product use : Fried and served with rice and vegetables
Main ingredient : Skipjack *(Katsuwonus pelamis)*, longtail tuna *(Thinnus tonggol)*

Processing method :

1. Arrange fish in aluminum basin
2. Add salt in between the fish
3. Arrange fish in layers
4. Boil in saturated brine for 4-5 hours
5. Store in room temperature with aluminum basin

Refer to Fig 1 for illustrated flow chart of processing *pindang badeng*

Fig 1. Processing *pindang badeng* (boiled fish)



a. Raw material: skipjack

b. Boiling in aluminum basin 4-5 hours

c. Pindang badeng (boiled fish)

d. End products ready for distribution

SOURCE: DIRECTORATE FISH, INDONESIA

2. CANNED FISH PRODUCTS

Canned fish products are described as thermally processed fish in a hermetically sealed can containers. The fish is subjected to high temperature to destroy the pathogenic microorganisms. Canned fish products can be consumed directly or re-cooked before consumption. The retail prices of raw materials range from US$ 0.34 to US$ 2.10/ kg and the retail prices of finished canned products range from US$ 0.47 to US$ 7.00/ kg (see Table 4).

TABLE 4. COST OF RAW MATERIALS AND CANNED FISH PRODUCTS

Product	Local Name	Country	Cost (US$/kg)	
			Raw Material	Canned Product
Sardine, mackerel, tuna	*Ikan kaleng*	IND	0.53, 0.75, 2.00	2.50
Crab meat	*Kepiting kaleng*	IND	1.50	5.60
Anchovy in sambal	*Sambal ikan bilis*	MAL	3.58	NA
Fish in tomato sauce	*Ikan dalam sos tomato*	MAL	NA	NA
Sardine/ platu	*Platu sethutbu*	MYA	0.34	0.47
Hilsa	*Nga the lauk se thut bu*	MYA	0.44	1.14
Canned fish	*Nga myint chin sethutbu*	MYA	0.38	0.51
Mackerel	*Galonggong*	PHI	1.32 - 1.60	1.18 - 1.23
Sardine in tomato sauce	*Tamban*	PHI	0.80 - 1.32	1.93 - 2.30
Herring "French Style" (Bottled)	*Tawilis*	PHI	1.32 - 1.60	3.04
Anchovy "Frence Style" (Bottled)	*Tuakang*	PHI	1.32 - 1.60	1.30
Anchovy	*Dilis*	PHI	1.32 - 1.60	1.16
Tuna	*Tambacol*	PHI	1.85 - 2.10	1.88- 2.13
Milkfish	*Bangus*	PHI	1.60 - 1.85	5.91 - 6.64
Shrimp/ anchovy in sambal sauce	*Sambal shrimp/ anchovy*	SIN	NA	NA
Fish in tomato sauce	*Pla krapong*	THA	NA	NA
Crab meat	*Poo krapong*	THA	1.60 - 2.10	4.20 - 7.00
Baby clam	*Hoi lai krapong*	THA	0.50 - 0.80	1.60 - 3.30
Sardine in tomato sauce	*Pla sardine krapong*	THA	0.10 - 0.20	1.50 - 3.50
Shrimp	*Koong krapong*	THA	NA	1.60 - 5.30
Squid/ cuttlefish/ octopus	*Muck krapong*	THA	0.60 - 1.10	NA
Tuna	*Pla tuna krapong*	THA	0.40 - 1.50	3.10 - 4.40

Before being used in the canning process, the fish is cleaned and gutted. It is packed in can and cooked in exhaust before filling with sauce, liquid or oil. After seaming, the canned product is sterilized, cooled and labeled.

Canned products are packed in fiberboard carton box or carton box and stored in cool dry place. The shelf life of these products is about 6 months to 1 year (see Table 5). Problems encountered with canned fish products include excessive use of food additives, e.g. EDTA and sulphites and high levels of heavy metals, such as cadmium for clam.

TABLE 5. STORAGE CONDITIONS AND SHELF LIFE OF CANNED FISH PRODUCTS

Product	Country	Storage Conditions	Shelf Life
Sardine, mackerel, tuna	IND	Dry place at room temperature	12 - 24 months
Crab meat	IND	Refrigerated	12 months
Anchovy in *sambal*	MAL	Dry place at below 45°C	12 months or more
Fish in tomato sauce	MAL	NA	NA
Sardine/ platu	MYA	Room temperature	36 months
Hilsa	MYA	Room temperature	12 - 36 months
Canned fish	MYA	Room temperature	12 - 24 months
Mackerel	PHI	Cool, dry place at room temperature	12 months or more
Sardine in tomato sauce	PHI	Cool, dry place at room temperature	12 months or more
Herring "French Style" (Bottled)	PHI	Cool, dry place at room temperature	12 months or more
Anchovy "Frence Style" (Bottled)	PHI	Cool, dry place at room temperature	12 months or more
Anchovy	PHI	Cool, dry place at room temperature	12 months or more
Tuna	PHI	Cool, dry place at room temperature	12 months or more
Milkfish	PHI	Cool, dry place at room temperature	12 months or more
Shrimp/ anchovy in *sambal* sauce	SIN	Room temperature	36 months
Fish in tomato sauce	THA	Dry place at below 45°C	12 months or more
Crab meat	THA	Dry place at below 45°C	12 months or more
Baby clam	THA	Dry place at below 45°C	12 months or more
Sardine in tomato sauce	THA	Dry place at below 45°C	12 months or more
Shrimp	THA	Dry place at below 45°C	12 months or more
Squid/ cuttlefish/ octopus	THA	Dry place at below 45°C	12 months or more
Tuna	THA	Dry place at below 45°C	12 months or more

Thailand is the largest producer and exporter of canned tuna in the Southeast Asia region and one of the largest producers of canned fish products in the world. Although canned fish products are also available in Indonesia, Myanmar, Malaysia, Philippines and Singapore, there is no complete data on the export and/ or production volume (see Table 6).



SOURCE: DIRECTORATE FISH, INDONESIA

Canned fish

TABLE 6. PRODUCTION AND EXPORT VOLUME OF CANNED FISH PRODUCTS

		Production Volume (MT)							Export Volume (MT)						
Product	Country	1994	1995	1996	1997	1998	1999	2000	1994	1995	1996	1997	1998	1999	2000
Sardine, mackerel, tuna	IND	36,935	49,597	50,460	47,278	NA	NA	NA	26,217	34,613	35,050	27,278	NA	NA	NA
Crab meat	IND	3,400	3,806	4,513	6,298	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anchovy in *sambal*	MAL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish in tomato sauce	MAL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sardine/ platu	MYA	NA	NA	23.37	14.87	NA	37.88	NA	NA	NA	NA	NA	NA	NA	NA
Hilsa	MYA	NA	NA	NA	59.76	NA	64.15	NA	NA	NA	NA	NA	NA	NA	NA
Canned fish	MYA	NA	NA	63.75	46.75	NA	6.81	NA	NA	NA	NA	NA	NA	NA	NA
Mackerel	PHI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sardine in tomato sauce	PHI	NA	NA	NA	NA	NA	NA	NA	2,094	1,009	584	219	NA	NA	NA
Herring "French Style" (Bottled)	PHI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anchovy "Frence Style" (Bottled)	PHI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anchovy	PHI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tuna	PHI	NA	NA	NA	NA	NA	NA	NA	58,033	46,738	58,374	56,163	NA	NA	NA
Milkfish	PHI	153	167	174	173	NA	NA	NA	58	47	58	56	NA	NA	NA
Shrimp/ anchovy in *sambal* sauce	SIN	NA	NA	NA	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish in tomato sauce	THA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	18,128	17,353	19,437
Crab meat	THA	NA	NA	NA	NA	NA	NA	NA	6,903	8,008	6,157	6,067	7,177	7,616	4,493
Baby clam	THA	NA	NA	NA	NA	NA	NA	NA	5,214	4,655	4,234	4,555	5,145	5,501	4,973
Sardine in tomato sauce	THA	NA	NA	NA	NA	NA	NA	NA	33,339	41,677	35,707	34,752	37,926	32,198	35,936
Shrimp	THA	NA	NA	NA	NA	NA	NA	NA	50,666	58,755	67,248	75,493	84,604	101,387	15,165
Squid/ cuttlefish/ octopus	THA	NA	NA	NA	NA	NA	NA	NA	365	108	670	959	1381	782	871
Tuna	THA	NA	NA	NA	NA	NA	NA	NA	268,974	221,244	188,434	203,730	227,178	259,004	242,238

3. COMMINUTED FISH PRODUCTS

Comminuted fish products are made from minced meat and surimi. These products include fish ball, fish/ prawn sausage and burger, *chikuwa,* imitation crabstick and cuttlefish products.

Comminuted products can be consumed directly, cooked with noodles, rice or vegetables or in soup. The prices of raw materials range between US$ 0.31/ kg and US$ 3.96/ kg while the final comminuted products prices range between 8 cents per piece for prawn *wantan* (Malaysia) to US$6.80/ kg for Thailand's imitation crab meat *(Poo tium/ Poo aud)* (see Table 7).

TABLE 7. COST OF RAW MATERIALS AND COMMINUTED FISH PRODUCTS

Product	Local Name	Country	Cost (US$/kg)	
			Raw Material	Canned Product
Fish ball	*Bebola Ikan*	BRU	NA	NA
Fish cake	*Kek ikan*	BRU	NA	NA
Fish burger	*Burger ikan*	MAL	NA	3.35
Fish in tomato sauce	*Ikan dalam sos tomato*	MAL	NA	NA
Scallop flavor fish cake	NA	MAL	NA	0.09/piece
Cuttlefish sausage, cocktail	*Sosej sotong*	MAL	NA	3.53
Fish sausage	*Sosej ikan*	MAL	0.37	3.35
Fish ball	*Bebola ikan*	MAL	1.18	3.16
Fish cake	*Tauhu ikan*	MAL	0.37	NA
Otak-otak	*Otak-otak*	MAL	NA	NA
Prawn burger	*Burger udang*	MAL	NA	4.46
Prawn dumpling	NA	MAL	NA	0.10/piece
Prawn sausage	*Sasej udang*	MAL	NA	0.09/piece
Prawn *wantan*	NA	MAL	NA	0.08/piece
Cuttlefish ball	*Bebola sotong*	MAL	NA	2.38
Fish ball	*Nga soke*	MYA	0.31	0.88 - 1.37
Fried fish cake	*Nga soke*	MYA	0.35	1.26
Fish ball	*Bola-bola*	PHI	1.60 - 1.85	2.11
Surimi shrimp nugget	Nugget	PHI	3.96	3.44
Fish burger patty	Burger	PHI	1.90 - 2.11	2.90
Squid ball	*Bola-bola*	PHI	2.64	2.24
Native sausage	*Longanisa*	PHI	1.85 - 2.11	2.64
Surimi-shrimp patty	Patty	PHI	3.96	4.36
Breaded fish finger, nugget	NIL	SIN	NA	NA
Fish ball, fish cake	*Hu-ei/ hu-kueh*	SIN	NA	NA
Chikuwa, imitation crab stick	NIL	SIN	NA	NA
Prawn ball, finger	NIL	SIN	NA	NA
Otah-otah	*Otah-otah*	SIN	NA	NA
Cuttlefish ball/ paste/ finger	NIL	SIN	NA	NA
Imitation crab meat	*Poo tium/ Poo aud*	THA	1.50 - 2.30	5.40 - 6.80
Surimi	*Nur pla bod*	THA	0.30 - 0.50	1.50 - 2.30

Surimi and fish meat are the main ingredients for comminuted products. The term 'surimi' refers to fish minced meat that has been leached by washing with water and thoroughly mixed with additives such as sugar and polyphosphate before freezing. The types of fish used for surimi are threadfin bream *(Nemipterus* spp.), bigeye snapper *(Priacanthus* spp.), jewfish *(Sciaena* spp.) and lizardfish. Among the Southeast Asian countries, only Thailand indicated the production of surimi in this survey (see Table 8).

TABLE 8. PRODUCTION AND EXPORT VOLUME OF COMMINUTED FISH PRODUCTS

		Production Volume (MT)							Export Volume (MT)						
Product	Country	1994	1995	1996	1997	1998	1999	2000	1994	1995	1996	1997	1998	1999	2000
Fish ball	BRU	72.13	88.44	96.90	116	105	110	NA	NA	NA	NA	NA	NA	NA	NA
Fish cake	BRU	72.13	88.44	96.90	116	105	110	NA	NA	NA	NA	NA	NA	NA	NA
Fish burger	MAL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Scallop flavor fish cake	MAL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cuttlefish sausage, cocktail	MAL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish sausage	MAL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish ball	MAL	5,372	6,250.6	7,874.76	7,839.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish cake	MAL	NA	297.74	186.41	177.29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Otak-otak	MAL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Prawn burger	MAL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Prawn dumpling	MAL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Prawn sausage	MAL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Prawn *wantan*	MAL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cuttlefish ball	MAL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish ball	MYA	NA	NA	NA	NA	NA	38.14	NA	NA	NA	NA	NA	NA	NA	NA
Fried fish cake	MYA	NA	NA	NA	NA	NA	65.82	NA	NA	NA	NA	NA	NA	NA	NA
Fish ball	PHI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Surimi shrimp nugget	PHI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish burger patty	PHI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Squid ball	PHI	NA	NA	NA	NA	NA	NA	NA	NA	16,821	11,793	3,288	NA	NA	NA
Native sausage	PHI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Surimi-shrimp patty	PHI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Breaded fish finger, nugget	SIN	700	750	700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish ball, fish cake	SIN	NA	NA	NA	12,225	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chikuwa, imitation crab stick	SIN	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Prawn ball, finger	SIN	100	100	100	133	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Otah-otah	SIN	NA	NA	NA	NA	NA	NA	NA	0	0	0	0	NA	NA	NA
Cuttlefish ball/ paste/ finger	SIN	NA	NA	NA	774	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Imitation crab meat	THA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Surimi	THA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	75,220	79,184	84,062

Comminuted products are often produced directly from fresh fish. The species used are shark (*Stegrotoma faceiatom, Chiloselyllium* spp.), wolf herring (*Chirocentrus nudus*), barracuda (*Sphyyraena* spp.), bigeye snapper *(Somberomorus* spp.), threadfin bream, lizardfish, round herring (*Dussumieria* spp.), scad, Indian mackerel, tuna *(Thunnus tonggol, Euthynnus afinis, Katsunwonus pelamis, Thunnus alalunga*) and other species.



SOURCE: DIRECTORATE FISH, INDONESIA

Fish ball

The method of processing comminuted products varies according to the different types of product but generally it involves the washing of mince fish, mixing with ingredients, forming, cooking, cooling and packing. The machineries used are meat bone separator, mincer, mixing/ grinding machine, forming machine, water-bath and cooking facilities. The ingredients used are salt, sugar, oil, flour, monosodium glutamate, water and vegetables, etc.

Table 8 shows the variety of comminuted products available in Southeast Asian region. Little data on the production and export volume, however, is available.

Comminuted products are packed in polyethylene bag, palm leaf, polystyrene tray covered with wrapping film, vacuum packed or wrapped up at time of selling to consumers. The shelf life of these products range from a few days at 4 - 5°C to 3 - 12 months when frozen at -18°C (see Table 9). In this survey, most countries did not indicate any problems encountered in the comminuted products except Philippines and Brunei, which indicated packaging and hygiene respectively as their main problems.



SOURCE: MFRD, SINGAPORE

A range of comminuted products

TABLE 9. STORAGE CONDITIONS AND SHELF LIFE OF COMMINUTED FISH PRODUCTS

Product	Country	Storage Conditions	Shelf Life
Fish ball	BRU	Refrigerated	1 - 3 days
Fish cake	BRU	Refrigerated	1 week
Fish burger	MAL	Frozen at -20°C	6 months
Scallop flavor fish cake	MAL	Frozen at -20°C	6 months
Cuttlefish sausage, cocktail	MAL	Frozen at -20°C	6 months
Fish sausage	MAL	Frozen at -20°C	6 months
Fish ball	MAL	Refrigerated	7 days
Fish cake	MAL	Refrigerated	7 days
Otak-otak	MAL	Refrigerated	5 days
Prawn burger	MAL	Frozen at -20°C	6 months
Prawn dumpling	MAL	Frozen at -20°C	3 months
Prawn sausage	MAL	Frozen at -20°C	6 months
Prawn *wantan*	MAL	Frozen at -20°C	3 months
Cuttlefish ball	MAL	Frozen at -20°C	6 months
Fish ball	MYA	Room temperature	2 -3 days
Fried fish cake	MYA	Room temperature	2 -3 days
Fish ball	PHI	Frozen at -14°C	6 months
Surimi shrimp nugget	PHI	Frozen at -14°C	6 months
Fish burger patty	PHI	Frozen at -14°C	6 months
Squid ball	PHI	Frozen at -14°C	6 months
Native sausage	PHI	Chilled at 5°C	1 - 6days
Surimi-shrimp patty	PHI	Frozen at -14°C	6 months
Breaded fish finger, nugget	SIN	Frozen at -14°C	6 months
Fish ball, fish cake	SIN	Chilled/ frozen	3 - 5 days/ up to 6 months
Chikuwa, imitation crab stick	SIN	Frozen	6 months
Prawn ball, finger	SIN	Frozen	6 months
Otah-otah	SIN	Chilled	8 days
Cuttlefish ball/ paste/ finger	SIN	Frozen	6 months
Imitation crab meat	THA	Frozen at -18°C	3 - 5 months
Surimi	THA	Frozen at -18°C	3 - 5 months

3.1 Examples of Popular Comminuted Products in Southeast Asia

Product name : *Bebola ikan* (fish ball)
Country of origin : Brunei
Product description : A type of fish jelly product made from surimi, fresh fish meat, salt, flour and MSG
Product use : Cooked with vegetables and noodles, fried, or consumed directly
Main ingredient : Surimi, minced meat (threadfin bream, *Caesio* fish, Spanish mackerel)
Other ingredient : Salt, flour, MSG

Processing method :

1. Mix frozen surimi and fresh fish meat twice to get fine meat texture
2. Add salt, tapioca flour, MSG and water for 30 minutes to form a paste
3. Pass the paste through fish ball forming machine, size adjusted according to requirements
4. Set fish ball in warm water or tap water for 2 – 3 hours before boiling or frying
5. Pack the final products in styrofoam trays wrapped with plastic film for distribution to supermarket or packed in bulk in polyethylene bag for distribution to restaurants or open market

Refer to Fig 2 for illustrated flow chart of processing *bebola ikan*

Packaging condition: Plastic bag with or without water, styrofoam tray
Machines Used : Deboner, strainer, mixer, waterbath, fish ball forming machine
Storage condition : Refrigerated
Shelf life : 1 – 3 days

Problem in marketing and quality control :

- Stiff competition from imported product
- Lacked of hygiene and sanitary practices in plant
- Small demand of product for restaurants, supermarkets and open market

Fig 2. Processing *bebola ikan* (fish ball)



a. Raw material: surimi



b. Mincing surimi



c. Mixing with other ingredients



d. Forming fish ball



e. Setting



f. Placed on styrofoam tray and wrap with plastic film

SOURCE: DEPARTMENT OF FISHERIES, BRUNEI

Product name : *Kek ikan* (fish cake)
Country of origin : Brunei
Product description : Bar or oval shaped fish jelly product. Some incorporated with vegetables
Product use : Cooked with vegetables and noodles, fried, or consumed directly
Main ingredient : Surimi, fish meat (threadfin bream, *Caesio* fish, Spanish mackerel)
Other ingredient : Flour, salt, MSG, water

Processing method :

1. Prepare fresh fish
2. Remove head and gut. Wash. Remove bone
3. Leach, then strain the fish meat
4. Mix the fish meat with other ingredients
5. Pass the paste through fish cake forming machine or manually form fish paste to oval or bar shape
6. Set fish ball in warm water or tap water for 2 – 3 hours before boiling or frying
7. Pack in plastic bag or styrofoam tray before distribution

Packaging condition: Plastic bag, styrofoam tray
Machines used : Deboner, strainer, mixer, waterbath, fish cake forming machine
Storage condition : Refrigerated
Shelf life : 1 week
Product use : Deep fried and cooked with vegetables and noodles, served as side dish, boiled in soup

Problem in marketing and quality control :

- Stiff competition from imported products
- Lacked of hygiene and sanitary practices in plant
- Small demand amongst restaurants, supermarkets and open market

Product name : Fish ball
Country of origin : Malaysia
Production cost : RM 4.50/ kg
Price : RM 1.20/ 100 g
Main ingredient : Surimi
Other ingredient (proportion based on fish meat weight) :

- Salt 3%
- Corn Flour 6.0%
- Sugar 1.5%
- MSG 0.3%
- Ice cube 40 – 60%

Processing method :

1. Prepare surimi
2. Add salt, corn flour, sugar, MSG and ice cube. Mix evenly
3. Pass the paste through fish ball moulding machine
4. Set fish ball for 3 hours
5. Boil fish ball at 90°C
6. Cool fish ball and pack before distribution



SOURCE: DEPARTMENT OF FISHERIES, MALAYSIA

Fish ball

Product name : Fish ball, fish cake
Country of origin : Singapore
Main ingredient : Frozen surimi, frozen minced fish meat, frozen fish fillet

Processing method :

1. Thaw the frozen surimi in air
2. Cut the surimi block by surimi cutter
3. Mix surimi with other ingredients by silent cutter to form paste
4. Pass the surimi paste through fish ball/ fish cake forming machine
5. Set fish ball/ fish cake at 40-45°C for 20-30 minutes

Fish ball:

6. Cook fish ball at 90°C
7. Transfer fish ball to cooling tank, chill the product in cold water
8. Pack fish ball inside plastic bag before distribution

Fish cake:

6. Cook fish cake at 90°C
7. Deep fry fish cake
8. Cool fish cake and store it in chiller before distribution

Refer to Fig 3 for illustrated flow chart of processing fish ball/ fish cake

Fig 3. Processing fish ball/ fish cake



a. Thawing frozen surimi



b. Cutting surimi by surimi cutter



c. Mixing/grinding paste in silent bowl cutter



d. Forming



e. Setting



f. Cooking



f. Transporting fish ball/fish cake to cooling tank

SOURCE: MFRD, SINGAPORE

Fish ball



h. Chilling in cooled water



i. Packing raw fish ball

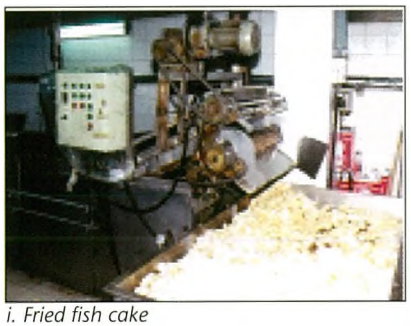


j. Storing finished products before distribution

Fish cake



h. Deep frying fish cake



i. Fried fish cake



j. Storing finished products in chiller before distribution

SOURCE: MFRD, SINGAPORE

Product name : *Otah*
Country of origin : Singapore
Main ingredient : Minced fish meat, *otah* paste

Processing method :

1. Mince fish meat in mincer/ blender
2. Mix with *otah* paste. Pass the mixture through the *otah* paste dispenser
3. Wrap the mixture in two pieces of coconut leaves. Secure the two ends with wooden splinter
4. Grill *otah* with electric griller

Refer to Fig 4 for illustrated flow chart of processing *otah*



SOURCE: MFRD, SINGAPORE

Otah

Fig 4. Processing *otah*



a. Raw material: minced fish meat



a. Raw material: otah paste



a. Raw material: coconut leaves



b. Mixing minced fish meat and otah paste in mincer/blender



c. Passing mixture through otah paste dispencer



e. Grilling by electric griller



d. Wrapping otah paste in of coconut leaves. Securing the ends with woods

SOURCE: MFRD, SINGAPORE

4. CURED FISH PRODUCTS

Curing by salting without drying or pickling is another traditional method of preservation. This method is common mostly in the Philippines. The cured product is known as *kench*-style cured fish. The main ingredients used for processing cured fish products are fish and salt. The types of fish used are skipjack, herring, round scad and mackerel.

The processing involves washing the raw materials and saturating it with salt. It is then washed with 2% salt. The salt water is drained away before packing the fish in wooden boxes. It is packed in layers of fish and salt. The equipment used are viz barrel, jar, pot or tank.

Kench-style cured fish is produced mainly for local consumption. The prices of the raw material range from US$ 1.32 to US$ 1.60 and the cured product is sold for US$ 1.90/ kg.



SOURCE: FTDI, DOF THAILAND

Pickled mussel



SOURCE: FTDI, DOF THAILAND

Cured mantis shrimps and small crab sold in local markets

The cured product is usually packed in glass bottle, wooden box or plastic container. The shelf life of this product is about 3 days at room temperature or 7 days at chilled condition. The product can be eaten after wet curing for 1 day.

The problems encountered in this production are mainly concerned with poor handling and sanitation. This results in reddening, souring, salt-burn or slimy products. The quality of the product can be improved by looking into the methods of processing, handling, transportation, marketing and packaging.

4.1 Examples of Popular Cured Fish Products in Southeast Asia

Product name : *Balbakua* (salted fish)
Country of origin : Philippines

Processing method :

1. Remove internal organ of fish and wash thoroughly
2. Soak in saturated brine solution for 3 - 4 hours or in 60°S brine solution overnight. For whole sardines, soak in saturated brine for 10 - 12 hours
3. Remove the brine-soaked fish and allowed to drain for 2 - 3 hours
4. Pack the drained fish in a wooden (lined with plastic sheet) or plastic box. Place a layer of salt on the bottom of the box and pack fish in layers with a heavy sprinkling of salt over each layer. The proportion of salt to fish may vary between 1:5 and 1:8 by weight. Put enough salt on top to make up for that which dissolves and runs out as brine. Containers with drain must be used to easily drain the brine formed
5. Store the salted fish at room temperature



SOURCE: BFAR, PHILIPPINES

Salted fish

5. DRIED FISH PRODUCTS

Dried fish product is one of the most widely processed and popular traditional products in Southeast Asia region. Dried fish products are described as salted dried products. They are usually deep fried till crispy or used in soups as flavor enhancers. They can also be cooked with vegetables or meat, mixed with salads or widely used in various ways in local dishes.

The prices of raw materials vary widely from US$ 0.26/ kg for jellyfish from Malaysia to US$ 7.40/ kg for abalone from Philippines. The price of dried products ranged from US$ 0.07/ kg for prawn shell dust from Myanmar to US$ 52.90/ kg for shark fin from Philippines. Retail price for raw materials and dried products are shown in Table 10 in the following page.

Raw materials used for dried fish products are fish, shrimp and squid. During the processing of dried fish products, fish is headed and gutted, precooked, soaked with brine, boiled and dried. Simple traditional types of equipments are mostly used, such as gas or kerosene stove, drying machine for dried shrimp and dried shark fin. Most countries in the survey did not indicate the use of sophisticated machinery.



SOURCE: DOF, MALAYSIA

Sun drying anchovies

TABLE 10. COST OF RAW MATERIALS AND DRIED FISH PRODUCTS

Product	Local Name	Country	Cost (US$/kg)	
			Raw Material	Canned Product
Anchovy	*Ikan bilis/ pusu kering*	BRU	2.50	12.51
Salted fish	*Ikan masin*	BRU	1.50	13.30
Chilled-sour salted fish	*Liking*	BRU	3.00	8.00
Salted fish	*Trey pra laak*	CAM	1.50	5.50
Smoked fish	*Trey chyer*	CAM	NA	NA
Dried fish	*Trey ngiet*	CAM	1.80	4.50
Small shrimp	*bankear kream*	CAM	NA	NA
Stingray	*Borbel ngiet*	CAM	NA	NA
Squid	*Meuk kream*	CAM	NA	NA
Fish meal	*Msao trey*	CAM	NA	NA
Sea cucumber	*Chleun samot*	CAM	NA	NA
Marine catfish	*Ikan asin jambal roti*	IND	0.75	3.00
Fish	*Ikan asin*	IND	0.75	4.50
Anchovy	*Teri nasi kering*	IND	0.70	1.50
Cuttlefish	*Sotong kering*	MAL	1.86	14.49
Salted fish	*Ikan masin*	MAL	NA	2.81
Shellfish	*Siput kering*	MAL	NA	NA
Jellyfish	*Ubur-ubur*	MAL	0.26	1.90
Cockie	*Kerang kering*	MAL	NA	NA
Prawn	*Udang kering*	MAL	1.14	9.40
Anchovy	*Ikan bilis/ bilis kering*	MAL	0.48	3.40
Jellyfish	*Yekhu*	MYA	1.50	1.65
Prawn shell dust	*Pazun phwe*	MYA	NA	0.07
Sea cucumber	*Myaut chauk*	MYA	NA	15
Dried squid	*Ye kyet chauk*	MYA	NA	1.79
Dried prawn	*Pazun chauk*	MYA	1.78	3.10
Various fish	*Nga chauk*	MYA	Depend on fish species	Depend on fish species
Shark	*Ngamantaung*	MYA	NIL	37.49
Anchovy	*Nganitu*	MYA	NA	1
Tilapia	*Nga chauk*	MYA	0.41	0.85
Slipmouth	*Daing na sap-sap*	PHI	1.32 - 1.60	2.17
Fish liver, fish roe	NA	PHI	0.53	1.72
Striped mackerel	*Daing na alumahan*	PHI	1.32 - 1.60	2.75
Anchovy	*Daing na dilis*	PHI	1.32- 1.60	1.94
Shrimp	*Hibe*	PHI	3.97	2.70
Lizard fish	*Daing na kalaso*	PHI	1.06 - 1.32	2.58
Milkfish	*Daing na bangus*	PHI	1.60 - 1.85	3.43
Siganid	*Daing na danggit*	PHI	1.59	8.56
Hairtail	*Daing na balila*	PHI	1.32 - 1.60	1.35
Crevalle	*Daing na salay-salay*	PHI	1.32 - 1.60	2.54
Eastern little tuna	*Daing na bonito*	PHI	1.32 - 1.60	2.38
Short-bodied mackerel	*Daing na hasa-hasa*	PHI	1.32 - 1.60	2.99
Long-tailed nemipterid	*Daging ns bisugo*	PHI	1.60- 1.85	3.40
Fimbriated herring	*Daing natonsoy*	PHI	1.06 - 1.32	2.27
Round scad	*Daing na galonggong*	PHI	1.32 - 1.60	2.29
Squid	*Daing na pusit*	PHI	2.11	6.87
Deep-bodied herring	*Daing na lapad*	PHI	1.32 - 1.60	2.64
Sea urchin	*Tugon*	PHI	1.85	3.70
Big-eyed scad	*Daing na matambaka*	PHI	1.32 - 1.60	2.03
Mullet	*Daing na kapak*	PHI	1.32 - 1.60	2.94
Sea cucumber	*Daing na trepang*	PHI	0.66	26.42
Abalone	*Sopas*	PHI	6.61- 7.40	13.20
Shark fin	*Pinatuyong paliklik ng pating*	PHI	2.11	52.90
Indian sardine	*Daing na tamban*	PHI	0.80 - 1.06	2.23
Barracuda	*Daing na torcillo*	PHI	1.32 - 1.60	2.06
Shark fin	*Hu-chi*	SIN	NA	NA
Sea cucumber	*Hai-som*	SIN	NA	NA
Shellfish	*Hoi hang*	THA	0.88 - 1.00	5.00
Shrimp	*Kung hang*	THA	2.50 - 3.50	8.75
Squid	*Pla muk hang*	THA	1.75 - 2.75	7.50

Most of dried products are consumed locally while some are exported. Details of the production and export figures of dried fish products in Southeast Asia are shown in Table 11.

TABLE 11. PRODUCTION AND EXPORT VOLUME OF DRIED FISH PRODUCTS

		Production Volume (MT)							Export Volume (MT)						
Product	Country	1994	1995	1996	1997	1998	1999	2000	1994	1995	1996	1997	1998	1999	2000
Anchovy	BRU	2.42	1.77	1.28	2.063	NA	NA	NA	NIL	NIL	NIL	NIL	NA	NA	NA
Salted fish	BRU	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chilled-sour salted fish	BRU	2.90	9.0	4.5	9.0	3.57	5.52	NA	NA	NA	NA	NA	NA	NA	NA
Salted fish	CAM	1,490	1,250	1,822	1,888	4,503	3,277	1,855	NA	0.370	150	NA	NA	NA	NA
Smoked fish	CAM	511	453	383	401	573	412	512	NA	2.414	0.469	0.312	0.21	3.818	NA
Dried fish	CAM	991	1,602	839	1,162	1,663	733	1562	NA	50.908	31.286	0.855	8.710	8.546	NA
Small shrimp	CAM	44	41	41	48	82	94	185	NA	0.244	NA	0.384	NA	NA	NA
Stingray	CAM	28	24	19	17	17	23	37	NA	NA	NA	NA	NA	NA	NA
Squid	CAM	27	21	17	17	19	14	18	NA	NA	NA	NA	NA	NA	NA
Fish meal	CAM	NA	NA	333	1,300	1,100	540	740	NA	NA	NA	NA	NA	NA	NA
Sea cucumber	CAM	18	15	14	14	13	10	7	NA	NA	NA	NA	NA	NA	NA
Marine catfish	IND	42,402	43,423	51,362	78,578	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish	IND	22,585	28,034	30,872	253,869	NA	NA	NA	5,132	7,412	9,052	NA	NA	NA	NA
Anchovy	IND	150,368	157,216	161,779	NA	NA	NA	NA	7,750	4,868	12,340	NA	NA	NA	NA
Cuttlefish	MAL	80	77.08	89.59	131.45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Salted fish	MAL	4321	3593.19	4582.86	4370.95	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Shellfish	MAL	17	205.2	95.49	186.54	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jellyfish	MAL	52	153	311.26	304.84	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cockie	MAL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Prawn	MAL	895	592.03	627.54	419.48	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anchovy	MAL	4,480	4,752.3	4,570.86	4,730.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Jellyfish	MYA	NA	NA	NA	NA	NA	NA	NA	NA	1,697.74	3,984.46	1,162.91	NA	560	241.26
Prawn shell dust	MYA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	152.00	NA	NA	12.51
Sea cucumber	MYA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	409.24	NA	NA	NA
Dried squid	MYA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.07	NA	NA	NA
Dried prawn	MYA	NA	NA	NA	NA	NA	NA	NA	NA	22.64	337.66	312.61	NA	314.6	268.07
Various fish	MYA	53,619	45,131	58,336	62,019	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Shark	MYA	5.3	7.9	10.2	18.4	NA	21.79	NA	NA	0.07	1.25	1.99	NA	NA	0.014
Anchovy	MYA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tilapia	MYA	NA	NA	NA	NA	NA	NA	NA	NA	86.65	85.96	152.12	NA	NA	158.92
Slipmouth	PHI	NA	NA	NA	NA	NA	NA	NA	6	8	8	7	NA	NA	NA
Fish liver, fish roe	PHI	NA	NA	NA	NA	NA	NA	NA	3	3	5	NA	NA	NA	NA
Striped mackerel	PHI	NA	NA	NA	NA	NA	NA	NA	49	30	21	21	NA	NA	NA
Anchovy	PHI	NA	NA	NA	NA	NA	NA	NA	109	64	69	33	NA	NA	NA
Shrimp	PHI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lizard fish	PHI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Milkfish	PHI	NA	NA	NA	NA	NA	NA	NA	200	NA	NA	NA	NA	NA	NA
Siganid	PHI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hairtail	PHI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Crevalle	PHI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Eastern little tuna	PHI	NA	NA	NA	NA	NA	NA	NA	41	NA	NA	NA	NA	NA	NA
Short-bodied mackerel	PHI	NA	NA	NA	NA	NA	NA	NA	49	30	206	21	NA	NA	NA
Long-tailed nemipterid	PHI	NA	NA	NA	NA	NA	NA	NA	36	26	26	19	NA	NA	NA
Fimbriated herring	PHI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Round scad	PHI	NA	NA	NA	NA	NA	NA	NA	13	12	18	14	NA	NA	NA
Squid	PHI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,924	NA	NA	NA
Deep-bodied herring	PHI	NA	NA	NA	NA	NA	NA	NA	129	92	79	50	NA	NA	NA
Sea urchin	PHI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Big-eyed scad	PHI	NA	NA	NA	NA	NA	NA	NA	11	64	69	35	NA	NA	NA
Mullet	PHI	NA	NA	NA	NA	NA	NA	NA	10	8	5	5	NA	NA	NA
Sea cucumber	PHI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Abalone	PHI	NA	NA	NA	NA	NA	NA	NA	45	77	106	106	NA	NA	NA
Shark fin	PHI	NA	NA	NA	NA	NA	NA	NA	13	36	35	34	NA	NA	NA
Indian sardine	PHI	NA	NA	NA	NA	NA	NA	NA	3	1.2	0.5	1.5	NA	NA	NA
Barracuda	PHI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Shark fin	SIN	NA	NA	NA	260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sea cucumber	SIN	NA	NA	NA	483	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Shellfish	THA	880.5	927.0	1,169.6	NA	470.1	NA	NA	NA	NA	NA	NA	5,624	8,937	7,260
Shrimp	THA	7,509.1	8,316.0	10,491.0	NA	2,618.5	NA	6,258.6	2,945	3,181	NA	4,416	2,618.6	1,245	1,067
Squid	THA	3,465.60	2,971.6	2,996.36	NA	2,035.8	NA	9,101.3	1,443	1,075	815.0	1,140	438	467	428



SOURCE: DOF, CAMBODIA

Dried salted fish (whole fish)

Dried fish products are usually packed in polyethylene bag, hard cardboard box, wooden box, braided rattan/ bamboo basket, paper bag, sack, barrel or container during transportation. They are sometimes displayed at the retail without packaging.

The shelf life of dried products depends on the condition of the final products e.g. the moisture content. Except for Brunei's dried chilled-sour salted fish, most dried products can be kept for a few months as shown in Table 12 in the following page. Brunei's dried chilled-sour salted fish has shelf life of 2-3 days, as they are semi-dried. Dried products should be stored in cool dry places or in well-ventilated storage rooms. Their shelf life is around 1 - 4 months provided that insects or moulds do not attack the dried products.

In this survey, most countries identify poor hygiene, use of low quality materials and spoilage due to insect infestation and mould growth during storage as main problems encountered for dried fish products. In addition need for improvement in packaging is identified by Philippines.

In order to improve the quality of final products, there is a need to improve the sanitation and hygiene of premises, handling and processing of raw materials and final products.



SOURCE: DOF, MALAYSIA

Sun drying fish



SOURCE: DOF, MALAYSIA

Sun drying cuttlefish

TABLE 12. STORAGE CONDITIONS AND SHELF LIFE OF DRIED FISH PRODUCTS

Product	Country	Storage Conditions	Shelf Life
Anchovy	BRU	Cool, dry place	A few months
Salted fish	BRU	Cool, dry place	A few months
Anchovy	BRU	NA	NA
Chilled-sour salted fish	BRU	Dry place	2 - 3 days
Salted fish	CAM	Dry condition	NA
Smoked fish	CAM	Dry condition	NA
Dried fish	CAM	Dry condition	NA
Small shrimp	CAM	Dry condition	NA
Stingray	CAM	Dry condition	NA
Squid	CAM	Dry condition	NA
Fish meal	CAM	Dry condition	NA
Sea cucumber	CAM	Dry condition	NA
Marine catfish	IND	Dry place at room temperature	2 - 6 months
Fish	IND	Dry place at room temperature	2 - 3 months
Anchovy	IND	Clean, cool and dry place at room temperature or cool room	3 - 6 months
Cuttlefish	MAL	Cool, dry place	1 - 6 months
Salted fish	MAL	Cool, dry place	6 months
Shellfish	MAL	Cool, dry place	1 - 6 months
Jellyfish	MAL	Cool, dry place	1 - 6 months
Cockie	MAL	Cool, dry place	1 - 6 months
Prawn	MAL	Cool, dry place	3 - 6 months
Anchovy	MAL	Cool, dry place	1 - 6 months
Jellyfish	MYA	Cool, dry place of around 5°C	12 months
Prawn shell dust	MYA	Cool, dry place	NA
Sea cucumber	MYA	Room temperature	12 months
Dried squid	MYA	Cool, dry place	12 months
Dried prawn	MYA	Cool, dry place	6 months
Various fish	MYA	NIL	6 months
Shark	MYA	Cool, dry place	NA
Anchovy	MYA	Cool, dry place	6 months
Tilapia	MYA	Room temperature	6 months
Slipmouth	PHI	Clean, dry and cool place	A few months
Fish liver, fish roe	PHI	Clean, dry and cool place	A few months
Striped mackerel	PHI	Clean, dry and cool place	A few months
Anchovy	PHI	Clean, dry and cool place	A few months
Shrimp	PHI	Clean, dry and cool place	A few months
Lizard fish	PHI	Clean, dry and cool place	A few months
Milkfish	PHI	Clean, dry and cool place	A few months
Siganid	PHI	Clean, dry and cool place	A few months
Hairtail	PHI	Clean, dry and cool place	A few months
Crevalle	PHI	Clean, dry and cool place	A few months
Eastern little tuna	PHI	Clean, dry and cool place	A few months
Short-bodied mackerel	PHI	Clean, dry and cool place	A few months
Long-tailed nemipterid	PHI	Clean, dry and cool place	A few months
Fimbriated herring	PHI	Clean, dry and cool place	A few months
Round scad	PHI	Clean, dry and cool place	A few months
Squid	PHI	Clean, dry and cool place	A few months
Deep-bodied herring	PHI	Clean, dry and cool place	A few months
Sea urchin	PHI	Clean, dry and cool place	A few months
Big-eyed scad	PHI	Clean, dry and cool place	A few months
Mullet	PHI	Clean, dry and cool place	A few months
Sea cucumber	PHI	Clean, dry and cool place	A few months
Abalone	PHI	Clean, dry and cool place	A few months
Shark fin	PHI	Clean, dry and cool place	A few months
Indian sardine	PHI	Clean, dry and cool place	A few months
Barracuda	PHI	Clean, dry and cool place	A few months
Shark fin	SIN	Cool, dry place	Indefinite if properly stored
Sea cucumber	SIN	Room temperature	Indefinite if properly stored
Shellfish	THA	Well ventilated room/ chilled room	3 - 6 months
Shrimp	THA	Well ventilated room/ chilled room	3 - 6 months
Squid	THA	Well ventilated room/ chilled room	3 - 6 months

5.1 Examples of Popular Dried Fish Products in Southeast Asia

Product name : Dried salted fish
Country of origin : Brunei
Product description : Salted and sun dried fish
Product use : Fried and mixed with nuts or other ingredients. Ready-to-eat snack
Main ingredient : *Sardinella* spp.

Processing method :

1. Remove scale, head and gut of the fish. Open-split the belly and remove the bones
2. Wash three times with water, then drain
3. Soak in a solution of salt, sugar and MSG for 1 minutes in a ratio of 2:2:1 of salt, sugar and MSG respectively
4. Sun dry for 7 to 8 hours
5. Pack dried fish in small packets of polyethylene bags

Refer to Fig 5 for illustrated flow chart of processing dried salted fish.

Fig 5. Processing dried salted fish



a. Raw material: fresh sardine
b. Scaling
c. Heading
d. Gutting
e. Splitting
f. Deboning
g. Washing
h. Draining
i. Soaking
j. Sun drying
k. Dried fish
l. Packing in polyethylene

SOURCE: DEPARTMENT OF FISHERIES, BRUNEI

Product name : *Liking* (marinated dried fish)
Country of origin : Brunei
Product description : Semi-dried salted fish. Sold as fresh/chilled product in open market and supermarket
Product use : Fried and served as side dish
Main ingredient : Short-bodied mackerel, Chacunda gizzard, jewfish, croaker
Other ingredient : Salt, MSG, tamarind, chili paste

Processing method :

1. Wash fish. Remove scale and gut. Back-split the belly
2. Add tamarind, chili paste, salt and MSG
3. Keep fish overnight. Semi-dry for one day
4. Pack the semi-dried fish in plastic bag and styrofoam tray

Packaging condition: Plastic bag and styrofoam tray
Storage condition : Cool, dry place
Machine used : Blender
Shelf life : 1 week

Product name : *Trey ngiet* (dried fillet fish)
Country of origin : Cambodia
Product description : Dried fillet fish
Product use : Served with rice and other meals
Main ingredient : Snakehead, giant snakehead
Other ingredient : Salt, sugar and other flavors

Processing method :

1. Clean fish. Remove bone and gut. Fillet fish
2. Add salt to fish fillet. Add sugar and other flavors
3. Sun dry fish

Refer to Fig 6 for illustrated flow chart of processing *trey ngiet*

Packaging condition: Paper container, plastic bag
Storage condition : Dry place
Shelf life : 1 – 6 months
Target country for export : Thailand, Vietnam, Australia, China, USA, Malaysia
Problem in marketing and quality control : The quality of product deteriorates over time



SOURCE: DOF, CAMBODIA

Dried snakehead



SOURCE: DOF, CAMBODIA

Dried snakehead

Fig 6. Processing *Trey ngiet* (dried fillet fish)



a. Raw material: snakehead fish



b. Removing gut, bone. Filleting fish



c. Sun drying



d. Dried snakehead fillet

SOURCE: DOF, CAMBODIA

Product name : *Trey pra laak* (dried and salted fish)
Country of origin : Cambodia
Product description : Salted whole fish or fillet
Product use : Served with rice or porridge
Main ingredient : Soldier croaker
Other ingredient : Salt

Processing method :

1. Clean fish. Remove stomach part
2. Put the fish into the salt solution until the fish nearly fermented
3. Sun dry fish

Packaging condition: Bamboo basket, plastic bag
Storage condition : Dry place
Shelf life : 1 – 4 months
Target country for export : Vietnam, Singapore
Problem in marketing and quality control : Poor hygiene and quality of product deteriorates over time



SOURCE: DOF, CAMBODIA

Split dried salted fish



SOURCE: DOF, CAMBODIA

Fish placed on bamboo sheet for sun drying



SOURCE: DOF, CAMBODIA

Sun drying fish

Product name : Dried anchovy
Country of origin : Malaysia
Production cost : RM 8.00 to RM 10.00/ kg
Product price : depending on product grade
Grade 1 = RM 25.00 – RM 30.00/ kg
Grade 2 = RM 20.00 – RM 25.00/ kg
Grade 3 = RM 10.00 – RM 15.00/ kg

Processing method:

1. Clean fish
2. Boil in brine solution
3. Transfer to rattan trays
4. Remove from basket and drain
5. Sun dry for 2 - 4 days
6. Sort and pack

Storage condition : Cool, dry place
Shelf life : 2 – 5 months



SOURCE: DOF, MALAYSIA

Dried anchovy

Product name : Dried prawn
Country of origin : Malaysia
Production cost : RM 6.00 to RM 8.00/ kg
Product price : depending on product grade
Grade 1 = RM 30.00 – RM 40.00/ kg
Grade 2 = RM 20.00 – RM 30.00/ kg
Grade 3 = RM 10.00 – RM 20.00/ kg

Processing method :

1. Prepare small prawn
2. Spread to cemented floor. Sun dry
3. Pack to small gunny sacks
4. Beat continuously to remove shell
5. Sort according to size and grade. Pack

Storage condition : Cool, dry place

Product name : *Ikan asin jambal roti* (salted dried marine catfish)
Country of origin : Indonesia
Product use : Fried and served with rice and vegetables
Main ingredient : Marine catfish (*Arius thallasinus*)

Processing method :

1. Remove head of fish
2. Age fish by keeping it at room temperature overnight
3. Clean fish
4. Add salt 20-30 % w/w to fish. Keep fish-salt mixture for 24 hours
5. Add water. Soak fish-salt mixture for 24 hours
6. Wash fish with water
7. Dress and fillet fish
8. Sun dry fish until moisture content is around 30%
9. Pack in plastic bag

Refer to Fig 7 for illustrated flow chart of processing *ikan asin jambal roti*

Packaging condition: Plastic bag

Fig 7. Processing *ikan asin jambal roti* (salted dried marine catfish)



a. Raw material: marine catfish



b. Deheading fish



c. Aging fish overnight at room temperature



d. Adding 20-30% salt, keep for 24 hours. Then soaking in water for another 24 hours



e. Washing fish with water



f. Sun drying fish until moisture is around 30%



g. Salted dried catfish

SOURCE: DIRECTORATE FISH, INDONESIA

Product name : *Trey nasi* (dried anchovy)
Country of origin : Indonesia
Product use : Fried and served with rice and vegetables
Main ingredient : Anchovy (*Ophio cephallus* spp.)

Processing method :

1. Boil fish in 0.3% brine for 5 – 10 minutes
2. Sun dry or use mechanical dryer to reduce the moisture content to around 40%
3. Size and sort fish
4. Pack in plastic bag or carton
5. Store in cold storage

Refer to Fig 8 for illustrated flow chart of processing *trey nasi*

Packaging condition: Plastic bag and carton

Fig 8. Processing *trey nasi* (dried anchovy)



a. Raw material: anchovy



b. Sun drying anchovy



c. Trey nasi (dried anchovy)



d. Storing final product in carton

SOURCE: DIRECTORATE FISH, INDONESIA

Product name	: *Nam prik pla* yang (dried smoked fish)
Country of origin	: Thailand
Product use	: Served with rice or raw/ cooked vegetables
Product description	: Dried fish paste with strong spicy flavour
Main ingredient	: Dried smoked marine and/ or freshwater fish
Other ingredient	: Garlic, shallot, dried pepper, vegetable oil, salt, coconut sugar, tamarind paste

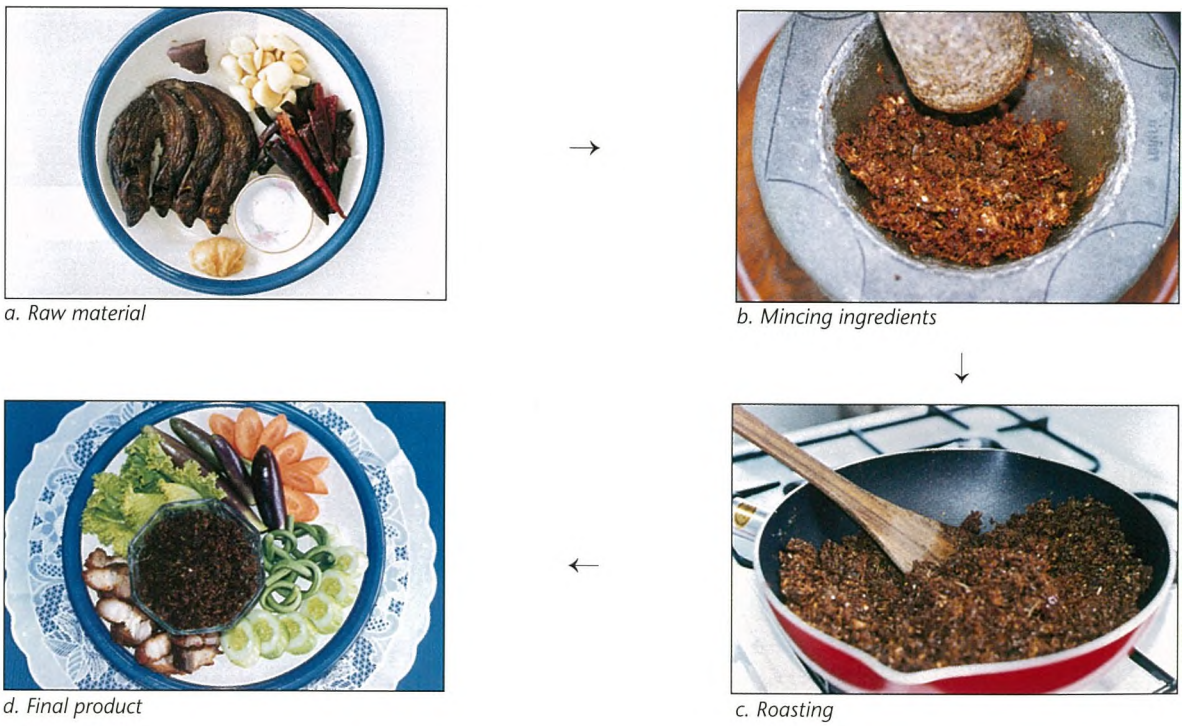
Processing method :

1. Mince smoked fish and other ingredients
2. Roast fish mix
3. Ready to serve

Refer to Fig 9 for illustrated flow chart of processing *Nam prik pla yang*

Shelf life	: 1 – 3 months
Storage condition	: 5 - 8°C

Fig 9. Processing *Nam prik pla yang* (dried smoked fish)



a. Raw material

b. Mincing ingredients

c. Roasting

d. Final product

SOURCE: FTDI, DOF, THAILAND

Product name : Dried shrimp
Country of origin : Thailand
Product use : Deep fried and used as sub-ingredient in local dish

Processing method :

1. Wash raw shrimp
2. Boil in brine solution for 15 minutes
3. Drain
4. Sun dry shrimp for 4 – 6 hours
5. Dry in dryer for 20 – 30 minutes
6. Remove shell
7. Sort and grade shrimp
8. For medium and large shrimp, dry in dryer for another 15 – 20 minutes
9. Pack

Refer to Fig 10 for illustrated flow chart of processing dried shrimp

Fig 10. Processing dried shrimp



a. Raw material: Shrimp

→



b. Washing

↓



c. Roasting

←



d. Sun drying for 4 - 6 hours, Drying in dryer for 20 - 30 minutes

↓

e. Deshelling → *f. Sizing* →



Final product

SOURCE: FTDI, DOF, THAILAND

6. FERMENTED FISH PRODUCTS

Fermented fish products are described as a way for preserving the fish that involves deliberate growth of fermentative microorganism. In most Southeast Asian countries, fish fermentation process involves addition of salt, followed by drying or reducing fully fermented products to liquid or paste. The fermentation products are extremely varied, they can take form of a liquid (fish sauce), paste (shrimp paste) or whole fish (fermented anchovy).

During fermentation, salt is added at certain concentration to inhibit the growth of pathogenic organism as well as to encourage the growth of desired organism that breakdown muscle and develop flavor. The mixture is left to ferment till a desirable taste, color and flavor is matured before it is ready for consumption. In certain products, rice bran or roasted rice is added to the mixture to obtain a specific taste of flavor.

The fermented fish products can be eaten with rice, cooked with vegetables, prepared with onion, chili and spices or used in other ways. Fermented fish products are produced widely in all surveyed Southeast Asia countries except Singapore. The raw materials cost range from US$ 0.03/ kg for shrimp paste from Indonesia to US$ 1.60/ kg for fish sauce and fish paste from Philippines. Reported retail prices of fermented products and their raw materials are shown in Table 13.



SOURCE: DOF, MALAYSIA

Traditional fish sauce fermentation



SOURCE: DOF, MALAYSIA

Cottage industry for fish sauce fermentation

TABLE 13. COST OF RAW MATERIALS AND FERMENTED FISH PRODUCTS

Product	Local Name	Country	Cost (US$/kg)	
			Raw Material	Canned Product
Green mussel	*Budu kupang*	BRU	NA	NA
Cured shrimp	*Cincaluk*	BRU	0.50	15.99
Mussel	*Budu Kupang*	BRU	0.50	15.99
Shrimp paste	*Belacan*	BRU	1.00	15.00
Shrimp paste	*Belacan*	BRU	1.00	16.70
Fish sauce (mixed species)	*Teuk Trey*	CAM	NA	NA
Small shrimp or krill	*Ki*	CAM	NA	NA
Crab	*Kdarm pray*	CAM	NA	NA
Fish	*Prorhok*	CAM	NA	NA
Fish	*Phor-ork*	CAM	NA	NA
Shrimp paste	*Petis*	IND	0.03	0.80
Fish	*Peda*	IND	0.38	0.77
Shrimp paste	*Terasi*	IND	0.30	2.00
Fish sauce	*Kecap ikan*	IND	0.30	0.50
Anchovy	*Budu*	MAL	0.37	NA
Shrimp paste	*Belacan*	MAL	0.22	2.04
Pickled prawn	*Cincaluk*	MAL	0.61	NA
Prawn paste	*Otak udang*	MAL	NA	NA
Fish sauce	*Ngan pyaye*	MYA	NA	0.20
Fermented mysis	*Hmyin ngapi*	MYA	NA	0.50
Fish	*Ngachin*	MYA	NA	1.10
Shrimp	*Pazunchin*	MYA	0.09	1.42
Fish	*Nagpi yecho*	MYA	0.55	0.73
Fish paste	*Bagoong isda*	PHI	1.30 - 1.60	3.51
Shrimp paste	*Bagoong alamang*	PHI	0.80	3.49
Fish sauce	*Patis*	PHI	1.30 - 1.60	1.63
Fish sauce	*Nam pla*	THA	0.11	0.25 - 1.00
Fish	*Pla-ra*	THA	0.30 - 1.25	0.50 - 1.25
Fish sauce (muslim)	*Budu*	THA	0.63	0.75
Fish	*Plasom, plajom, somfak*	THA	0.45	0.58
Shrimp paste	*Kapi*	THA	0.63	0.75

Fermented fish products are prepared from shrimp, prawn, mussel and fish, such as anchovy (*Stolephorus* spp.), sardine (*Sardinella* spp.) and mackerel. The species of fish used in the fermentation of fish sauce in some Southeast Asian countries are listed in Table 14.

TABLE 14. SPECIES OF FISH USED FOR FISH SAUCE PRODUCTION IN SOME SOUTHEAST ASIAN COUNTRIES

Countries	Local Names	Species of fish used
Indonesia	*Kecap ikan*	*Clupea spp., Stolephorus spp., Puntius spp., Osteochilus spp., Ctenops spp.*
Philippines	*Patis*	*Stolephorus commersonji, S.indicus, Clupeoides lile, Sardinella perforata, S.frimbriata, S.longiceps, Decapterus macrosoma*
Thailand	*Nampla, budu*	*Stolephorus spp., rastrelliger spp., Clupea spp., Sardinella spp., Cirrhinus spp.*
Vietnam	*Nuocomam*	*Stolephorus spp., Clupeoides lile, Eagraulis mystax, Decapterus spp.*
Japan*	*Uwo-Shoyu, qunaga*	*Lilogo bleekeri, Katsuwonus pelamys*

* for reference
Adapted from P.Saisithi, 1994

The raw materials are mixed with salt. The liquid is then drained off. Depending on types of products, the mixtures are packed in plastic bag, bamboo basket or wooden tub before allowed to ferment at room temperature. They can also be sun-dried or left to mature in fermenting vat, earthenware jar, concrete tank, plastic drum, oil drum or oil can.

Most of the fermented products in Southeast Asia are consumed locally and some are exported. Table 15 lists the production and export volume of fermented fish products in Southeast Asian region.

TABLE 15. PRODUCTION AND EXPORT VOLUME OF FERMENTED FISH PRODUCTS

		Production Volume (MT)							Export Volume (MT)						
Product	Country	1994	1995	1996	1997	1998	1999	2000	1994	1995	1996	1997	1998	1999	2000
Green mussel	BRU	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cured shrimp	BRU	3.219	2.541	2.143	3.515	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mussel	BRU	3.219	2.541	2.143	3.515	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Shrimp paste	BRU	7.017	7.063	5.942	2.063	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Shrimp paste	BRU	3.22	2.54	2.14	3.515	NA	NA	NA	NIL	NIL	NIL	NIL	NA	NA	NA
Fish sauce (mixed species)	CAM	2,488	1,866	1,582	1,990	5,200	4,214	5,42	NA	NA	NA	NA	NA	NA	NA
Small shrimp or krill	CAM	61	40	48	66	70	66	92	NA	NA	NA	NA	NA	NA	NA
Crab	CAM	5	8	13	19	21	38	40	NA	NA	NA	NA	NA	NA	NA
Fish	CAM	4,064	5,353	3,477	4,210	4,716	4,297	7,187	NA	NA	NA	NA	NA	NA	NA
Fermented fish	CAM	1,273	1,252	697	933	702	455	1165	NA	NA	NA	NA	NA	0.030	NA
Shrimp paste	IND	5,620	7,413	9,324	2,997	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fermented fish	IND	5,774	11,193	12,567	2,260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Shrimp paste	IND	6,912	17,393	23,512	2,997	NA	NA	NA	4,533	3,295	6,780	NA	NA	NA	NA
Fish sauce	IND	895	677	11,680	NA	NA	NA	NA	NA	NA	NA	1	NA	NA	NA
Anchovy	MAL	146	54.8	79.03	93.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Shrimp paste	MAL	5,073	4,147.22	4,937.86	4,641.43	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pickled prawn	MAL	52	53.63	13.21	27	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Prawn paste	MAL	2	2.71	18.2	15.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish sauce	MYA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fermented mysis	MYA	80,304	67,592	87,368	92,886	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fermented fish	MYA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fermented Shrimp	MYA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fermented fish	MYA	109,104	86,072	118,699	113,395	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish paste	PHI	NA	NA	NA	NA	NA	NA	NA	172	219	194	114	NA	NA	NA
Shrimp paste	PHI	NA	NA	NA	NA	NA	NA	NA	942	667	791	687	NA	NA	NA
Fish sauce	PHI	NA	NA	NA	NA	NA	NA	NA	29	25	29	30	NA	NA	NA
Fish sauce	THA	NA	50,745,000	NA	1,551.058	31.745	38,224	40,576.7	NA	50,745,000	NA	1,551.058	31,745.3	38,277	28,752.6
Fermented fish	THA	NA	NA	NA	18.18	NA	NA	5,494.5	NA	NA	NA	18.18	NA	NA	NA
Fish sauce (muslim)	THA	NA	318,400	NA	NA	NA	NA	NA	NA	318,400	NA	NA	NA	NA	NA
Fermented fish	THA	NA	NA	NA	NA	NA	NA	5,941.9	NA	NA	NA	NA	NA	NA	NA
Shrimp paste	THA	NA	NA	NA	NA	NA	NA	10,322.8	NA	NA	NA	NA	NA	NA	NA

The fermented products are normally packed and sold in glass bottle, jar or can, polyethylene bag, glazed earthenware pot, bamboo basket, tin, banana leaf or plastic box. The products are stored in well-ventilated room or cool, dry place. The shelf life of fermented fish products range from 1 week for fermented fish Myanmar to 3 years for fish sauce and fermented fish from Thailand. Table 16 shows the shelf life and storage conditions for this survey's fermented fish products.

TABLE 16. STORAGE CONDITIONS AND SHELF LIFE OF FERMENTED FISH PRODUCTS

Product	Country	Storage Conditions	Shelf Life
Green mussel	BRU	Cool, dry place	3 - 4 weeks
Cured shrimp	BRU	Cool, dry place	1 month
Fermented mussel	BRU	Cool, dry place	3 - 4 weeks
Shrimp paste	BRU	Cool, dry place	a few months
Shrimp paste	BRU	Cool, dry place	a few months
Fish sauce (mixed species)	CAM	Dry and normal condition	NA
Small shrimp or krill	CAM	Normal condition	NA
Fermented crab	CAM	Normal condition	NA
Fermented fish	CAM	Normal condition	NA
Fermented fish	CAM	Normal condition	A few months
Shrimp paste	IND	Dry place at room temperature	1 - 2 months
Fermented fish	IND	Dry place at room temperature	1 - 4 months
Shrimp paste	IND	Dry place at room temperature	3 - 6 months
Fish sauce	IND	Dry place at room temperature	6 - 12 months
Fermented anchovy	MAL	NA	NA
Shrimp paste	MAL	Cool, dry place	6 months
Pickled prawn	MAL	Cool, dry place	1 - 2 months
Prawn paste	MAL	Cool, dry place	6 months
Fish sauce	MYA	Room temperature	6 months
Fermented mysis	MYA	Room temperature	6 months
Fermented fish	MYA	Room temperature	1 week
Fermented shrimp	MYA	Room temperature	1 week
Fermented fish	MYA	Room temperature	12 - 24 months
Fish paste	PHI	Cool, dry place	6 - 12 months
Shrimp paste	PHI	Dry place at room temperature	3 - 6 months
Fish sauce	PHI	Dry place at room temperature	6 - 12 months
Fish sauce	THA	Cool, dry place	12- 36 months
Fermented fish	THA	Room temperature at 28 - 35°C	12- 36 months
Fish sauce (muslim)	THA	Room temperature	2 - 3 months
Fermented fish	THA	Room temperature at 29 - 33°C	7 - 9 days
Shrimp paste	THA	Room temperature at 29 - 30°C	12 - 18 months



SOURCE: DOF, MALAYSIA

Bottled fermented shrimp

In this survey, most countries identified problems encountered in fermented products, that is:

1. Long fermentation period required by traditional fermented products
2. Sanitation and hygiene problems, e.g. insect infestation and microbial spoilage during fermentation and storage that result in undesirable color, flavor and odor
3. Poor packaging of low-cost products, e.g. rust on the bottle caps and poor design

Most fermented fish products in Southeast Asia are basically salt-fermented products. Depending on the amount of salt added, the products are classified to high-salt (>20% salt of total weight) and low-salt (6-20% salt). When salt concentration is higher than 20% of total weight, pathogenic microorganism cannot grow and the product does not need other preservative means. If the salt concentration is lower than 20%, salted fish products undergoes rapid spoilage, hence other means of preservation is needed. Rice, flour and even sugar are used as carbohydrate source. The amount of added carbohydrate and salt concentration primarily control the extent of lactic acid fermentation and the keeping quality. Table 17 shows some of the properties of traditional fermented fish.

TABLE 17. PROPERTIES OF TRADITIONAL FERMENTED FISH PRODUCTS

Country	Product	Local Name	pH	Acidity (% lacticacid)	Salt
Malaysia	Shrimp paste	*Belacan*	7.2 - 7.8	-	20.0 - 25.0
	Fermented anchovy	*Budu*	5.4 - 6.2	-	21.7 - 28.2
	Fermented fish with rice	*Pekasam*	4.1 - 5.4	1.4 - 2.6	9.8 - 10.5
	Cured shrimp	*Cincaluk*	4.8 - 5.9	up to 2.8	7.0 - 17.0
Philippines	Fermented shrimp with rice	*Balao-balao*	3.6 - 3.8	1.8 - 2.00	-
	Fish paste	*Burong isda*	3.5 - 3.8	-	1.33
	Cured fish	*Bagoong*	5.5 - 6.0	-	13.0 - 25.3
	Fish sauce	*Patis*	5.5 - 5.9	1.02 - 1.04	20.0 - 25.0
Thailand	Fish sauce (muslim)	*Budu*	5.3 6.0	0.22 - 1.29	14.9 - 27.5
	Fish sauce	*Nam pla*	6.5 - 6.7	-	20.5 - 27.4
	Fermented fish	*Pla-ra*	4.7 - 6.2	0.37 - 3.15	7.8 - 17.9
	Fermented fish viscera	*Tai-pla*	5.2 - 6.2	1.01 - 2.34	25.0
	Red fermented fish	*Pla-paeng-daeng*	3.9 - 5.2	1.42 - 2.10	4.5 - 9.2
	Fermented fish	*Plasom*	4.0 - 4.6	2.12 - 4.01	2.25 - 5.9
	Fermented fish	*Somfak*	4.1 - 5.0	1.08 - 2.83	
Japan*	Fish paste	*Ika-shiokara*	6.0 - 7.0	-	8.0 - 15.0
	Fish sauce	*Shottsuru*	5.5 - 6.0	-	27.0 - 30.0

* for reference
Adapted from P.Saisithi, 1994

The fermentation process in the fermented fish products is mainly carried by proteolytic enzymes present in entrails and flesh of the fish. Bacterial participation, however, cannot be ignored in the overall fermentation process. Depending on the salt content of the products, different types of microorganisms dominate the fermentation. In high-salt products, the microflora population is

heterogenous with no specific population dominate during the early stage of fermentation. In the later stage of fermentation however, the microflora is dominated by halophilic bacteria. In low-salt product with carbohydrate added, lactic acid bacteria dominate the fermentation process. Table 18 lists the microorganisms found in fermented fish products in Southeast Asia.

TABLE 18. MICROORGANISMS FOUND IN FERMENTED FISH PRODUCTS

Country	Product	Local Name	Microorganisms
Philippines	Cured fish	*Bagoong*	*Pediococcus* spp., *Bacillus* spp.
	Fish sauce	*Patis*	*P. halophilus, Micrococcus* spp., *Halobacterium* spp., *Halococcus* spp., *Bacillus* spp.
	Fermented shrimp with rice	*Balao-balao*	*Leuconostoc* spp., *Lactobacillus* spp., *Pediococcus* spp., *Streptobacillus* spp.
	Fish paste	*Burong isda*	*Leuconostoc* spp., *Lactobacillus* spp., *Streptococcus* spp., *Micrococcus* spp.
Thailand	Fish sauce	*Budu, Nam pla*	*P. halophilus, Staphylococcus* spp., *Halobacterium* spp., *Halococcus* spp.
	Fermented fish	*Pla-ra*	*Pediococcus* spp., *P.halophilus, Staphylococcus* spp.
	Fermented fish viscera	*Tai-pla*	*Pediococcu* spp, *P. halophilus*
	Red fermented fish	*Pla-paeng-daeng*	*Pedicoccus* spp., *Staphylococcus* spp., *Micrococcus* spp., *P. halophilus*
	Fermented fish	*Plasom, somfak*	*Pedicoccus* spp., *Lactobacillus* spp., *Staphylococcus* spp.
		Pla-chom and kung-chom	*Pedicoccus* spp., *P.halophilus, Lactobacillus* spp., *Staphylococcus* spp.
Japan*	Fish sauce	*Shottsuru*	*Pediococcus homeri, Halobacterium* spp.
	Cured fish	*Ika-shiokara*	*Micrococcus* spp., *Staphylococcus* spp., *Debaryomyces* spp.

* for reference
Adapted from P.Saisithi, 1994

6.1 Examples of Popular Fermented Products in Southeast Asia

Product name : *Nam pla* (fish sauce)
Country of origin : Thailand
Product description : Clear, brownish color fish sauce
Product use : As condiments and/ or ingredients in local dishes
Main ingredient : Various freshwater fish or seawater fish, e.g. anchovy, round herring, Indian mackerel
Other ingredient : Salt

Processing method :

1. Wash fish
2. Put in wooden or cement tank with salt at a ratio of 5:1 to 1:1
3. Ferment fish 5 to 18 months
4. Filter the liquid formed. Expose to sun until ripe
5. Store sauce in bottles or earthenware jars

Refer to Fig 11 for illustrated production of commercial *nam pla*

Packaging condition: Bottle, jar
Storage condition : Room temperature
Shelf life : 2 years

Fig 11. Production of commercial *nam pla* (fish sauce)



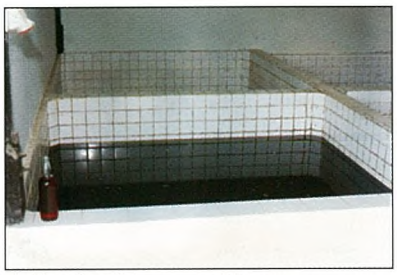
a. Raw material: marine salt



b. Fermenting fish sauce



c. Pumping filtered fish sauce



d. Blending fish sauce with sugar



e. Mechanical washing of bottle



f. Machine filling bottle with sauce



g. Packing line



h. Packing for distribution

SOURCE: FTDI, DOF, THAILAND

Product name : Shrimp paste
Country of origin : Brunei
Product description : Dried fermented salted shrimp
Product use : Fried and served as condiment in local dishes
Main ingredient : Shrimp (*Acetes* spp.)
Other ingredient : Salt

Processing method :

1. Wash shrimp twice with running water
2. Mix shrimp with salt at a ratio of 1:60 of salt to shrimp and left to stand overnight in a covered plastic bucket with small holes at the bottom to drain the excess liquid Add salt, tapioca flour, MSG and water for 30 minutes to form a paste
3. Sun dry fermented shrimp for 7-8 hours
4. Mince shrimp using electrical mincer and pounded using wooden or stone pounder to form a paste
5. Form shrimp to cake or ball of 600 g each
6. Pack in polyethylene bags and stored in freezer

Refer to Fig 12 for illustrated flow chart of processing shrimp paste

Packaging condition: Polyethylene bag

Fig 12. Processing shrimp paste



a. Fresh acetes



b. Washing



c. Fermenting



d. Sun drying



e. Mincing



f. Packing in polyethylene bag

SOURCE: DEPARTMENT OF FISHERIES, BRUNEI

Product name : *Petis* (shrimp paste)
Country of origin : Indonesia
Product use : As seasoning and flavorings for local dishes
Main ingredient : Shrimp/shrimp head
Other ingredient : Sugar (400% of shrimp weight), salt (6%), MSG (0.12%)

Processing method :

1. Add water to shrimp/ shrimp head (1:1), cook for 6 hours by continuous mixing
2. Grind cooked product while adding water (3:1/ v:w)
3. Filter shrimp mixture with cloth
4. Boil to evaporate water and paste formed. Add sugar, salt and MSG
5. Pack in plastic bag or jar

Refer to Fig 13 for illustrated flow chart of processing petis

Packaging condition: Polyethylene bag, jar

Fig 13. Processing *petis* (shrimp paste)



a. Raw material: shrimp head



b. Cooking



c. Grinding while adding water



d. Ground product



e. Filtration and extraction process



f.



g. Boiling filtrate while continuously stirred to form a paste



h. Adding sugar, salt and MSG



Shrimp paste packed in plastic jar



Shrimp paste packed in small plastic bag



Shrimp paste packed in plastic bag

SOURCE: DIRECTORATE FISH, INDONESIA

Product name : *Terasi* (shrimp paste)
Country of origin : Indonesia
Product use : Added to vegetables, as seasoning and flavoring for local dishes
Main ingredient : Shrimp/ shrimp head
Other ingredient : Salt (2%)

Processing method :

1. Grind shrimp while adding salt until form a paste. Allow the shrimp paste to ferment overnight
2. Slice paste thinly. Sun dry for 1 – 2 days
3. Grind dried paste.
4. Add water until homogenous
5. Form paste to desired shape
6. Pack in plastic bag

Refer to Fig 14 for illustrated flow chart of processing *terasi*

Packaging condition: Plastic bag

Fig 14. Processing *terasi* (shrimp paste)



a. Raw material: Small shrimp or shrimp head



b. Grinding while adding salt



c. Drying sliced fermented product for 1-2 days



d. Dried fermented product



e. Pound paste while adding water until homogenous



f. Forming paste manually



g. Formed paste



h. Shrimp paste in plastic bag packaging

SOURCE: DIRECTORATE FISH, INDONESIA

Product name : *Bangoong monamon* (anchovy paste)
Country of origin : Philippines
Product use : Ready-to-eat, as condiment or ingredient for local dishes
Intended use : Can be consumed with or without further cooking
Product description : Brown fish paste made from salted and fermented anchovy
Main ingredient : Anchovy (*dilis*)
Other ingredient : Salt, water, sodium benzoate

Processing method :

1. Ferment fish with salt for at least 1 month
2. Cook sauce with brine for 30 minute at 98-105°C

Please refer to Fig 15 for flow chart of processing *bangoong monamon*

End product characteristic :

- Salinity : 100°Be and above
- Salt content : 23 – 27%
- Aw < 0.85

Packaging condition: 12 oz lug type bottle with plastic cap
Storage condition : Room temperature (before opening) and/ or refrigerated (after opening)
Shelf life : 18 – 24 months



SOURCE: BFAR, PHILIPPINES

Bottled Bangoong monamon (anchovy paste)

6.1.1 Specifications of the raw materials and packaging materials for *bangoong monamon* (anchovy paste)

Raw Material:

- No off-odor or sign of decomposition
- Weight of filth/ foreign material: ≤ 1%.
- Salt content: 23 – 27%/ salinity is 100° Be and above
- Histamine level: ≤ 50 ppm/100g

Salt:

- Industrial food-grade
- Refines, free from filth and foreign matter
- Purity: 95-97%
- Moisture content: ≤ 5%

Water:

- Potable water with 0.5-1.5 ppm chlorine

Sodium benzoate:

- Food grade, white and in powder form
- Purity: 99.9%
- Packed in paper bag with plastic inside and stored at room temperature in dry storage area *(food additives: per country's requirement)*

Bottle:

- 12 oz. Lug type bottle

Cap:

- 58 mm plastic cap with liner (12 oz)

Capseal:

- Formed, shrink-wrapped
- Color: white
- Size: 96 x 26 mm



SOURCE: BFAR, PHILIPPINES

Bangoong monamon (anchovy paste)

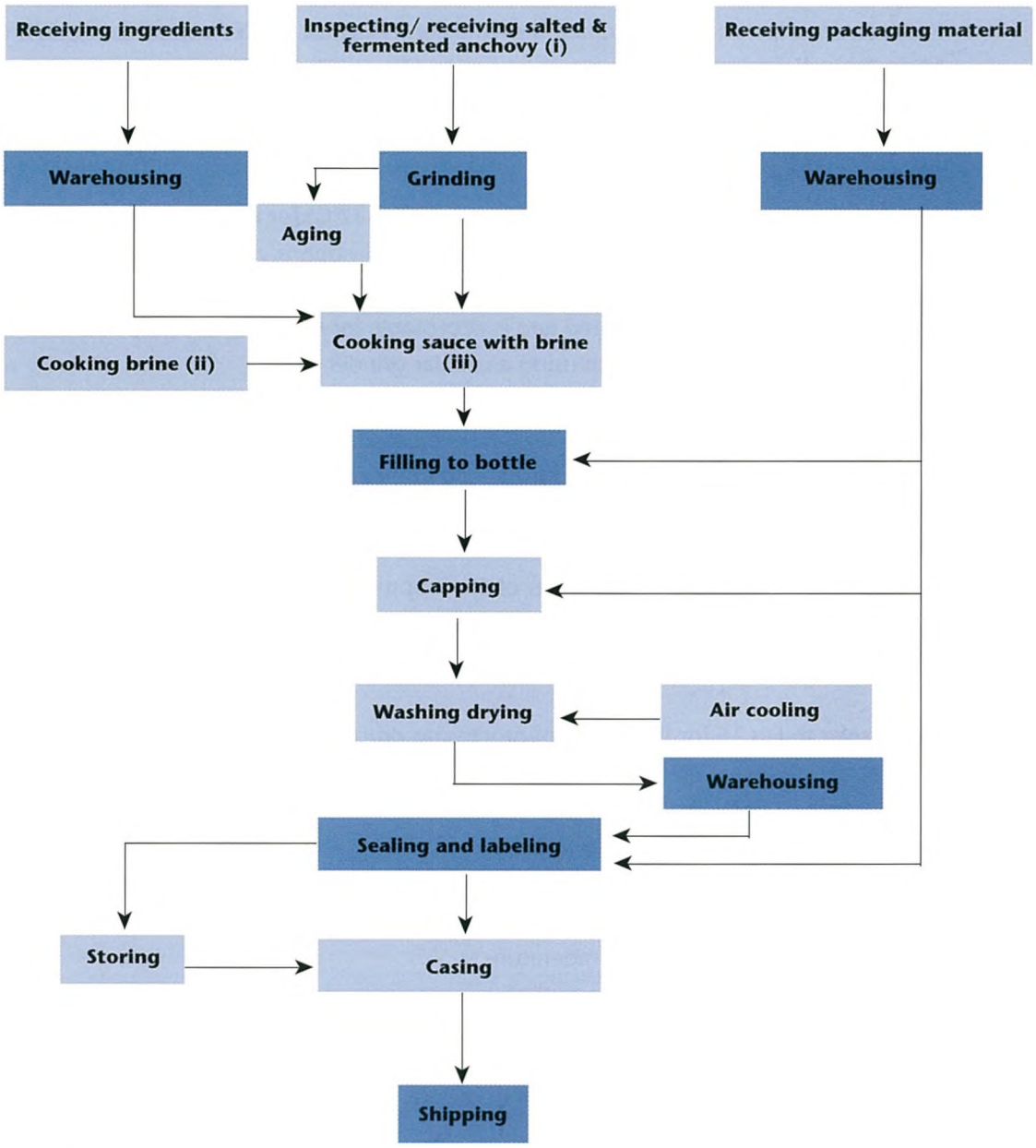
Label:

- According to buyers specifications, 60 - 65 microns thickness

Carton/ partition:

- Corrugated carton

Fig 15. Flow chart of processing *bangoong monamon* (anchovy paste)



Note:

i) 23-27% salt
Salinity: > 100° Be
Histamine content: < 50ppm/100g
At 2-4 weeks or until acceptable for production of bangoong monamon

ii) For 30 minutes at 98-105°C
95-100°Be

iii) For 30 minutes at 98-105°C
23-27% salt
100°Be salinity

Product name : *Patis* (fish sauce)
Country of origin : Philippines
Product use : Ready-to-eat, as condiment or ingredient for local dishes
Intended use : Can be consumed with or without further cooking
Product description : Clear golden brown color fish sauce made from anchovy, salt, caramel
Main ingredient : Anchovy
Other ingredient : Salt, caramel, coloring, potassium sorbate

Processing method:

1. Ferment fish and salt in ambient temperature (28-32°C) for 6 - 12 months or until the fish is fully fermented
2. Transfer fermented fish in clean container and hold under ambient temperature (28-32°C) for at least 2 weeks or fully fermented and is acceptable for use
3. Grind a part of fermented fish using a circular grinder
4. Cook brine by boiling salt and water fir 25 – 30 minutes at 98 - 105°C. Salinity of brine should be 96°Be and above. Filter
5. Cook anchovy sauce with brine for 25 – 30 minutes at 98 - 105°C
6. Fill salted fish with sauce to bottles. Ensure that head space is 1.5 – 2.0 cm
7. Cap manually. Cap tightness is 7 – 11 mm
8. Wash bottle with chlorinated water of 5 – 7 ppm
9. Code and label manually each bottle
10. Pack in carton

Please refer to Fig 16 for flow chart of processing *patis*

End product characteristic:

- Salinity : 95°Be and above

Packaging condition: 750 ml glass bottle with plastic cap
Storage condition : Room temperature
Shelf life : 18 – 24 months

6.1.2 Specifications of the raw materials and packaging materials for *patis* (fish sauce)

Raw Material:

- No off-odor or sign of decomposition
- Weight of filth/foreign material: ≤ 1%.
- Salt content: 23 – 27%/ salinity is 100° Be and above
- Histamine level: ≤ 50 ppm/100g



SOURCE: BFAR, PHILIPPINES

Patis (fish sauce)

Salt:

- Industrial food-grade
- Refines, free from filth and foreign matter
- Purity: 95-97%
- Moisture content: ≤ 5%

Caramel:

- Dark, brown liquid, thick, food grade

Potassium sorbate:

- Food grade, white and in powder form
- Purity: 99.9%
- Packed in paper bag with plastic inside and stored at room temperature in dry storage area *(food additives: per country's requirement)*

Water:

- Potable water with 0.5 - 1.5 ppm chlorine

Bottle:

- 750 ml glass bottle

Cap:

- Plastic cap with styro liner

Capseal:

- Formed, shrink-wrapped, yellow color
- Size: 55 x 65 mm

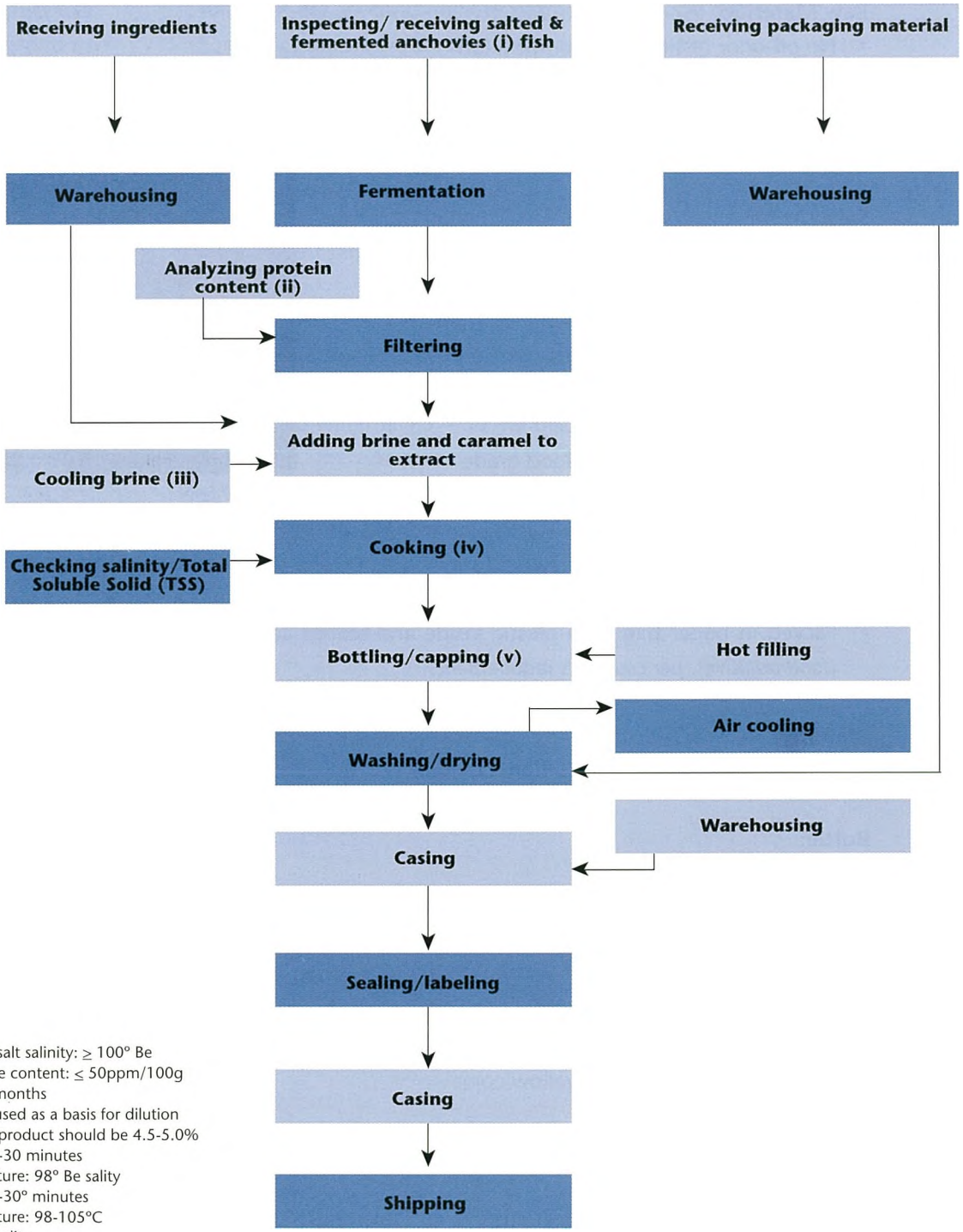
Label:

- According to buyers specifications, 60 - 65 microns thickness

Carton/ partition:

- Corrugated carton

Fig 16. Flow chart of processing *patis* (fish sauce)



Note:

i) 23-27% salt salinity: ≥ 100° Be
Histamine content: ≤ 50ppm/100g
At 6-12 months

ii) % CP is used as a basis for dilution
Finished product should be 4.5-5.0%

iii) Time: 20-30 minutes
Temperature: 98° Be sality

iv) Time: 20-30° minutes
Temperature: 98-105°C
>90° Be sality
ISS: 28-30° Brix

v) Filling temperature of the products should not be lower than 60°C
Plastic cap with lining immersed in brine solution before capping

Product name : *Bangoong padas* (siganid paste)
Country of origin : Philippines
Product use : Ready-to-eat, can be used as condiment or ingredient for local dishes
Intended use : Can be consumed with or without further cooking
Product description : Fish paste made from salted and fermented siganid
Main ingredient : Siganid fry
Other ingredient : Malt, water, sodium benzoate (food additives: per country's requirement)

Processing method:

1. Ferment fish with salt for around 1 month
2. Transfer raw material in clean container and hold under ambient temperature (28-32°C) for at least 2 weeks or until fully fermented and is acceptable for production use
3. Filter sauce from the fermented fish and cook for 30 minutes at 98-105°C. Salinity is 100° Be or above
4. Sort manually to remove extraneous material such as small fish, shell, stone, seaweed, pieces o f plastic, wood, then arrange the siganid fish at the sides of bottle. Fill bottle with sauce
5. Cap bottle manually, cap tightness: 7 – 11 mm
6. Wash bottle with chlorinated water (5 – 7 ppm)
7. Code and label each glass
8. Pack in carton

Please refer to Fig 17 for flow chart of processing *bangoong padas*

End product characteristic:

- Paste like sauce with sedimented siganid fry on the side of bottle, filled with clear sauce
- Salinity : 100 Boehm and above
- Aw : 0.85 and below

Packaging condition: 12 Oz lug type bottle, plastic cap
Storage condition : Room temperature and/ or refrigerated after opening
Shelf life : 2 years

6.1.4 Specifications of the raw materials and packaging materials for *bangoong padas* (siganid paste)

Raw Material:

- No off-odor or sign of decomposition
- Weight of filth/ foreign material: ≤ 1%.
- Salt content: 23 – 27%/ salinity is 100° Be and above

Salt:

- Industrial food-grade
- Refines, free from filth and foreign matter
- Purity: 95 – 97%
- Moisture content: ≤ 5%



SOURCE: BFAR, PHILIPPINES

Bangoong padas (siganid paste) in plastic jar

Water:

- Potable water with 0.5 – 1 .5 ppm chlorine

Sodium benzoate:

- Food grade, white and in powder form
- Purity: 99.9%
- Packed in paper bag with plastic inside and stored at room temperature in dry storage area *(food additives: per country's requirement)*

Bottle:

- 12 oz. Lug type bottle

Cap:

- Plastic cap with liner

Capseal:

- Formed, shrink-wrapped
- Color: yellow
- Size: 96 x 26 mm



SOURCE: BFAR, PHILIPPINES

Bangoong padas (siganid paste) in bottle

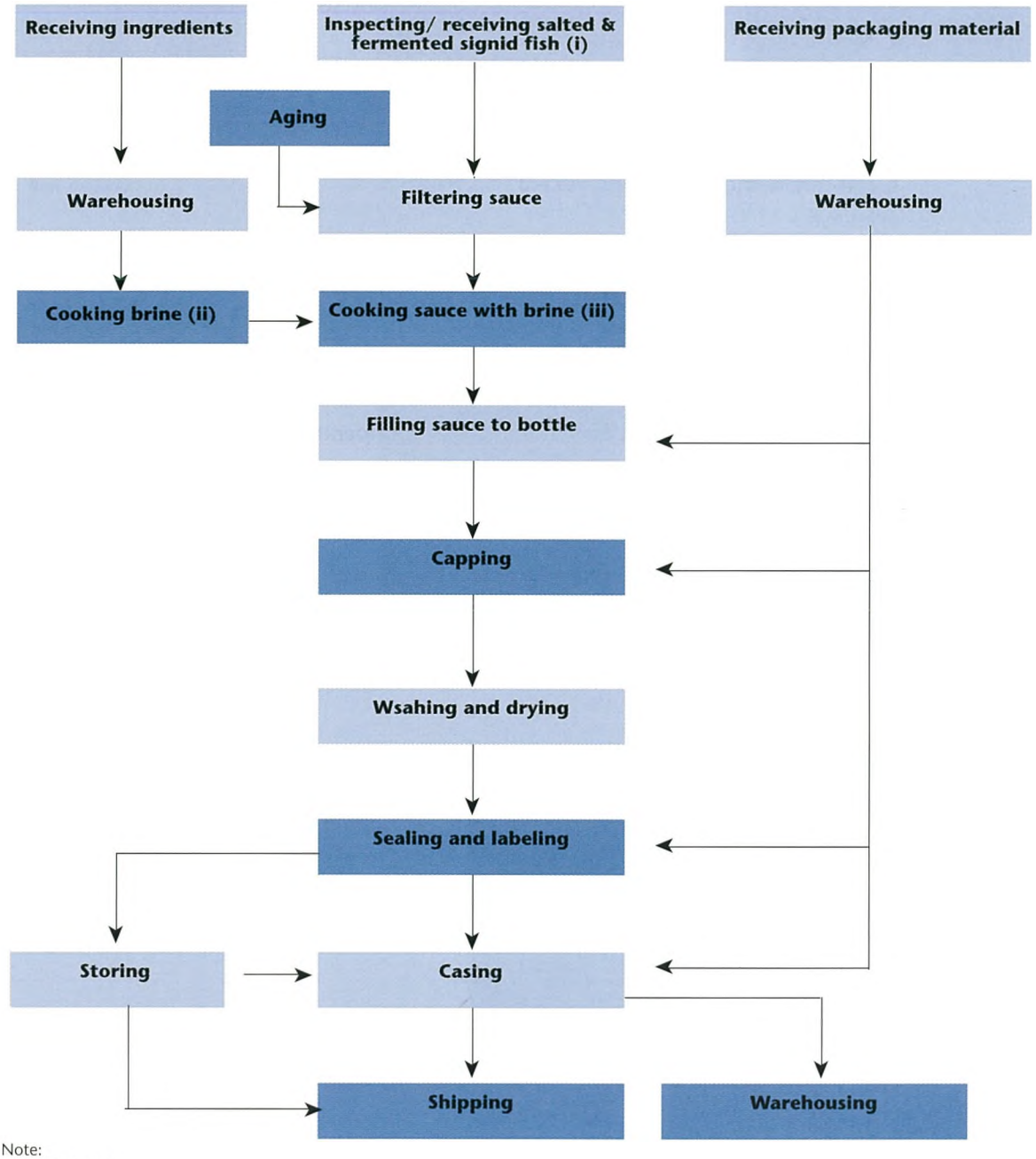
Label:

- According to buyers specifications, 60 - 65 microns thickness

Carton/ partition:

- Corrugated carton

Fig 17. Flow chart of processing *bangoong padas* (siganid paste)



Note:

i) 23-27% Salt
Salinity: ≥ 100 Be
Histamine content: ≤ 50ppm/100g
At 2-4 weeks or until acceptable for production of *Padas*

ii) For 30 minutes at 98-105°C
95-100°Be

iii) For 30 minutes at 98-105°C
23-27% salt
>100°Be salinity

Product name : *Somfak* (fermented fish cake)
Country of origin : Thailand
Product use : Grilled or cooked with vegetables
Product description : Fermented fish cake with slightly sour and salty taste
Main ingredient : Freshwater fish
Other ingredient : Salt, cooked rice, garlic

Processing method:

1. Clean fish. Remove head and viscera
2. Fillet fish
3. Mince fish fillet
4. Add salt, cooked rice and garlic
5. Mince fish again for 2 times
6. Knead fish to form elastic paste
7. Wrap in banana leaf (30 – 40 g/ pack)
8. Allow fish paste to ferment for 3 days at room temperature (28 - 30°C)

Refer to Fig 18 for illustrated flow chart of processing *Somfak*

Packaging condition: Banana leaf
Shelf life : 2 weeks

Fig 18. Processing *Somfak* (fermented fish)



a. Raw material



b. Filleting



c. Mincing fish



f. Wrapping in banana leaves (30-40 g/pack)



e. Mincing (2-3x), then kneading



d. Mixing with salt, cooked rice, garlic

g. Fermenting for 3 days (28-30°C)



h. Somfak (fermented fish)

SOURCE: FTDA, DOF, THAILAND

7. FISH MEAL

Fish meal is described as high-protein dried fish powder, used for animal feed and fertilizer. It utilizes trawl by-catch and processing waste from fish processing plants. Though claimed as low value product, there is a trend of producing high quality fish meal by using fresh raw material and improved processing method. In this survey, the cost of raw materials ranges from US$ 0.03/ kg to US$ 0.10/ kg. Fish meal cost from US$ 0.40 to US$ 0.80/ kg. Reported retail prices of fish meal and their raw material are shown in Table 19.

TABLE 19. COST OF RAW MATERIALS AND FISH MEAL

Product	Local Name	Country	Cost (US$/ kg)	
			Raw material	Fish meal
Fish manure	*Ikan bajar*	MAL	NA	NA
Fish	*Tepong ikan*	MAL	NA	NA
Fish meal	*Nga hmoke*	MYA	0.10	0.50
Fish meal for animal feed	*Pla pon*	THA	0.03	0.40

Though no doubt most of Southeast Asian countries produce fish meal, only Malaysia, Myanmar and Thailand reported the fish meal production in their countries. The production and export data are shown in Table 20.

TABLE 20. PRODUCTION AND EXPORT VOLUME OF FISH MEAL

Product	Country	Production Volume (MT)							Export Volume (MT)						
		1994	1995	1996	1997	1998	1999	2000	1994	1995	1996	1997	1998	1999	2000
Fish manure	MAL	10.891	11,848.79	18,317.45	15,036.66	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish	MAL	46,064	38,215.41	38,034.2	34,345.78	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish meal	MYA	NA	NA	760	2330	NA	NA	NA	NA	NA	NA	511.96	NA	866	348
Fish meal for animal feed	THA	389,885	449,785	425,075	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	25,199

The fish meal products are usually packed in gunny sack, kraft bag, jute bag, plastic or black-linen sack. The shelf life ranges from 6 to 12 months (see Table 21).

TABLE 21. STORAGE CONDITIONS AND SHELF LIFE OF FISH MEAL

Product	Country	Storage Conditions	Shelf Life
Fish manure	MAL	NA	NA
Fish	MAL	NA	NA
Fish meal	MYA	Cool dry place	12 months
Fish meal for animal feed	THA	Ambient temperature	6 months

In this survey, only Thailand indicates the problems encountered in fish meal production. Poor hygiene was identified as the main problem, thus there is a need to apply good manufacturing practice (GMP) in the processing.

8. FROZEN FISH PRODUCTS

Frozen fish products are defined by FDA as those which are intended to be sold in frozen state. In Southeast Asia, frozen fish products range from uncooked products, e.g. fish and prawn, to ready-to-eat frozen products, e.g. boiled prawn. Table 22 shows the retail prices of some frozen fish products.

TABLE 22. COST OF RAW MATERIALS AND FROZEN FISH PRODUCTS

Product	Local Name	Country	Cost (US$/ kg)	
			Raw Material	Frozen Product
Fish	*Ikan beku*	BRU	2.80	4.00
Shrimp	*Bangkear ker chnay*	CAM	NA	NA
Crab	*Satch kdarm*	CAM	NA	NA
Frog	*Paha kodok beku*	IND	0.90	3.90
Shrimp	*Udang beku*	IND	6.60	26.60
Crab	*Kepiting beku*	IND	1.30	2.50
Fish	*Ikan beku*	IND	0.79	3.57
Fish	*Ikan beku*	MAL	NA	NA
Cuttlefish	*Sotong beku*	MAL	NA	NA
Prawn	*Udang beku*	MAL	NA	NA
Long tongue sole	*Nga khwe shar*	MYA	0.40	0.42
Boiled hard clam	*Gon*	MYA	NA	2.90
Surimi	*Ngakyaither*	MYA	NA	0.89
Squid ring	NA	MYA	NA	1.60
Rohu	*Nga myint chin*	MYA	0.80	1.00
Yellow croaker	*Nga thin war*	MYA	0.90	1.29
Cuttlefish	*Pyi Gyi nga*	MYA	1.50	1.70
Red snapper	*Ngapanrni*	MYA	0.62	1.10
Hilsa	*Nga tha lauk*	MYA	0.91	1.10
Novashi ebi	*Pazun podi*	MYA	7.00	7.50
Salt water fish (assorted)	NA	MYA	0.80	1.10
Barramundi fillet	*Nga athahlawer*	MYA	2.50	3.00
Fresh water prawn	*Ye cho pazun*	MYA	6.00	7.41
Sea water prawn	*Ye ngan pazun*	MYA	5.00	6.64
Ribbon	*Nga da gon nga*	MYA	0.60	0.70
Milkfish	*Bangus*	PHI	1.60 - 1.85	2.91
Prawn/ shrimp	*Sugpo*	PHI	4.76	8.56
Scallop	*Tikab*	PHI	1.32	3.84
Cuttlefish	*Bankuta*	PHI	3.96	4.68
Squid	*Pusit*	PHI	2.40	2.91
Tuna	Tuna	PHI	1.85 - 2.06	2.64
Octopus	*Pugita*	PHI	2.64	3.96
Squid and cuttlefish	*Sotong*	SIN	NA	NA
Prawn/ shrimp meat	*Sia*	SIN	NA	NA
Prawns/ shrimp	*Sia*	SIN	NA	NA
Fillet, steak	*He-pian*	SIN	NA	NA
Fish	NA	SIN	NA	NA
Octopus	*Muek sai chae kang*	THA	0.60 - 1.10	1.40 - 2.20
Squid	*Muek kluay chae kang*	THA	1.60 - 1.80	1.90 - 2.40
Shrimp	*Koong sod chae kang*	THA	4.70 - 11.10	NA
Fish	*Pla chae kang*	THA	0.70 - 2.70	NA
Cuttlefish	*Muek kra dong chae kang*	THA	1.60 - 1.80	1.80 - 1.90
Cooked shrimp	*Kung tom chae kang*	THA	4.70 - 11.10	NA
Shellfish	*Hoy chae kang*	THA	0.20 - 0.80	NA

The production and export volume of frozen fish products are shown in Table 23.

TABLE 23. PRODUCTION AND EXPORT VOLUME OF FROZEN FISH PRODUCTS

Product	Country	Production Volume (MT)							Export Volume (MT)						
		1994	1995	1996	1997	1998	1999	2000	1994	1995	1996	1997	1998	1999	2000
Fish	BRU	5.74	0.17	3.87	13.502	NA	NA	NA	NIL	NIL	NIL	NIL	NA	NA	NA
Shrimp	CAM	68	245	212	221	284	339	311	NA	NA	5.199	NA	0.144	0.090	NA
Crab	CAM	61	124	165	176	152	224	332	NA	NA	NA	NA	1.586	NA	NA
Frog	IND	2,111	2,194	1,793	1,793	NA	NA	NA	1,021	1,425	1,862	2,625	NA	NA	NA
Shrimp	IND	214,069	219,733	223,349	191,980	NA	NA	NA	92,401	87,695	95,500	2,842	NA	NA	NA
Crab	IND	6,441	7,980	7,342	3,303	NA	NA	NA	1,096	1,432	1,242	1,352	NA	NA	NA
Fish	IND	248,529	233,833	261,136	249,695	NA	NA	NA	30,316	32,040	35,860	133,253	NA	NA	NA
Fish	MAL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cuttle-fish	MAL	573	723.8	972.15	1,154.69	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Prawn	MAL	180	120	480	605.08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Long tongue sole	MYA	NA	NA	NA	NA	NA	NA	NA	NA	NA	33.00	16.00	NA	762.474	185.71
Boiled hard clam	MYA	NA	NA	NA	30	NA	NA	NA	NA	NA	NA	30	NA	NA	51.59
Surimi	MYA	NA	NA	NA	NA	NA	NA	NA	NA	300.94	114.68	301.00	NA	646	999.40
Squid ring	MYA	NA	NA	112.05	114	NA	NA	NA	NA	NA	112.05	114	NA	NA	NA
Rohu	MYA	NA	NA	NA	NA	NA	NA	NA	NA	NA	332.00	587.32	NA	4131.9671	6296.35
Yellow croaker	MYA	NA	NA	NA	NA	NA	NA	NA	NA	112.83	431.11	152.12	NA	1077.16	174.06
Cuttle-fish	MYA	NA	NA	NA	NA	NA	NA	NA	NA	44.50	NA	NA	NA	NA	NA
Red snapper	MYA	NA	NA	NA	NA	NA	NA	NA	NA	2.34	9.66	10.73	NA	50.14	NA
Hilsa	MYA	NA	NA	NA	NA	NA	NA	NA	NA	1,580.27	3,473.66	2,612.58	NA	8,446.46	10,549.63
Novashi ebi	MYA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	11.4	NA
Salt water fish (assorted)	MYA	NA	NA	NA	NA	NA	NA	NA	NA	28,521.09	NA	31,439.72	NA	2,066.46	3,023.28
Barra-mundi fillet	MYA	NA	NA	NA	NA	NA	NA	NA	NA	NA	15.10	114.82	NA	787.74	761.99
Fresh water prawn	MYA	NA	NA	NA	NA	NA	NA	NA	NA	1,607.05	3,709.18	1,867.07	NA	2,220.22	2,140.07
Sea water prawn	MYA	NA	NA	NA	NA	NA	NA	NA	NA	6,752.35	8,223.56	10,838.41	NA	8,917.17	10,981.39
Ribbon	MYA	NA	NA	NA	NA	NA	NA	NA	NA	138	1,352	2,089.65	NA	6,957.03	932.58
Milkfish	PHI	NA	NA	NA	NA	NA	NA	NA	137	66	67	39	NA	NA	NA
Prawn/ shrimp	PHI	130,000	90,456	79,509	41,454	NA	NA	NA	21,676	17,879	13,149	10,139	NA	NA	NA
Scallop	PHI	NA	NA	NA	NA	NA	NA	NA	48	35	57	258	NA	NA	NA
Cuttlefish	PHI	NA	NA	NA	NA	NA	NA	NA	104	747	1,179	5,579	NA	NA	NA
Squid	PHI	NA	NA	NA	NA	NA	NA	NA	104	747	1,179	5,579	NA	NA	NA
Tuna	PHI	NA	NA	NA	NA	NA	NA	NA	5,519	4,981	3,057	4,795	NA	NA	NA
Octopus	PHI	NA	NA	NA	NA	NA	NA	NA	2,544	2,246	2,314	4,320	NA	NA	NA
Squid, cuttlefish	SIN	4,000	4,000	3,000	1,206	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Prawn/ shrimp meat	SIN	NA	NA	NA	59	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Prawn/ shrimp	SIN	4,000	4,000	3,700	837	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fillets, steaks	SIN	9,000	9,200	8,652	9,597	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish	SIN	7,050	7,100	7,000	9,156	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Octopus	THA	NA	NA	NA	NA	NA	NA	NA	9,825	12,133	12,833	11,994	11023	13145	12252
Squid	THA	NA	NA	NA	NA	NA	NA	NA	12,256	10,873	12,629	18,456	NA	NA	NA
Shrimp	THA	NA	NA	NA	NA	NA	NA	NA	187,069	175,091	161,468	137,086	150146	138091	143955
fish	THA	NA	NA	NA	NA	NA	NA	NA	306,747	332,282	331,186	356, 278	281099	363699	331289
Cuttle-fish	THA	NA	NA	NA	NA	NA	NA	NA	23,517	31,331	30,774	35,305	42,712	45,879	45,069
Cooked shrimp	THA	NA	NA	NA	NA	NA	NA	NA	1,515	1,649	788	300	188	38	34
Shellfish	THA	NA	NA	NA	NA	NA	NA	NA	28	56	38	38	1,213	8,794	9,270

In the processing of frozen fish products, raw materials are cleaned, cut/ filleted, raw or cooked, packed and finally frozen by air-blast, contact or IQF freezer. The products are packed in polyethylene bag, cardboard box or small plastic tray. Frozen products are stored below – 18°C. Their shelf life range from 6 to 12 months (see Table 24).

TABLE 24. STORAGE CONDITIONS AND SHELF LIFE OF FROZEN FISH PRODUCTS

Product	Country	Storage Conditions	Shelf Life
Fish	BRU	- 30°C	12 months
Shrimp	CAM	Frozen	NA
Crab	CAM	Frozen	NA
Frog	IND	-18°C	12 months
Shrimp	IND	-18°C	12 months
Crab	IND	-18°C	12 months
Fish	IND	-18°C	12 months
Fish	MAL	NA	NA
Cuttlefish	MAL	-18°C	12 months
Prawn	MAL	-18°C	12 months
Long tongue sole	MYA	-20°C	12 months
Boiled hard clam	MYA	-20°C	12 months
Surimi	MYA	-20°C	12 months
Frozen squid ring	MYA	-20°C	12 months
Rohu	MYA	-20°C	12 months
Yellow croaker	MYA	-20°C	12 months
Cuttlefish	MYA	-20°C	12 months
Red snapper	MYA	-20°C	12 months
Hilsa	MYA	-20°C	12 months
Novashi ebi	MYA	-20°C	12 months
Salt water fish (assorted)	MYA	-20°C	12 months
Barramundi fillet	MYA	-20°C	12 months
Fresh water prawn	MYA	-20°C	12 – 18 months
Sea water prawn	MYA	-20°C	12 months
Ribbon	MYA	-20°C	12 months
Milkfish	PHI	-18°C	6 months
Prawn/ shrimp	PHI	-18°C	6 months
Scallop	PHI	-18°C	6 months
Cuttlefish	PHI	-18°C	6 months
Squid	PHI	-18°C	6 months
Tuna	PHI	-18°C	6 months
Octopus	PHI	-18°C	6 months
Squid, cuttlefish	SIN	-18°C	6 – 12 months
Prawn/ shrimp meat	SIN	-18°C	6 – 12 months
Prawns/ shrimp	SIN	-18°C	6 – 12 months
Fillet, steak	SIN	-18°C	6 – 12 months
Fish	SIN	-18°C	6 – 12 months
Octopus	THA	-18°C	12 months
Squid	THA	-18°C	12 months
Shrimp	THA	-18°C	12 months
Fish	THA	-18°C	12 months
Cuttlefish	THA	-18°C	12 months
Cooked shrimp	THA	-18°C	12 months
Shellfish	THA	-18°C	12 months

8.1 Examples of Popular Frozen Products in Southeast Asia

Product name : Frozen milkfish
Country of origin : Philippines
Product use : Cooked in local dishes
Main ingredient : Milkfish *(Chanos chanos)*

Processing method:

1. Weigh, sort, and wash fish with 30 to 50 ppm chlorinated chilled water
2. Split fish by cutting along the dorsal side, form into butterfly fillet
3. Remove gut and wash in chilled water
4. Remove bone manually using knife and forcep. Check fish to ensure 99% of bones are removed
5. Dip fish in 1% cold brine solution to remove the remaining blood
6. Drain to remove excess brine solution
7. Weigh fish
8. Place in a blast freezer at –40°C
9. Pack fish individually and seal in polyethylene (PE) bag. Pack inside corrugated carton box
10. Store in -18°C or colder

Refer to Fig 19 for illustrated flow chart of processing boneless milkfish

Packaging condition: Polyethylene bag

Fig 19. Processing boneless milkfish



Deboning



Milkfish packed in styrofoam tray



Milkfish packed in polyethylene bag

SOURCE: BFAR, PHILIPPINES

8.1.1.1 Utilization and Processing of Milkfish in Philippines

INTRODUCTION

Milkfish, locally known as a *"bangus" (Chanos chanos, Forskal)*, is considered the national fish and is one of the favorite fish of the Philippinos. Characterized by scaly feature and bony structure, it thrives in either brackish or freshwater fishponds. It makes up for a highest percentage of fish bought in Manila and nearby markets. The culture of milkfish as pond-raised fish is one of the most important aspects of Philippines fisheries.

In the Philippines, milkfish is consumed fresh, frozen, marinated and smoke in either whole or boneless forms. Like any other fishery products, milkfish has a great potential to the fishing industry not only for local consumption but also for export to other ASEAN and European countries.

Milkfish is considered highly perishable especially if proper attention is not given to handling, processing, packaging and distribution.

Technology Intervention

- *Types of Milkfish Products*

Smoked Soft-Boned *Bangus* – milkfish that is prepared in a way to make the bones edible so that the whole fish can be eaten. The product comes in whole with golden brown or amber color with softened bones

Boneless *Bangus* – milkfish with bones removed. It is becoming a popular food in the Philippines due to its convenience. The boneless fish may be cooked (fried, dried, smoked or frozen) with or without adding any spices

Milkfish Canning – milkfish that is processed and packed in can. There are various types of canned milkfish such as: *bangus* in tomato sauce, *bangus* in oil, *bangus* salmon style, *bangus* in *tausi* and *bangus escabeche*. Those products use the same principle of preparation but differ in type of packing medium or ingredients used, for example canned *bangus* in tomato sauce is packed in tomato sauce and oil with salt and pepper added. At room temperature, the product lasts for 12 months or longer

Smoked Boneless *Bangus* – is a more convenient smoked product to consume in the sense that the inter-muscular bones of the fish have been removed. The product comes in butterfly or double fillets with a golden brown or amber color. Its delicate smoke flavor and aroma makes it a tasty treat and special product

- ***Use and Merit***

The sweet, delicate taste of the milkfish makes it a popular food fish. Housewives, restaurants and food manufacturers can identify to the products mentioned. It is an excellent potential item for domestic markets.

- ***Research***

Most published work relating to milkfish in Southeast Asian countries is associated more with the science of milkfish such as growth, reproduction, food habits and protection of estuarine environment. Very little studies are done on handling and processing of this fish. With the advance technology on aquaculture and fish processing, there is indeed an increasing demand for both local and export market.

9. POWDERED FISH PRODUCTS

Powdered fish products are also known as floss, granulated/ flaked products or fish concentrate. It is made from by-products of dried prawn or the mince from tuna, mackerel, lizard, sardine etc. The raw material is mixed with other ingredients to enhance the product taste. They can be served with bread or rice, used in soups or consumed as snack. The price of raw material and powdered fish products from Thailand are shown in Table 25.

TABLE 25. COST OF RAW MATERIALS AND POWDERED FISH PRODUCTS

Product	Local Name	Country	Cost (US$/ kg)	
			Raw Material	Powdered Product
Fish powder	*Pla pon*	THA	2.00 - 2.60	5.20 - 6.50
Fish floss	*Pla yong*	THA	0.20	8.00 - 9.00

There is no data on the production and export volume of powdered fish products.

The powdered fish products packed in glass bottle or polyethylene bag. The shelf life of fish powder and fish floss is reported to be 3 - 6 months at ambient temperature.

TABLE 26. STORAGE CONDITIONS AND SHELFLIFE OF POWDERED FISH PRODUCTS

Product	Country	Storage Conditions	Shelf Life
Fish powder	THA	Ambient temperature	3 - 6 months
Fish floss	THA	Ambient temperature	3 - 6 months



SOURCE: MFRD, SINGAPORE

Fish floss

10. SMOKED FISH PRODUCTS

Smoking is one type of traditional drying salt-cured method in preserving fish. In addition to facilitating preservation, the smoke contributes a pleasing flavor. Smoked fish products can be served fried or cooked with other ingredients such as chili and tamarind. They are eaten with rice, salad or noodles.

The type of fish used for smoked fish products are are tuna (skipjack), milkfish, sardines, round scad, sharks, stingray, snakehead, swamp eel, catfish, *Clupidae*, etc. The retail price of raw materials and end products are shown in Table 27.

TABLE 27. COST OF RAW MATERIALS AND SMOKED FISH PRODUCTS

Product	Local Name	Country	Cost (US$/ kg)	
			Raw Material	Smoked Product
Fish	*Trey chyer*	CAM	2.00 – 3.00	12.00
Milkfish	*Ikan asap*	IND	1.00	2.40
Tuna	*Ikan aya asap*	MAL	1.12	7.43
Fish	*Nga gyi chauk*	MYA	NA	5
Mackerel	*Hasa-hasa*	PHI	1.30 - 1.60	4.20
Milkfish	*Tinapang bangus*	PHI	1.60 - 1.85	4.20
Herring	*Tinapang tunsoy*	PHI	1.30 - 1.60	3.20
Round scad	*Tinapang galonggong*	PHI	1.30 - 1.60	2.40
Sardine	*Tinapang tamban*	PHI	0.80 - 1.08	2.50
Tuna	*Tinapang* tuna	PHI	1.85 - 2.10	2.91
Boneless milkfish	*Tinapang* boneless *bangus*	PHI	1.60 - 1.85	3.83
Dried fish	*Pla rom quan; pla krob*	THA	1.50	3.00

Most of smoked fish produced in Southeast Asian countries are both locally consumed and exported. Table 28 shows the production and export volume of smoke fish products.

TABLE 28. PRODUCTION AND EXPORT VOLUME OF SMOKED FISH PRODUCTS

Product	Country	Production Volume (MT)							Export Volume (MT)						
		1994	1995	1996	1997	1998	1999	2000	1994	1995	1996	1997	1998	1999	2000
Fish	CAM	511	453	383	401	573	412	NA	NA	2.41	0.31	0.31	0.21	3.82	NA
Milkfish	IND	42,324	38,121	43,376	21,254	NA	NA	NA	1,368	2,767	4,260	2,421	NA	NA	NA
Tuna	MAL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish	MYA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mackerel	PHI	NA	NA	NA	NA	NA	NA	NA	6	10	7	7	NA	NA	NA
Milkfish	PHI	NA	NA	NA	NA	NA	NA	NA	4	3	8	NA	NA	NA	NA
Herring	PHI	NA	NA	NA	NA	NA	NA	NA	34	21	22	23	NA	NA	NA
Round scad	PHI	NA	NA	NA	NA	NA	NA	NA	75	80	116	110	NA	NA	NA
Sardine	PHI	NA	NA	NA	NA	NA	NA	NA	3	1	1	NA	NA	NA	NA
Tuna	PHI	NA	NA	NA	NA	NA	NA	NA	NA	2,000	49,082	19,600	NA	NA	NA
Bone-less milkfish	PHI	NA	NA	NA	NA	NA	NA	NA	3	1	1	NA	NA	NA	NA
Dried fish	THA	NA	NA	NA	NA	NA	NA	2,474.6	NA	NA	NA	13	937	1,846	3,242

The processing method for smoked fish is quite similar in most countries. The fish are headed and gutted. Larger sized fishes are usually split into half, salted, sun dried, smoked or smoked and sun dried. Most countries indicated smoke house and charcoal as the main equipment and material needed in the smoked fish processing.

The products are packed in polyethylene bags, wrapped with paper, packed in basket with banana leaf or newspaper. They have shelf life of 3 days to 1 year depending on whether they are kept in well-ventilated storage rooms at air temperature, in refrigerators or freezers. This depends also on the moisture content in the products, which influences the bacterial and mold growth during storage.

TABLE 29. STORAGE CONDITIONS AND SHELF LIFE OF SMOKED FISH PRODUCTS

Product	Country	Storage Conditions	Shelf Life
Fish	CAM	Dry place at room temperature	1 – 5 months
Milkfish	IND	Chilling room or room temperature	15 days (chilled room) 3 days (room temperature)
Tuna	MAL	Cool, dry place, 0 - 8oC	1 month
Fish	MYA	Room temperature	6 months
Mackerel	PHI	Frozen	3 – 6 months
Milkfish	PHI	Frozen	3 – 6 months
Herring	PHI	Refrigerated temperature	6 days
Round scad	PHI	Frozen	3 – 6 months
Sardines	PHI	Frozen	3 – 6 months
Tuna	PHI	Frozen	3 – 6 months
Boneless milkfish	PHI	Frozen	3 – 6 months
Dried fish	THA	Dried place at room temperature	> 6 months

Most countries surveyed indicated mould and bacterial spoilage that lead to short shelf life as the main problems encountered in smoked products.

10.1 Examples of Popular Smoked Products in Southeast Asia

Product name : *Trey chyer* (smoked fish)
Country of origin : Cambodia
Product description : Firewood smoked fish. End product is hard and dry
Product use : Served with rice and other dishes
Main ingredient : Common sheat fish

Processing method:

1. Clean fresh fish
2. Skewer fish to bamboo stick
3. Sun dry fish for a few hours
4. Smoke fish under high temperature with firewood for 11 – 14 hours

Refer to Fig 20 for illustrated flow chart of processing *trey chyer*

Storage condition : Dry condition
Shelf life : 1 – 5 months
Target country for export : Thailand, Vietnam, Australia, China, USA, Malaysia

Problem in marketing and quality control:

- Product is difficult to keep and easy to spoil.
- The quality of product deteriorates over time



SOURCE: DOF, CAMBODIA

Trey chyer (smoked fish)

Fig 20. Illustrated flow chart of processing *trey chyer* (smoked fish)



a. Skewering fish with bamboo stick



b. Sun drying large fish



b. Sun drying small fish



c. Smoking large fish



c. Smoking small fish



d. Stack the smoked fish

SOURCE: DOF, CAMBODIA

Product name : *Ikan bandeng asap* (smoked milkfish)
Country of origin : Indonesia
Product description : Firewood smoked fish. End product is hard and dry
Main ingredient : Milkfish *(Chanos-chanos)*

Processing method:

1. Remove gills and entrails of fish
2. Soak fish in 10% brine
3. Cold smoke fish in smoking cabinet at 55-60°C for 4 hours then hot smoke at 75-80°C for 2 hours
4. Cool smoked fish at ambient temperature
5. Pack in plastic bag

Refer to Fig 21 for illustrated flow chart of processing ikan bandeng asap

Storage condition : Dry condition

Fig 21. Illustrated flow chart of processing *ikan bandeng asap* (smoked milkfish)



a. Raw material: milkfish



b. Removing the entrails and gills through the hole gill



c. Soaking fish in 10% brine



d. Cold smoking at 55-60°C for 4 hours then hot smoking 75-80°C for 2 hours



e. Packing fish in plastic bag

SOURCE: DIRECTORATE FISH, INDONESIA

11. OTHER FISH PRODUCTS

Other fish products include *satay,* seaweed products, e.g. agar, barbequed fish and crackers, made from prawn, squid or fish. Raw materials for these products range from US$ 0.20/ kg for crackers in Indonesia to US$ 7.00/ kg for prawn cracker in Brunei Darussalam. The end products range from US$ 2.00/ kg to US$ 19.00/ kg. The details of prices of raw materials and end products are shown in Table 30.

TABLE 30. COST OF RAW MATERIALS AND OTHER FISH PRODUCTS

Product	Local Name	Country	Cost (US$/ kg)	
			Raw Material	Other Fish Product
Prawn cracker	*Keropok udang*	BRU	7.00	19.00
Barbequed fish	*Ikan panggang*	BRU	3.80	11.40
Fish/ shrimp cracker	*Kerupuk ikan/ udang*	IND	0.20	1.90
Fish *satay*	*Sate ikan*	MAL	NA	NA
Prawn cracker	*Keropok udang*	MAL	NA	3.72
Fish cracker	*Nga moke, papala*	MYA	1.00	2.00
Shrimp *kroepeck*	*Sitsarong hipon*	PHI	3.96	3.52
Seaweed	*Gulamang dagat*	PHI	0.26	18.49
Prepared cuttlefish	NA	SIN	NA	NA
Prawn stick/ cracker/ chip	*Hay-pia*	SIN	NA	NA
Fish *satay*	*Pla satay*	THA	1.30	2.60 - 4.00
Fish/ shrimp cracker	*Khau kriab pla, khau kriab kung*	THA	1.30	3.50 - 4.00

Crackers are most commonly found other fish products in Southeast Asian region. They are made from fish, prawn or shrimp. Mixed with flour, spices and water, they are deep fried prior to consumption. Crackers are consumed as ready-to-eat snack or eaten with rice.

Satay and/ or barbequed fish, another type of traditional other fish products consumed as ready-to eat snack. It prepared by soaking the fillets in seasonings before drying and baking until the product has a crispy texture.



SOURCE: FTDI, DOF, THAILAND

Ready-to-eat fried fish cracker



SOURCE: FTDI, DOF, THAILAND

Dried fish cracker

Other fish products are consumed locally and for export. The details for production and export volume are listed in Table 31. Though no doubt that most of Southeast Asian countries export their other fish products, only Indonesia gives detail for the export volume.

TABLE 31. PRODUCTION AND EXPORT VOLUME OF OTHERS FISH PRODUCTS

Product	Country	Production Volume (MT)							Export Volume (MT)						
		1994	1995	1996	1997	1998	1999	2000	1994	1995	1996	1997	1998	1999	2000
Prawn cracker	BRU	7.02	7.06	5.94	8.83	20.48	22.31	NA	NIL	NIL	NIL	NIL	NA	NA	NA
Barbequed fish	BRU	19.22	15.55	15.95	48.99	NA	NA	NA	NIL	NIL	NIL	NIL	NA	NA	NA
Fish/ shrimp cracker	IND	17,746	19,192	22,224	17,420	NA	NA	NA	4,436	4,798	6,056	3,720	NA	NA	NA
Fish *satay*	MAL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Prawn cracker	MAL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish cracker	MYA	NA	NA	NA	NA	NA	111.78	NA	NA	NA	NA	NA	NA	NA	NA
Shrimp *kroepeck*	PHI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Seaweed	PHI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Prepared cuttlefish	SIN	450	450	450	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Prawn stick/ cracker/ chip	SIN	60	60	80	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish *satay*	THA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fish/ shrimp cracker	THA	9,520	10,428.5	11,400	NA	NA	NA	2020.3	NA	NA	NA	NA	NA	NA	NA

Other fish products use traditional method to preserved fish. The raw materials, e.g. fish, prawn or seaweed, are washed, seasoned, sun dried or machine dried, then further processed depending on the type of products. They are then packed in airtight polyethylene or aluminum bags. The shelf life of these products is referred in Table 32.

TABLE 32. STORAGE CONDITIONS AND SHELF LIFE OF OTHERS FISH PRODUCTS

Product	Country	Storage Conditions	Shelf Life
Prawn cracker	BRU	Cool, dry place	12 months
Barbequed fish	BRU	Cool, dry place	1 – 2 days
Fish/ shrimp cracker	IND	Room temperature	12 – 36 months
Fish *satay*	MAL	Room temperature	3 – 6 months
Prawn cracker	MAL	Room temperature	12 months
Fish cracker	MYA	Room temperature	6 months
Shrimp *kroepeck*	PHI	Cool, dry place	3 – 6 months
Seaweed	PHI	Cool, dry place	>12 months
Prepared cuttlefish	SIN	Room temperature	12 months
Prawn stick/ cracker/ chip	SIN	Room temperature	12 months
Fish satay	THA	Room temperature	3 – 5 months
Fish/ shrimp cracker	THA	Room temperature	6 – 12 months

11.1 Examples of Popular Other Fish Products in Southeast Asia

Product name : *Keropok udang* (prawn cracker)
Country of origin : Brunei
Product use : Deep fried and eaten as snack
Main ingredient : Small prawn
Other ingredient : Tapioca flour, salt, MSG, pepper, water

Processing method:

1. Mince prawn
2. Mix prawn with other ingredients
3. Roll dough
4. Steam dough
5. Cool dough at room temperature
6. Add coloring
7. Cool dough in refrigerator for 1 night
8. Cut to thin slices
9. Sun dry or oven dry cracker slices

Refer to Fig 22 for illustrated flow chart of processing *keropok udang*

Packaging condition: Plastic bag of 300 – 600 g
Storage condition : Dry condition
Shelf life : Few months
Machines Used : Mincer, mixer, steamer, slicer and oven

Problem in marketing and quality control:

- Seasonal availability of shrimp
- Lack of quality control
- Poor product presentation and packaging

Fig 22. Processing *keropok udang* (prawn cracker)



a. Preparing ingredients



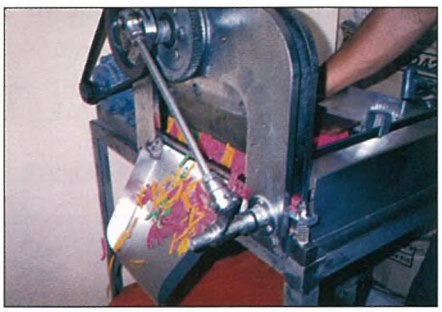
b. Mixing



c. Forming dough



d. Steaming dough



e. Slicing dough



f. Sun drying cracker



g. Assorted keropok udang (prawn cracker)

SOURCE: DEPARTMENT OF FISHERIES, BRUNEI

Product name	: *Keropok ikan/ udang* (fish/ prawn cracker)
Country of origin	: Indonesia
Product use	: Deep fried and eaten as snack
Main ingredient	: Yellow pike conger *(Congresox talabon)*
Other ingredient	: Cassava flour, sugar, MSG, salt, baking powder, water

Processing method:

1. Fillet fish/ shrimp manually or use meat bone separator for fish
2. Grind fish/ shrimp meat
3. Mix minced fish/ shrimp with cassava flour (1:3 ratio)
4. Add sugar, MSG, salt, baking powder
5. Add water, mix dough until form a homogenous paste
6. Form paste to round or cube shape
7. Steam formed paste
8. Allow paste to stand at room temperature for 1 night
9. Slice paste by slicer machine to make uniform slice (5 – 10 mm thickness)
10. Pack in plastic bag

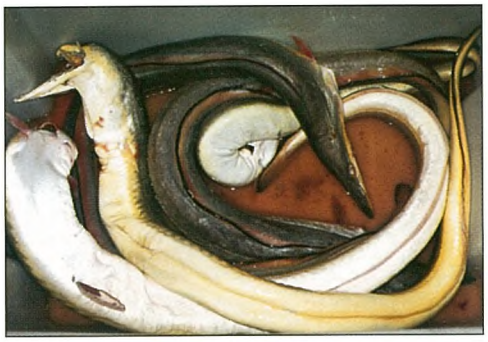
Refer to Fig 23 for illustrated flow chart of processing *keropok ikan*



SOURCE: DIRECTORATE FISH, INDONESIA

Fish/shrimp cracker

Fig 23. Illustrated flow chart of processing *keropok ikan* (fish cracker)



a. Raw material: yellow pike conger



b. Filleting



c. Separating meat from bone



d. Grinding fish meat



e. Mixing fish meat with other ingredients



f. Forming dough into long round or cube shape



g. Steaming dough



h. Allowing dough to stand overnight at ambient temperature



i. Slicing dough by slicer machine to make uniform slice (5-10mm thickness)



j. Sun drying until moisture about 20%



k. Packing in plastic bag for distribution

SOURCE: DIRECTORATE FISH, INDONESIA

Annex 1

Annex 1. Product Details

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Boiled	CAM	Boiled mackerel	Mackerel	Salt	1. Fresh fish. 2. Place in salt solution. 3. Clean and wash. 4. Boil. 5. Dry in warm temperature and preserve.	Bamboo basket
Boiled	IND	Boiled fish *(ikan pindang badeng)* Salted and boiled fish. Served with rice.	Scad *(layang)*, sardine	Salt	1. Fresh fish. 2. Wash. 3. Arrange the fish into the bamboo basket. 4. Boil in saturated brine for 10-60 minute.	Plastic bag or bamboo basket
Boiled	IND	Boiled fish *(ikan pindang naya)* Salted and boiled fish. Served with rice.	Skipjack, mackerel	Salt	1. Fresh fish. 2. Wash. 3. Add salt in between the fish. 4. Arrange the fish in layers. 5. Place into aluminum basin or earthen basin. 6. Boil for 4-5 hours.	Plastic bag or bamboo basket
Boiled	MAL	Boiled fish Salted and boiled fish. Can be deep fried before serving or cooked in curry.	Fish, mackerel *(Rastrelliger spp.)*	NA	1. Fresh fish. 2. Wash and keep in wooden tub in saturated brine for 3-4 hours. 3. Arrange in baskets and boil in saturated brine. 4. Cool for 24 hrs before storage or distribution.	Basket
Boiled	MYA	Cooked crab Meat only.	Freshwater crab *(mud crab)*	Salt	1. Fresh crab. 2. Boil with salt. 3. Remove shell. 4. Freeze.	Aluminium foil (500 g/ pack)
Boiled	SIN	Cooked fish Boiled whole fish. Served with porridge.	Indian mackerel *(Rastrelliger kanagurta)*, horse mackerel (*Caranx spp.*), anchovy	Salt	1. Fresh fish. 2. Wash whole fish with water. 3. Rub fish with salt. 4. Arrange on bamboo trays. 5. Boil in brine for 10-15 minute. 6. Drain and cool.	Sold fresh; usually no packaging
Boiled	THA	Steamed fish Salted steamed fish. Served with chili paste or fried with oil	Indo-pacific mackerel, Indian mackerel, scad	Salt	1. Fresh fish. 2. Remove gut. 3. Clean in brine solution. 4. Steam for 20 minute.	Bamboo tray or plastic bag
Canned	IND	Canned crab meat It can be eaten directly or cooked with other ingredients.	Crab meat	Brine	1. Fresh crab. 2. Remove shell and impurities. 3. Pack into cans and fill other ingredients. 4. Exhaust, close cans by vacuum sealing. 5. Pasteurize crab meat in cans (at about 90°C). 6. Cool and wash. 7. Label and pack.	Canned products in packed carton box

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Canned	IND	Canned sardine, mackerel, tuna It can be eaten directly or cooked with other ingredients.	Sardine, mackerel, tuna	Brine, tomato sauce	1. Fresh fish. 2. Remove entrails, gills and wash. 3. Pre-cook for 15-20 minute. 4. Cool at room temperature. 5. Cut or slice. 6. Pack into cans and fill other ingredients. 7. Exhaust, close cans by vacuum sealing. 8. Retort sterilized. 9. Cool and wash. 10 Pack.	Canned products packed in carton box
Canned	MAL	Canned anchovy in sambal Served with rice.	Anchovy	Chili powder, salt, sugar, garlic	1. Dried anchovy. 2. Wash impurities. 3. Pack in can. 4. Exhaust. 5. Fill with other ingredients. 6. Close cans by vacuum sealer. 7. Retort sterilized. 8. Cool. 9. Label and pack.	Canned products in packed carton box
Canned	MAL	Canned fish in tomato sauce Served with rice.	Sardine, mackerel, horse mackerel	Tomato sauce, salt, sugar	1. Fresh fish 2. Remove entrails, head, gills and wash. 3. Pack in cans. 4. Exhaust. 5. Fill with other ingredients. 6. Retort (sterilization) by boiler and retort. 7. Cool. 8. Label and pack.	Canned products packed in carton box
Canned	MYA	Canned fish in tomato sauce	Rohu	Tomato, salt, garlic, ginger, chili powder, oil, MSG	1. Fresh fish 2. Remove entrails, head and wash. 3. Pack in cans. 4. Dip in brine, pre-cook, and drain. 5. Fill with other ingredients. 6. Close the can and sterilize. 7. Cool. 8. Label and pack.	Canned products in packed carton box (24 cans of 425g/ carton)
Canned	MYA	Canned hilsa in tomato sauce	Hilsa	Tomato, salt, garlic, ginger, chili powder, oil, MSG	1. Fresh fish. 2. Wash, cut, remove scales. 3. Dip in brine 4. Pack in cans, pre-cook, and drain. 5. Fill with other ingredients. 6. Close the can and sterilize. 7. Cool. 8. Label and pack.	Canned products in packed carton box (24 cans of 425g/ carton)

Annex 1. Product Details (cont'd)

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Canned	MYA	Canned sardine in tomato sauce	Sardine	Tomato, salt, garlic, ginger, chili powder, oil, MSG	1 Fresh fish. 2. Wash, cut, remove scales. 3. Dip in brine 4. Pack in cans, pre-cook, and drain. 5. Fill with other ingredients. 6. Close the can and sterilize. 7. Cool. 8. Label and pack.	Canned products in packed carton box (24 cans of 425g/ carton or 50 cans of 155g/ carton)
Canned	PHI	Bottled anchovy 'French Style' It can be eaten directly from the can, cooked with vegetables, noodle or with eggs like omelet.	Anchovy *(Stolepherus indicus)*	Oil, salt, cloves, pickles, hot pepper, whole black pepper and carrots.	1. Cut fish. 2. Clean and wash. 3. Soak in brine. 4. Half-fry and drain. 5. Pack fish in bottles. 6. Exhaust. 7. Fill in ingredients. 8. Process. 9. Cool. 10 Label and pack.	Bottled products packed in fiberboard/carton Box
Canned	PHI	Canned anchovy in oil	Anchovy *(Stolepherus indicus)*	Salt and oil.	1. Clean fish. 2. Steam. 3. Cool/ airdry. 4. Fill in cans. 5. Add salt and oil. 6. Exhaust filled cans. 7. Seal cans. 8. Process. 9. Cool. 10 Label and pack.	Epoxyphenolic cans. Canned products packed in fiberboard/carton box
Canned	PHI	Canned (bottled) herring, 'French Style'	Herring *(Sardinella perforata)*	Oil, salt, cloves, pickles, hot pepper, whole black pepper and carrots.	1. Cut fish. 2. Clean and wash. 3. Soak in brine. 4. Half-fry, drain. 5. Pack fish in bottles. 6. Exhaust. 7. Fill in ingredients. 8. Process. 9. Cool. 10 Label and pack.	Bottled products packed in fiberboard/carton box
Canned	PHI	Canned mackerel in tomato sauce It can be sautéed with garlic, onion, and other ingredients. Served with rice or used as sandwich filling.	Mackerel *(Rastrelliger chrysozonus)*	Salt, oil and tomato sauce.	1 Fresh fish. 2. Inspect/grade. 3. Wash, remove gut. 4. Pack in cans. 5. Exhaust. 6. Fill with other ingredients. 7. Sealed using electric can sealer. 8. Cool. 9. Label and pack.	Canned products packed in fiberboard /carton box

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Canned	PHI	Canned (bottled) milkfish It can be eaten directly, cooked with vegetables noodle or with eggs like omelet.	Milkfish *(Chanos chanos)*	French Style: oil, salt, cloves, pickles, hot pepper, whole black pepper, and carrots. In oil: oil, salt, tomato sauce.	1. Cut fish. 2. Clean/wash. 3. Soak in brine. *For bottled products:* 4. Half-fry. 5. Drain. 6. Pack fish in bottles. 7. Add ingredients 8. Process. *For canned products:* 4. Fill into cans. 5. Add ingredients. 6. Exhaust filled cans. 7. Seal using electric can sealer. 8. Process. 9. Cool. 10 Label and pack.	Canned products packed in fiberboard/ carton box
Canned	PHI	Canned (bottled) sardine. Available in three types: French style, in oil, in tomato sauce	Indian sardine *(Sardinella longiceps)*	French style: Oil, salt, cloves, pickles, hot pepper, whole black pepper and carrots. In oil: oil and salt. In tomato sauce: oil, salt and tomato sauce.	1. Cut fish. 2. Clean/wash. 3. Soak in brine. *For bottled products*: 4. Half-fry. 5. Drain. 6. Pack fish in bottles. 7. Exhaust 8. Add ingredients. 9. Process. *For canned products:* 4. Fill into cans. 5. Add ingredients. 6. Exhaust filled cans. 7. Seal using electric can sealer. 8. Process. 9. Cool. 10 Label and pack.	Canned products packed in fiberboard/ carton box
Canned	PHI	Canned tuna in brine	Tuna *(Neothunnus macropterus)*	Salt and water.	1. Fresh fish. 2. Inspect/grade. 3. Wash, remove gut. 4. Exhaust. 5. Fill with other ingredients. 6. Sealed using electric can sealer. 7. Exhaust and cool. 8. Label and pack.	Canned products packed in fibreboard/carton box

Annex 1. Product Details (cont'd)

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Canned	SIN	Canned shrimp/ anchovy in sambal sauce Dried shrimp/ anchovy in local spicy sauce.	Dried shrimp, dried anchovy	Salt, sugar, garlic, spices.	1. Dried shrimp/ anchovy. 2. Wash/soak in water. 3. Pack in cans. 4. Exhaust. 5. Fill with other ingredients. 6. Sealed by vacuum sealer. 7. Retort sterilized. 8. Cool. 9. Label and pack.	Canned products in packed carton box
Canned	THA	Canned baby clam in brine It can be cooked with vegetables or served with rice.	Baby clam meat (Paphia undulata)	Salt.	1. Fresh clam 2. Suck clam meat from shell using steam. 3. Wash and size. 4. Cook in boiling water. 5. Pack in cans. 6. Fill with brine. 7. Close can by vacuum sealer. 8. Retort sterilized. 9. Cool. 10 Label and pack.	Canned products in packed carton box
Canned	THA	Canned crab meat in brine It is cooked with spices and served with rice.	Crab meat *(Portunus spp.)*	Salt	1. Cook crab in boiling water. 2. Pick crab meat from shell. 3. Pack in cans. 4. Fill with brine. 5. Close can by vacuum sealer. 6. Cool. 7. Label and pack.	Canned products packed in carton box
Canned	THA	Canned mackerel in tomato sauce Served with rice.	Mackerel, Pilchards	Tomato sauce, salt, sugar and other ingredients.	1. Fresh mackerel 2. Remove head, gut and tail 3. Wash, cut and Pack in cans. 4. Fill with other ingredients 5. Exhaust. 6. Close cans by vacuum sealer. 7. Retort sterilized. 8. Cool. 9. Label and pack.	Canned products packed in carton box
Canned	THA	Canned sardine in tomato sauce	Sardine	Tomato sauce	1. Fresh sardine. 2. Remove gut and tail. 3. Wash and pack in cans. 4. Fill with tomato sauce. 5. Exhaust. 6. Close cans by vacuum sealer. 7. Retort sterilized 8. Label and pack.	Canned products packed in carton box

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Canned	THA	Canned shrimp in brine It is mixed with spices and served with rice.	Sand shrimp *(Metapenaeus spp., Metapenaeopsis spp., Trachypenaeus spp., Parapenaeopsis spp.)*	Salt, sugar, citric acid and other ingredients.	1. Fresh shrimp. 2. Wash and size. 3. Remove shell. 4. Cook in boiling water. 5. Pack into cans. 6. Fill with other ingredients. 7. Close cans by vacuum sealer. 8. Retort sterilized. 9. Label and pack.	Canned products packed in carton box
Canned	THA	Canned squid, cuttlefish, octopus in oil, brine, ink or tomato sauce	Squid, cuttlefish, octopus	Vegetable oil, salt, ink or tomato sauce.	1. Fresh squid/ cuttlefish/ octopus. 2. Wash and dress. 3. Pack in cans. 4. Fill with other ingredients. 5. Close can by vacuum sealer. 6. Retort sterilized. 7. Cool. 8. Label and pack.	Canned products in packed carton box
Canned	THA	Canned tuna in oil, brine, water or curry It is served with rice or used as sandwich filling.	Tuna *(Thunnus tonggol, Euthynnus affinis, Katsuwonus pelamis, Thunnus alalunga)*	Water, vegetable oil, brine, spices and other ingredients.	1. Frozen tuna. 2. Remove gut. 3. Pre-cook. 4. Remove head, tails, fins and skin. 5. Remove dark meat. 6. Pack in cans. 7. Close cans by vacuum sealer. 8. Retort sterilized. 9. Label and pack.	Canned products packed in carton box
Comminuted	MAL	Cuttlefish ball Round shape product made from cuttlefish and surimi. It is eaten as snack or cooked with vegetables.	Fresh cuttlefish, surimi	Flavor enhancer, salt, tapioca starch	1. Cuttlefish and surimi. 2. Mince and mix with other ingredients. 3. Form and set. 4. Boil. 5. Chill. 6. Pack, freeze and store	Plastic (1 kg/ pack or 400 gm/pack)
Comminuted	MAL	Cuttlefish cocktail/ sausage Tube shape product made from cuttlefish and surimi, packed in casing. It is deep fried or cooked with vegetables or pan fried and eaten like 'hot dog'.	Fresh cuttlefish, surimi	Flavor enhancer, salt, tapioca starch	1. Mince cuttlefish and surimi. 2. Mix with fixed colorings. 3. Stuff into casing. 4. Boil or steam. 5. Reboil. 6. Chill. 7. Remove casing. 8. Pack, freeze and store.	Plastic (1 kg/ pack or 400 gm/pack)
Comminuted	MAL	Fish ball Round shape fish jelly product. It is used in soup or eaten as snack.	Fish	Salt, pepper, onion, celery, chili, flavor enhancer, tapioca starch, sodium borate, polyphosphate	1. Fresh fish. 2. Remove head, scale and viscera. 3. Debone and mince. 4. Add other ingredients and mix thoroughly. 5. Form and set for 2-3 hours. 6. Boil and cool. 7. Pack, freeze and store.	Plastic

Annex 1. Product Details (cont'd)

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Comminuted	MAL	Fish burger Patty shape product made from surimi and fish meat. It is pan fried and served with bread.	Fresh minced fish meat, surimi	Flavor enhancer, salt, tapioca starch, breadcrumbs	1. Fresh fish meat or surimi. 2. Mix with fixed colorings. 3. Form into burger shapes. 4. Freeze and store.	Plastic (10 pieces/bag)
Comminuted	MAL	Fish cake Square or tube shape fish jelly product. It is used in soup or fried with noodle or vegetables.	Fresh minced meat, surimi	Salt, pepper, onion, celery, chili, flavor enhancer, tapioca starch, sodium borate, polyphopshate	1. Remove head, scale and viscera. 2. Debone and mince into fine structure. 3. Add ingredients and mix thoroughly. 4. Press into tray. 5. Set for 2-3 hours. 6. Cut into desired portions 7. Deep fry and store	Plastic bag
Comminuted	MAL	Fish sausage Tube shape product made from surimi and fish meat, packed in casing. Used in soup, fried noodle and fried vegetables.	Fresh minced fish, surimi	Flavor enhancer, salt, tapioca starch	1. Fresh fish. 2. Dehead and gut. 3. Wash. 4. Debone using a meat-bone separator. 5. Blend by machine and mix with colorings. 6. Stuff into casings by machine. 7. Boil and steam. 8. Reboil, chill and remove casings. 9. Pack, freeze and store.	Plastic (400 gram/pack)
Comminuted	MAL	*Otak-otak* Spicy fish meat wrapped in banana leaves. It is roasted before serving. Eaten as dish.	Minced conger eel	Flour, coconut juice, fish curry powder, coriander powder, chili, onion, sugar, salt, MSG, caraway seed.	1. Minced fish meat. 2. Mix with all other ingredients. 3. Blend for 3-4 times. 4. Pack and freeze. 5. Pack in palm leaves and roast. 6. Store.	Plastic or palm leaf
Comminuted	MAL	Prawn burger Patty shape product made from surimi and prawn. It is fried and served with bread.	Surimi	Minced prawn meat, flavor enhancer, salt tapioca starch, breadcrumbs.	1. Surimi. 2. Mix with minced prawn meat and other ingredients. 3. Form into burger shapes. 4. Pack and freeze. 5. Store.	Plastic bag (10 pieces/ bag)
Comminuted	MAL	Prawn dumpling Made from surimi and fresh prawn wrapped in dumpling skin. It is deep fried and cooked with soup.	Surimi	Minced fresh prawn meat, carrot, turnip, spring onion, sugar, salt, flavor enhancer	1. Surimi paste. 2. Mix with fresh prawn meat and other ingredients. 3. Wrap. 4. Pack and freeze. 5. Store.	Plastic bag (10 pieces/ bag)
Comminuted	MAL	Prawn sausage Tube shape product made from surimi and prawn paste. It is deep fried, cooked with vegetables, or served with sandwich.	Surimi	Minced fresh prawn meat, flavor enhancer, salt, tapioca starch.	1. Surimi paste. 2. Mix with other ingredients by silent cutter. 3. Stuff into casings. 4. Boil or steam. 5. Remove casings 6. Pack. 7. Freeze and store.	Plastic bag (1 kg/ pack or 400 gm/pack)

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Comminuted	MAL	Prawn *wantan* Made from surimi and fresh prawn wrapped in wantan skin. It is deep fried or cooked in soup.	Surimi	Minced fresh prawn meat, carrot, turnip, spring onion, sugar, salt, flavor enhancer	1. Surimi paste. 2. Mix with other ingredients by silent cutter. 3. Wrap. 4. Pack in trays. 5. Freeze and store.	Polyfoam tray, wrapped with plastic (15 pieces/ tray)
Comminuted	MAL	Scallop-flavored fish cake Scallop shape product made from surimi, flavored by scallop extract. It can be deep-fried and eaten as snack.	Surimi	Flavor enhancer, scallop extract, salt, tapioca starch, breadcrumbs	1. Surimi. 2. Mince with all ingredients. 3. Form into small scallop shape. 4. Set and boil. 5. Chill, pack, freeze and store.	Polyfoam tray (10 pieces/tray)
Comminuted	MYA	Fish ball	Rohu, wolf-herring, yellow pike, conger eel	Salt, ginger, chili powder, oil and MSG	1. Raw fish. 2. Wash. 3. Fillet. 4. Mix with other ingredients. 5. Mould. 6. Boil. 7. Cool. 8. Pack in plastic.	Plastic (324g/bag)
Comminuted	MYA	Fried fish cake	Rohu, yellow conger eel, wolf-herring, barracuda	Salt, ginger, garlic, oil, MSG, sugar	1. Wash. 2. Fillet. 3. Mix with other ingredients. 4. Mould. 5. Fry. 6. Cool and pack.	Plastic (324g/bag)
Comminuted	PHI	Breaded fish finger/ nugget Bite size products made from tuna meat. Eaten as snack.	Tuna *(Neothunnus macropterus)*	Salt, pepper, onion, egg, milk, hamburger seasoning.	1. Fresh fish meat. 2. Chop mix with salt and other ingredients. 3. Mold into patties. 4. Fry. 5. Cool. 6. Pack and store.	PE bag
Comminuted	PHI	Fish ball Round shape fish jelly product. It is deep fried before serving.	Fish *(Cassio cunning)*	Salt, cornstarch and baking powder	1. Fresh fish. 2. Chop. 3. Mixed with other ingredients 4. Form into ball. 5. Cook. 6. Drain and dry. 7. Pack. 8. Cool and store.	Plastic or styrofoam plates, covered with plastic
Comminuted	PHI	Native sausage Tube shape product made by fish meat packed in casing. It is fried and eaten as snack or cooked with other ingredients.	Tuna *(Neothunnus macropterus).*	Brine	1. Fresh tuna. 2. Remove gut, head and bone. 3. Fillet, minced, blanch and drain. 4. Stuff inside casing. 5. Boil or steam. 6. Reboil. 7. Pack and store.	In plastic/vacuum pack material or styrofoam plates covered with plastic

Annex 1. Product Details (cont'd)

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Comminuted	PHI	Squid ball	Squid *(Lolligo sp)*	Salt, cornstarch and baking powder.	1. Mince squid. 2. Mix with salt and other ingredients. 3. Form into ball. 4. Cook. 5. Drain and dry. 6. Pack. 7. Cool and store	Plastic/ vacuum pack or styrofoam plates, covered with plastic
Comminuted	PHI	Surimi shrimp nugget Bite size rectangular shape product made from shredded prawn and surimi. Eaten as snack.	Shrimp *(P. merguinses)*	Surimi, garlic, onion, spices, salt, battermix and breadcrumbs	1. Mix shrimp, surimi and other ingredients to form a paste. 2. Form to nuggets. 3. Freeze. 4. Dip in breadcumbs. 5. Re-freeze. 6. Pack. 7. Cool and store.	PE bags, PS trays or paperboard box
Comminuted	PHI	Surimi-shrimp patty Patty shape product made from surimi and shredded shrimp. The texture is similar to products made from fillet blocks.	Shrimp *(P. merguinses)*	Surimi, salt, onion, flour, seasoning, spices, starch, oil, sugar breadcrumbs, and battermix.	1. Minced shrimp meat. 2. Mix shrimp and other ingredients to form a paste. 3. Mold/form into patties. 4. Freeze. 5. Dip in batter, then breadcrumbs. 6. Re-freeze. 7. Pack and store.	PE bag, PS tray or paperboard box
Comminuted	SIN	Breaded fish finger/ nugget Made from surimi or fish, breaded and deep fried. It is eaten as snack.	Surimi, fish fillet	Salt, flour, batter, bread crumbs, MSG	1. Surimi or frozen fish fillet. 2. Thaw. 3. Mix with other ingredients to form a paste. 4. Form. 5. Cook. 6. Cool. 7. Pack.	PE bag
Comminuted	SIN	*Chikuwa* (imitation crab stick) Tube shape baked fish jelly product made from surimi. It can be eaten as snack or cooked in noodle and soup.	Surimi	Salt, sugar, starch, egg white, flavoring	1. Surimi 2. Mix with other ingredients to form a paste. 3. Bake in chikuwa machine or crabstick machine. 4. Vacuum pack (for crab stick). 5. Cook by steam or hot water (for crab stick). 6. Cool. 7. Freeze.	Vacuum pack
Comminuted	SIN	Fish ball/ fish cake A type of fish jelly product. They can be eaten as snack by itself or cooked in soup or noodle.	Surimi, frozen fish fillet, minced fish meat *(big-eye snapper (Priancanthus sp.)*, threadfin bream *(Nemipterus sp.)*, goatfish *(Upeneus sp.)*	Salt, flour, MSG, water, sugar, starch, vegetables	1. Surimi or frozen fish meat. 2. Mix with other ingredients 3. Form fish balls/cakes. 4. Set in warm water (40°C). 5. Cook in hot water (95-98°C). 6. Cool. 7. Fry (optional). 8. Pack. 9. Freeze (optional).	PE bag, styrofoam trays

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Comminuted	SIN	*Otah-otah* Spicy fish paste with coconut milk wrapped in banana leaf. It is grilled before consumption and eaten as snack.	Minced fish meat	Flour, sugar, salt, chili, spices, coconut milk	1. Minced fish meat. 2. Mix with other ingredients to form a paste. Place otah paste on pieces of coconut leaves either manually or by a otah paste dispensing machine. 3. Wrap up by hand in the piece of coconut leave with the ends held together by wooden splinters. 4. Depending on buyer, the otah can be grilled before delivery or delivered raw. 5. Store in chiller.	Individually wrapped in a piece coconut leave folded and held together by wooden splinters at both ends
Comminuted	SIN	Prawn ball, prawn finger A type of fish jelly product. It is eaten as snack or cooked in soup or noodle.	Surimi, prawn meat	Salt, sugar, flour, flavoring, MSG.	1. Surimi or frozen prawn meat. 2. Thaw. 3. Mix with other ingredients to form a paste. 4. Cook. 5. Cool. 6. Pack and freeze.	Vacuum packed/ PE bags
Comminuted	SIN	Squid ball Round shape product made from surimi and cuttlefish.	Surimi, cuttlefish	Salt, sugar, MSG, starch, lard/ vegetable oil	1. Frozen cuttlefish or surimi. 2. Thaw in water. 3. Mix with other ingredients 4. Form then set. 5. Cook. 6. Cool. 7. Packing and store in freezer	Vacuum packed/ PE bag
Comminuted	THA	Imitation crab meat Made from surimi and flavorings, formed to crabstick. It can be eaten as snack or used in salad or other cooking.	Surimi *(Nemipterus spp, Otolithes spp., Trichiurus spp.)*	Salt, crushed ice, flour, extract, flavorings, egg white and colorings.	1. Surimi. 2. Mix with other ingredients to form a paste. 3. Form into shapes 4. Add colorings. 5. Wrap. 6. Steam (using steam box) and cool. 7. Pack, freeze and store.	Plastic bag
Comminuted	THA	Surimi Washed minced fish with additives and frozen to block. Used as raw material for minced products such as fish ball, fish burger, and fish sausage.	Fresh fish *(Nemipterus spp., Priacanthus spp., Scianea spp., Saurida spp.)*	Polyphosphate, sugar	1. Fresh fish. 2. Mince fish with meat-bone separator. 3. Wash with 2-5 times iced water, using fish washing tank. 4. Remove excess water by screw press. 5. Strain. 6. Mix with polyphosphate and sugar. 7. Pack and store.	Plastic bag
Cured	PHI	Kench style cured fish Heavily salted and moist fish product. It can be broiled, sautéed with vegetables in noodle.	Minced mackerel *(Rastrelliger chrysozonus)*	Salt	1. Minced fish. 2. Saturate with salt. 3. Wash with 2% salt. 4. Drain away the water. 5. Pack in wooden box in layers of fish and salt.	Wooden box, PE bag and vacuum bag
Dried	BRU	Chilled - sour salted fish Semi-dried salted fish. It is fried and eaten as side dish.	Fish *(Scombridae spp.)*	Chili and salt	1. Fresh fish. 2 Remove gut. 3. Add chili and salt.	Plastic bag

Annex 1. Product Details (cont'd)

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Dried	BRU	Salted fish Product is normally available whole or split. It is eaten as side dish.	Scombridae, Johnius sp.	Salt	1. Fresh fish. 2. Degut and split. 3. Mix with salt. 4. Keep overnight. 5. Dry for 1 - 2 days.	Plastic bag
Dried	BRU	Sun-dried anchovy	Anchovy	NA	1. Fresh fish. 2. Boil for 15 min. 3. Drain. 4. Sundry.	Plastic bag
Dried	BRU	Sun-dried fish Normally served in fried form.	Fish (short-bodied mackerel, sardine)	NA	1. Fresh fish. 2. Wash, remove gill, entrails, scales and bones. 3. Sundry for 2 days.	NA
Dried	CAM	Dried fillet fish	Fish	Salt and sugar	1. Fresh fish. 2. Remove entrails. 3. Add salt and sugar. 4. Dry.	NA
Dried	CAM	Dried shrimp	Small shrimp	NA	1. Small shrimp. 2. Wash to remove the impurities. 3. Boil. 4. Remove shell. 5. Dry.	Plastic bag and/or jar
Dried	CAM	Dried squid	Squid	NA	1. Fresh squid. 2. Sundry the whole squid.	NA
Dried	CAM	Dried stingray fillet	Stingray	NA	1. Fresh stingray. 2. Remove entrails. 3. Fillet. 4. Sundry the fillet.	NA
Dried	CAM	Fish meal	By-catch	NA	1. By-catch. 2. Dry. 3. Grind. 4. Mix with some grains.	Plastic bag
Dried	CAM	Salted fish	Snake-head, giant snake-head fish	Salt, sugar and other flavors	1. Fresh fish. 2. Remove entrails. 3. Fillet. 4. Add salts, sugar and other flavors. 5. Dry the mixed fillet.	NA
Dried	CAM	Smoked fish	Fish	NA	1. Dry fresh fish over the smoke of firewood with high temperature.	Fix them onto a bamboo stick
Dried	CAM	Sun-dried sea cucumber	Sea cucumber	NA	1. Fresh sea cucumber. 2. Sundry sea cucumber.	Dried

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Dried	IND	Dried catfish Dried fermented and salted catfish.	Marine catfish	Salt	1. Raw material. 2. Remove head. 3. Age for 24 hours. 4. Wash. 5. Soak in salt 20-30% for 24 hours. 6. Add water and soak for another 24 hours. 7. Wash and fillet. 8. Remove gills, entrails and bones. 9. Sundry for 2-4 days. 10. Pack.	Pack into plastic bags, paper or cartons
Dried	IND	Salted and dried anchovy Normally fried and eaten as snack or used in soup as flavor enhancer.	Anchovy	Salt	1. Fresh anchovy. 2. Boil in 0.3% brine for 5-10 minute. 3. Drain in drying trays. 4. Sundry or dryer. 5. Sort according to size. 6. Pack.	Plastic bags, paper or cartons
Dried	IND	Salted and dried fish Normally fried or used in soup as flavor enhancer.	Fish	Salt	1. Raw material. 2. Fillet raw material or use as a whole. 3. Wash. 4. Soak in salt 20-30% by weight for 24 hours or in saturated brine for 24 hours. 5. Wash. 6. Sundry. 7. Pack.	Plastic bags, paper or cartons
Dried	MAL	Dried anchovy Usually deep fried and consumed as snack, or boiled and used in soup.	Anchovy	Salt	1. Fresh anchovy. 2. Boil in bamboo basket in 10% brine for 15 minute. 3. Remove baskets and drain. 4. Spread out or sundry for 2-4 days. 5. Pack.	Pack in hard box 10 kg/ box and braided bamboo basket of 60 kg
Dried	MAL	Dried cockle Sun-dried cockle. It is used in soup or fried with chili sauce as in dishes.	Blood cockle	NIL	NA	NA
Dried	MAL	Dried cuttlefish Served in local dishes.	Cuttlefish	NA	1. Fresh cuttlefish. 2. Cut open and wash. 3. Spread out on tray. 4. Sundry.	NA
Dried	MAL	Dried jellyfish	Jellyfish	Alum, sodium metabisulphite	1. Fresh jellyfish. 2. Clean. 3. Put in alternate layers of salt (jelly fish/salt 4:1). 4. Add sodium metabisulphite to decolourise the product.	NA
Dried	MAL	Dried prawn It is cooked with vegetables, meat or in soup.	Shrimp *(Solenocera sub-muda)*	Salt	1. Fresh shrimp. 2. Wash with sea water and mix with salt (salt/shrimp=4:100). 3. Cook by using gas/kerosene stove. 4. Remove of skin. 5. Spread out for sun drying for 1-4 days.	Pack in box, plastic or paper bag

Annex 1. Product Details (cont'd)

Category	Country	Products	Main Materials	Sub-ingredients		Processing Method	Packaging Conditions
Dried	MAL	Dried shellfish	Shellfish	Salt		NA	NA
Dried	MAL	Salted fish It is deep fried or used in soup.	Bycatch fish *(Rastrelliger kanagurta, Sciaena spp., Scomberomorus spp., Lutianus spp., Fomionger, Nemipterus spp)* and/ or any fish which are not distributed as fresh fish	Salt	1. 2. 3. 4. 5. 6. 7. 8.	Fresh fish. Wash with sea water. Remove gills, entrails, scale (optional). Place dressed fish in wooden tub. Addition of 10% salt, to weight of fish. Salt for 2 days. Spread out for sun-drying using wooden platforms and mats for 10-30 hrs and then pack.	Pack in braided rattan/ bamboo basket in 50-60 kg each
Dried	MYA	Dried anchovy	Nganitu	Salt	1. 2. 3. 4.	Fresh fish. Wash. Sundry. Pack	Depend on requirement of buyer at retail shop
Dried	MYA	Dried fish (whole)	Various type of fish	Salt	1. 2. 3. 4. 5	Fresh fish. Remove head and gut of fish. Clean. Mixed with salt.. Sundrying	NIL
Dried	MYA	Dried jelly fish	Jellyfish	Salt, alum	1. 2. 3. 4. 5. 6. 7. 8.	Fresh jellyfish. Soak jellyfish on ice water (8-10 hours) to remove mucous. Drain. Mix with 30% salt and alum mixture. Wash. Drain in shady area (3-4 days). Final pile for dehydration. Pack in wooden box.	PE and PP bag (20-50 kg)
Dried	MYA	Dried prawn	Prawn (pink, white)	Salt	1. 2. 3. 4. 5. 6. 7. 8.	Fresh prawn. Wash. Pre-cook in 3% salt boiling water. Drain. Sundry (3-4 days). Remove shell. Grade. Pack.	PE bag (300 g or 1 kg)
Dried	MYA	Dried shark fin	Shark	NIL		NA	NA
Dried	MYA	Dried sea cucumber	Sea cucumber	NIL	1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11.	Fresh sea cucumber. Boil in sea water. Drain. Cool. Slit (body wall along back). Boil until the sea cucumber become rubber- like hardness. Drain. Cool. Remove gut. Dry in oven (1-2days) until hard and dry. Sundry (4-5 days).	NIL

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Dried	MYA	Dried squid	Squid	Salt	1. Fresh squid. 2. Wash with salt water. 3. Arrange onto split bamboo rack. 4. Sundry (turn once or twice per day). 5. Store in cool place.	NIL
Dried	MYA	Dried tilapia *(whole)*	Tilapia	Salt	1. Fresh fish. 2. Remove head and gut. 3. Clean. 4. Mix with salt (3-5% salt). 5. Sundrying	20 kg/ plastic bag
Dried	MYA	Prawn shell dust	Prawn shell	NIL	1. Fresh prawn shell. 2. Sundrying 3. Grind. 4. Pack.	PE bag (50 kg)
Dried	PHI	Dried abalone Fleshy and hard texture product. It is used in Chinese dishes, noodle and chop suey.	Abalone	NIL	1. Fresh abalone. 2. Shuck 3. Soak. 4. Clean and drain. 5. Pre-cook. 6. Dry. 7. Pack.	Carton box, polyethylene bag and vacuum bag
Dried	PHI	Dried anchovy It is fried with vegetables, cooked in soup, or cooked in coconut milk with vegetables.	Anchovy *(Stolepherus indicus)*	NIL	1. Fresh fish. 2. Clean. 3. Dry. 4. Pack. 5. Store.	Carton box, polyethylene bag and vacuum bag
Dried	PHI	Dried barracuda It has savory taste and fishy flavor. It is cooked with vegetables, fried or broiled.	Barracuda *(Sphyraena obtusata)*	Salt	1. Fresh fish. 2. Clean fish. 3. Soak in brine. 4. Dry. 5. Store.	Carton box, polyethylene bag and vacuum bag
Dried	PHI	Dried big-eyed scad It has savory taste and fishy flavor. It is cooked with vegetables, fried or broiled.	Big-eyed scad *(Caranx crumenopthalmus)*	Salt	1. Fresh fish. 2. Split the fish. 3. Remove gills and internal organs. 4. Wash and clean. 5. Soak in brine. 6. Dry. 7. Store.	Carton box, polyethylene bag and vacuum bag
Dried	PHI	Dried crevalle Has savory taste and fishy flavor. It is cooked with vegetables, fried or broiled.	Crevalle *(Caranx leptolepis)*	Salt	1. Fresh fish. 2. Clean fish. 3. Soak in brine. 4. Dry. 5. Store.	Carton box, polyethylene bag and vacuum bag
Dried	PHI	Dried eastern little tuna Has savory taste and fishy flavor.	Eastern little tuna	Salt	1. Fresh fish. 2. Clean fish. 3. Soak in brine. 4. Dry. 5. Store.	Carton box, polyethylene bag and vacuum bag

Annex 1. Product Details (cont'd)

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Dried	PHI	Dried fimbriated herring It has savory taste and fishy flavor. It is cooked with vegetables, fried or broiled.	Fimbriated herring *(Sardinella perforata)*	Salt	1. Fresh fish. 2. Clean fish. 3. Soak in brine. 4. Dry. 5. Store.	Carton box, polyethylene bag and vacuum bag
Dried	PHI	Dried fish liver and roe	Fish liver and fish roe	Salt	1. Fish liver and fish roe. 2. Prepare raw material. 3. Soak in brine. 4. Dry. 5. Store.	Carton box, polyethylene bag and vacuum bag
Dried	PHI	Dried hairtail Has savory taste and fishy flavor. It is cooked with vegetables, fried or broiled.	Hairtail *(Trichiurus haumela)*	Salt	1. Fresh fish. 2. Clean fish. 3. Soak in brine. 4. Dry. 5. Store.	Carton box, polyethylene bag and vacuum bag
Dried	PHI	Dried Indian sardine It has savory taste and fishy flavor. It is cooked with vegetables, fried or broiled.	Indian sardine *(Sardinella longiceps)*	Salt	1. Fresh fish. 2. Clean fish. 3. Soak in brine. 4. Dry. 5. Store.	Carton box, polyethylene bag and vacuum bag
Dried	PHI	Dried lizard fish	Lizard fish *(Saurida tumbil)*	Salt	1. Fresh fish. 2. Remove gills, internal organs; and wash thoroughly. 3. Soak in brine. 4. Dry. 5. Store.	Carton box, polyethylene bag and vacuum bag
Dried	PHI	Dried long tailed nemipterid It has savory taste and fishy flavor. It is cooked with vegetables, fried or broiled.	Long tailed nemipterid *(Nemipterus japonicus)*	Salt	1. Fresh fish. 2. Clean fish. 3. Soak in brine. 4. Dry. 5. Store.	Carton box, polyethylene bag and vacuum bag
Dried	PHI	Dried milkfish Dried salted split fish. It has strong fishy flavor. It is fried and served with tomato.	Milkfish *(Chanos chanos)*	Salt	1. Fresh fish. 2. Split fish. 3. Clean raw material. 4. Soak in brine. 5. Dry. 6. Store.	Carton box, polyethylene bag and vacuum bag
Dried	PHI	Dried mullet It has savory taste and fishy flavor.	Mullet	Salt	1. Fresh fish. 2. Split fish and remove gut. 3. Soak in brine. 4. Dry. 5. Store.	Carton box, polyethylene bag and vacuum bag
Dried	PHI	Dried roundscad It has savory taste and fishy flavor. It is cooked with vegetables, fried or broiled.	Roundscad *(Decapterus macrosoma)*	Salt	1. Fresh fish. 2. Clean fish. 3. Soak in brine. 4. Dry. 5. Store.	Carton box, polyethylene bag and vacuum bag

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Dried	PHI	Dried sea cucumber It has to be soaked in water prior to cooking. It is cooked with vegetables, fried or broiled.	Sea cucumber	Salt	1. Fresh sea cucumber. 2. Soak. 3. Clean and boil. 4. Slice open. 5. Dry. 6. Pack. 7. Store.	Carton box or in polyethylene bags
Dried	PHI	Dried sea urchin It has savory taste and fishy flavor.	Sea urchin	Salt	1. Fresh sea urchin. 2. Soak in brine. 3. Dry. 4. Store.	Carton box, polyethylene bag and vacuum bag
Dried	PHI	Dried shark fin It is used for soup and other Chinese delicacies. Known as tasty and nutritious product.	Shark fin	Salt	1. Fresh shark fin. 2. Dust with salt (1:10). 3. Stand for 24 hours. 4. Wash. 5. Hang or spread out on wire. 6. Dry for over a month. 7. Pack in sack or barrel.	Sack or barrel
Dried	PHI	Dried short bodied mackerel It has savory taste and fishy flavor.	Short bodied mackerel *(Rastrelliger brachyosomus)*	Salt	1. Fresh fish. 2. Clean fish. 3. Soak in brine. 4. Dry. 5. Store.	Carton box, polyethylene bag and vacuum bag
Dried	PHI	Dried shrimp Dried whole shrimp with shell removed. It is cooked with vegetables, fried or broiled.	Shrimp *(P. merguinses)*	Salt	1. Fresh shrimp. 2. Prepare raw material. 3. Soak in brine. 4. Dry. 5. Store.	Carton box, polyethylene bag and vacuum bag
Dried	PHI	Dried siganid	Siganid	Salt	1. Fresh fish. 2. Soak in brine. 3. Dry. 4. Store.	Carton box, polyethylene bag and vacuum bag
Dried	PHI	Dried slipmouth It has savory taste and fishy flavor. It is cooked with vegetables, fried or broiled.	Slipmouth *(Leiognathus equulus)*	Salt	1. Fresh fish. 2. Clean fish. 3. Soak in brine. 4. Dry. 5. Store.	Carton box, polyethylene bag and vacuum bag
Dried	PHI	Dried squid It has savory taste and fishy flavor. It is fried or broiled.	Squid *(Lolligo sp.)*	Salt	1. Fresh squid. 2. Prepare raw material. 3. Soak in brine. 4. Dry. 5. Store.	Carton box, polyethylene bag and vacuum bag
Dried	PHI	Dried striped mackerel Has savory taste and fishy flavor. It is cooked with vegetables, fried or broiled.	Striped mackerel *(Rastrelliger chrysozonus)*	Salt	1. Fresh fish. 2. Clean fish. 3. Soak in brine. 4. Dry. 5. Store.	Carton box, polyethylene bag and vacuum bag

Annex 1. Product Details (cont'd)

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Dried	SIN	Dried sea cucumber It needs to be soaked in water prior to cooking. It is boiled in soup, fried with meat or vegetables.	Sea cucumber *(Microthele nobilis, Holothuria scabra)*	Salt	1. Fresh sea cucumbers 2. Boil in salt/ sea water until they swell. 3. Drain and cool. 4. Slit along the back. 5. Boil again until rubber-like hardness. 6. Drain, cooled and remove guts. 7. Dry for 1-2 days by oven or 4-5 days by sun. 8. Pack	Gunny sack
Dried	SIN	Dried shark fin Famous as Chinese delicacy. It is boiled in soup.	Dorsal fin, pectoral fin, tail fin of shark	NIL	1. Soak dried fins overnight in hot water. 2. Scrap off skin. 3. Separate fin needles from cartilage. 4. Boil until fin needles expand and curl. 5. Cool by soaking overnight in water. 6. Arrange fin needles into desired shapes on trays. 7. Dry in electric dryer at 45°C for 6 hours. 8. Pack.	Cellophane bag
Dried/ Salted	THA	Dried salted fish It is deep fried, cooked with vegetables or in soup.	Chub mackerel, cat fish, climbing perch, swam eel, local carp, sepat siam	Salt	1. Fresh fish. 2. Remove scales, head and gut. 3. Wash and soak in brine (10%) for 1 day or brine (30%) for 15-30 minutes. 4. Wash and drain. Sundry for 1-2 days.	Plastic bag
Dried	THA	Dried shellfish It is deep fried, cooked with vegetables or in soup.	Shellfish *(Mytilus smaragdinus)*	NIL	1. Fresh shellfish meat. 2. Clean. 3. Sundry for 1-2 days.	Plastic bag
Dried	THA	Dried shrimp It is deep fried or used as sub-ingredient in Thai dishes.	Shrimp *(Penaeus spp, Metapenaeus spp.)*	Salt	1. Fresh shrimp. 2. Boil in slightly salt water using gas stove. 3. Sundry for 0.5-1 day or 4 hours in dryer machine. 4. Pack.	Plastic bag
Dried	THA	Dried squid It is deep fried or seasoned with spices and roasted.	Squid *(Loligo spp., Sepia spp.)*, octopus	Salt	1. Fresh squid. 2. Split and clean squids in brine or sea water (prepare both round and flat shape). 3. Sundry for 2-3 days.	Plastic bag
Fermented	BRU	Cured shrimp *(cincaluk)* Defined as fermented acetes. It is used as side dish.	Shrimp *(Acetes)*	Salt	1. Shrimp. 2. Wash and mix with salt. 3. Place in a plastic bucket and drain overnight. 4. Sundry. 5. Mince. 6. Pound. 7. Pack.	Plastic bag
Fermented	BRU	Fermented anchovy	Anchovy	Fish stomach, fried rice powder, salt	1. Fresh anchovy 2. Add other ingredients. 3. Allow fermentation for at least 3 days 4. Pack.	Bottle
Fermented	BRU	Fermented mussel Used as side dish.	Mussel	Fried rice powder, salt	1. Fresh mussel 2. Wash and drain. 3. Add other ingredients. 4. Allow fermentation for at least 3 days 5. Pack.	Bottle

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Fermented	BRU	Fermented shrimp paste *(belacan)* It is used for flavoring and eaten as sambal or fried.	Shrimp *(Acetes)*	Salt, sugar	1. Fresh shrimp 2. Wash and drain 3. Add other ingredients. 4. Allow fermentation for at least 1 week. 5. Pack.	Bottle
Fermented	BRU	Shrimp paste *(belacan)*	Shrimp *(Acetes)*	Tapioca flour, MSG, salt, pepper	1. Fresh shrimp 2. Mince meat with other ingredients. 3. Allow fermentation for 1 week. 4. Pack.	Plastic bag (600 g/ pack)
Fermented	CAM	Fermented crab	Mangrove crab	Salt	1. Fresh crab. 2. Add salt. 3. Allow fermentation for at least 1 week. 4. Pack.	Pot or jar
Fermented	CAM	Fermented fish *(head and stomach removed)*	Fish	Salt	1. Fresh fish. 2. Remove head and stomach parts. 3. Clean the fish. 4. Dry fish until it is fermented 5. Salt the fish and keep it in pots for a long time.	Pot and glass
Fermented	CAM	Fermented fish *(whole)*	Fish	Salt, sugar and other flavors	1. Fresh fish. 2. Remove entrails. 3. Add salt. 4. Keep in the pot for 2-4 months to ferment.	Pot or glass
Fermented	CAM	Fermented small shrimp	Small shrimp, krill	Salt	1. Fresh shrimp. 2. Clean 3. Add salt. 4. Keep in jar for a long period to ferment.	Jar
Fermented	CAM	Fish sauce	Fish	Salt, sugar	1. Fresh fish. 2. Add salt and sugar. 3. Allow it to ferment. 4. Collect the liquid. 5. Dry and add flavor.	Bottle
Fermented	IND	Fermented fish It is fried and eaten with rice.	Fish mince *(Rastreliger spp.)*	Salt	1. Minced fish. 2. Wash. 3. Add salt 20-30% by weight. 4. Ferment material for 7 days. 5. Remove salt from fish and dry. 6. Add salt 10%. Age for 7-12 days. 7. Clean and dry until moisture is about 45-55%. 8. Packed.	Wooden box or bamboo basket

Annex 1. Product Details (cont'd)

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Fermented	IND	Fermented shrimp paste *(petis)* Dark semi liquid fermented product used as condiment in local dishes.	Shrimp *(Acetes)* or shrimp head	Salt, sugar	1. Fresh shrimp. 2. Wash. 3. Add water (1:1). 4. Cook product for 6 hours, mix continuously. 5. Grind cooked product, add water (3:1). 6. Filter. 7. Boil. 8. Pack.	Plastic bag or glass jar
Fermented	IND	Fermented shrimp paste *(terasi)* Dark thick paste fermented product. It is used as ingredient in local dishes.	Shrimp *(Acetes)* or shrimp head	Salt	1. Fresh shrimp. 2. Wash. 3. Grind raw material and mix with salt 2%. 4. Ferment for 24 hours at room temperature. 5. Sundry. 6. Add water and grind into paste. 7. Pound the paste until homogenous consistency 8. Form into certain shape. 9. Pack.	Plastic bag
Fermented	IND	Fish sauce Used as flavoring in soup, fried vegetables or meat.	Anchovy	Salt, brown sugar, seasoning	1. Fresh anchovy. 2. Wash. 3. Mix with salt (3:1). 4. Kept in closed earthen/glass jar for 4-12 months to ferment. 5. Filter. 6. Boil the liquid for 1 hour at 100°C and add sugar and seasonings. 7. Pack.	Bottle
Fermented	MAL	Fermented anchovy Used as condiment in local dishes.	Anchovy	Salt	1. Fresh anchovy. 2. Rinse with salt water repeatedly. 3. Add salt to anchovy (1:2-3). 4. Transfer to vats or pots. 5. Add salt on the surface. 6. Allow fermentation for 0.5-2 years. 7. Pack.	Bottle
Fermented	MAL	Pickled prawn Suspension of tiny, pink shrimp in sauce. It is eaten with rice.	Shrimp *(Acetes)*	Salt, rice	1. Fresh shrimp. 2. Wash. 3. Mix with 20% coarse salt, 6% cold rice. 4. Pack in jars. 5. Ferment for 20 - 30 days.	Bottle
Fermented	MAL	Prawn paste Thick, dark brown paste. Used as condiment in local dishes.	NA	NA	NA	Tin
Fermented	MAL	Shrimp paste Greyish pink color paste, with salty taste. Used as ingredients for local dishes.	Shrimp *(Acetes)*	Salt	1. Fresh shrimp. 2. Wash and mix with salt in bamboo baskets or wooden tubs. 3. Spread out to sundry to 5-8 hours. 4. Minced, allow fermentation for 7 days. 5. Pack.	Plastic bag

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Fermented	MYA	Fermented fish *(nagpi yecho)* Fermented fish with boiled broken rice.	Various low value fish	Salt, boiled broken rice	1. Fresh fish. 2. Remove head and gut. 3. Wash. 4. Mix with salt, boil broken rice. 5. Store in earthen pot. 6. Allow to ferment for 3-6 months.	NIL
Fermented	MYA	Fermented fish *(ngachin)* Fermented fish with broken rice.	Freshwater small fish	Broken rice, salt	1. Fresh fish. 2. Wash. 3. Mix with cooked rice and salt. 4. Pack in banana leave (3 days).	Wrap with banana leaves (160g)
Fermented	MYA	Fermented mysis	Shrimp *(Acetes)*	Salt	1. Fresh shrimp 2. Minced, mix with salt. 3. Grind. 4. Allow to ferment.	Plastic bag (0.80 and 1.6 kg)
Fermented	MYA	Fermented shrimp Fermented shrimp with rice.	Small shrimp	Rice, salt	1. Fresh fish. 2. Wash. 3. Mix with cooked rice and salt. 4. Pack in banana leave (3 days).	Banana leaf
Fermented	MYA	Fish sauce Fish sauce made from fermented fish with broken rice.	Trash fish	Cooked broken rice, salt	1. Fresh fish. 2. Wash. 3. Mix with cooked broken rice and salt. 4. Grind. 5. Ferment in earthen jar (6-12 months). 6. Filter to obtain the solution. 7. Pack.	Glass bottle, plastic bottle (0.7L, 1L)
Fermented	PHI	Fish paste	Anchovy *(Stolepherus indicus)*	Salt	1. Fresh fish. 2. Wash. 3. Mix with salt (1:3). 4. Ferment in earthen jars, concrete tank, wooden vats, plastic drum. 5. Pack in bottles.	Glass jar and bottle
Fermented	PHI	Fish sauce Clear brown liquid with ammonical, meaty, cheesy flavor. Used for viand.	Anchovy *(Stolepherus indicus)*	Salt	1. Fresh fish. 2. Clean and wash. 3. Drain. 4. Mix with salt (1:3). 5. Ferment in fermenting vats, earthenware jars. 6. Filter. 7. Pack.	Glass jar and bottle (390g)
Fermented	PHI	Shrimp paste It is sautéed in garlic or lard and used as dips for food.	Small shrimp *(Acetes)*	Salt	1. Fresh shrimp. 2. Wash and drain. 3. Mix with salt. 4. Ferment in tanks or mixing vats. 5. Pack.	Glass jar, bottle and can

Annex 1. Product Details (cont'd)

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Fermented	THA	Fermented fish *(plasom)* Fermented fish with salt and ground rice. It is cooked with coconut milk, shallot, chili and served with fresh vegetables.	Freshwater fish *(Trichogaster spp.)*	Salt, ground roasted rice	1. Fresh fish. 2. Remove head, gut and scales. 3. Wash and drain. 4. Mix with salt. 5. Pack in close jar 2-3 months. 6. Add ground roasted rice. 7. Pack product in close jar 3-6 months.	Earthen glass jar, plastic bag or jar
Fermented	THA	Fermented fish *(pla ra)* Sweetened fermented fish. It is mixed with lemon grass, shallots and chili, or use as condiment. It is ready-to-eat.	Freshwater fish *(Puntius spp., Pamgasium spp.)*	Salt, cooked rice	1. Fresh fish. 2. Remove scales and viscera. 3. Wash and drain. 4. Mix with salt and leave it for 1hour. 5. Drain liquid. 6. Add cooked rice and minced garlic. 7. Pack in jars. 8. Store at ambient temperature for 3-7 days.	Earthen jar with salt on top (*Plasom and Plajom*). Banana leaf or plastic bag (*Somfak*)
Fermented	THA	Fermented shrimp Salty, dark purple paste. Used for making chili sauce and spicy soup.	Shrimp *(Acetes)*	Salt	1. Fresh fish. 2. Wash and drain fresh raw material. 3. Mix with salt and keep in wooden vats. 4. Drain and dry under the sun for 4-5 hours. 5. Grind into paste. 6. Pack in earthen jar or wooden for 4-6 months. 7. Pack.	Glass jar, plastic bag
Fermented	THA	Fish sauce *(budu)* Think brown liquid with grey colloidal fish flesh.	Marine fish *(Stolephorus spp.,Decapterus spp.)*	Salt, tamarind	1. Fresh fish. 2. Wash and drain. 3. Mix with salt. 4. Keep in earthen jar for 3-6 months with occasional stirring. 5. Pack.	Earthen jar, glass bottle
Fermented	THA	Fish sauce *(nam pla)* Clear brown liquid with salty and fishy flavor. Used as condiment.	Marine fish *(Stolephorus spp.)*	Salt and sugar	1. Fresh fish. 2. Mix fish with salt. 3. Transfer to concrete tank with salt on top to keep fish below the brine. 4. Allot it to ferment for 8-12 months, drain and filter 5. Age for 2-3 weeks to improve color and flavor. 6. Blend with sugar for flavoring. 7. Fill in the glass bottles.	Glass bottle and polyethylene container
Fish meal	MAL	Fish manure Used for fertilizer.	Trawl by-catch	NA	NA	NA
Fish meal	MAL	Fish meal Feed ingredients for swine and poultry.	Trawl by-catch	NA	1. By-catch. 2. Cook by dry or wet method. 3. Press cooked fish to remove moisture. 4. Dry, grind and pack.	Multi layer paper bag

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Fish Meal	MYA	Fish meal Used for animal feed.	Trash fish and trawl by-catch	NIL	1. By-catch. 2. Pass through screw-conveyer 3. Steam. 4. Remove water by screw press. 5. Dry at 19°C. 6. Mill and pack.	50 kg each pack
Fish meal	PHI	Fish meal Used for animal feed.	Assorted fish species	NIL	1. Fresh fish. 2. Cook or steam. 3. Press, grind. 4. Pack and store.	Black-lined sack
Fish meal	THA	Fish meal Used for animal feed.	Trawl by-catch	NA	1. Wash. 2. Cook with coagulator. 3. Screw press. 4. Dry and mill.	Plastic bag
Frozen	BRU	Frozen whole fish and shrimp	Fish and shrimp	NA	1. Fresh fish or shrimp. 2. Clean. 3. Freeze in blast freezer. 4. Store at - 30°C.	Plastic
Frozen	CAM	Frozen crab meat	Crab (mud crab and sand crab)	NA	1. Boil the crab. 2. Remove the exoskeletons. 3. Freeze the product.	Plastic bag and/or paper box
Frozen	CAM	Frozen shrimp meat	Shrimp	NA	1. Clean and /or remove the exoskeleton. 2. Freeze the product.	Box.
Frozen	IND	Frozen crab	Mud crab, mangrove crab, blue crab	NIL	1. Raw material. 2. Wash. 3. Remove crab-leg or whole shell. 4. Pack in plastic bag and freeze in -18°C.	Plastic bag packed in carton
Frozen	IND	Frozen fish fillet	Tuna, skipjack, mackerel, red snapper	NIL	1. Raw material. 2. Sort according to size and quality. 3. Wrap in moisture vapour proof paper or plastic and freeze in -18°C. 4. Pack in plastic bag and cartons.	Plastic bag and carton
Frozen	IND	Frozen frog leg	Frog leg	NA	1. Raw material. 2. Wash. 3. Soak the raw material in 200 ppm chlorine solution for 10 minutes and mix continuously. 4. Remove head, finger, entrails and skin. 5. Soak in 100 ppm chlorine solution for 10 minute. 6. Soaking in 50 ppm chlorine solution for 10 minute. 7. Sort according to size. 8. Wash. 9. Pack in plastic bag and freeze in -18°C.	Plastic bag followed by cartons
Frozen	IND	Frozen shrimp meat	Shrimp	NIL	1. Sort shrimp according to size and quality. 2. Wash, remove head and shell. 3. Freeze by plate freezer or IQF freezer.	Plastic bag packed in carton

Annex 1. Product Details (cont'd)

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Frozen	MAL	Frozen cuttlefish	Cuttlefish	NA	1. Clean and pack into tins. 2. Store products in cold room.	NA
Frozen	MAL	Frozen fish	Fish	NA	NA	NA
Frozen	MAL	Frozen prawn	Prawn	NA	NA	NA
Frozen	MYA	Frozen boiled hard clam	Hard clam	NIL	NA	Plastic bag (2 kg)
Frozen	MYA	Frozen cuttlefish	Cuttlefish	NIL	1. Wash and weigh. 2. Freeze. 3. Pack.	Individually wrapped with plastic, packed in cardboard box (20kg)
Frozen	MYA	Frozen fish (assorted salt water fish)	Salt water fish	NIL	1. Wash. 2. Weigh. 3. Freeze. 4. Pack.	Individually wrapped with plastic, packed in cardboard box (20kg)
Frozen	MYA	Frozen fish fillet (barramundi)	Barramundi	NIL	1. Wash. 2. Fillet. 3. Weigh. 4. Freeze. 5. Pack.	Individually wrapped with plastic, packed in cardboard box (20kg)
Frozen	MYA	Frozen fresh water prawn (with shell)	Tiger prawn, white prawn, pink prawn	NIL	1. Wash and grade. 2. Freeze. 3. Label and pack.	Plastic, packed in carton (2 kg, 1.8 kg)
Frozen	MYA	Frozen hilsa (whole)	Hilsa	NIL	1. Wash and weigh. 2. Freeze. 3. Pack.	Individually wrapped with plastic, packed in cardboard box (20kg)
Frozen	MYA	*Frozen long tongue sole* (whole)	Long tongue sole	NIL	1. Wash and weigh. 2. Freeze. 3. Pack.	Individually wrapped with plastic, packed in cardboard box (20kg)
Frozen	MYA	Frozen *Novashi ebi*	*Microbrachium rocenbergii*	NIL	1. Wash and grade. 2. Freeze. 3. Label and pack.	Plastic, packed in cardboard box (2 kg, 1.8 kg)
Frozen	MYA	Frozen red snapper (whole)	Red snapper	NIL	1. Wash and weigh. 2. Freeze. 3. Pack.	Individually wrapped with plastic, packed in cardboard box (20kg)
Frozen	MYA	Frozen ribbon fish (whole)	Ribbon fish	NIL	1. Wash and weigh. 2. Freeze. 3. Pack.	Individually wrapped with plastic, packed in cardboard box (20kg)
Frozen	MYA	Frozen *rohu* (whole)	*Rohu*	NIL	1. Wash and weigh. 2. Freeze. 3. Pack.	Individually wrapped with plastic, packed in cardboard box (20kg)
Frozen	MYA	Frozen seawater prawn (with shell)	Tiger prawn, white prawn, pink prawn	NA	1. Remove shell and tail. 2. Cut belly side and stretched. 3. Vacuum. 4. Freeze. 5. Pack.	Vacuum packed (25 pieces of 425g per tray)

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Frozen	MYA	Frozen squid ring	Squid	NIL	1. Dress. 2. Wash and cut. 3. Freeze.	Plastic bag (1kg).
Frozen	MYA	Frozen surimi	Thread fin bream, croaker	Polyphosphate, salt, sorbitol	1. Clean. 2. Remove head and gut, wash. 3. Debone. 4. Leach. 5. Strain. 6. Mix with other ingredients. 7. Manual forming. 8. Set.	Individually wrapped with plastic, packed in cardboard box (20kg)
Frozen	MYA	Frozen yellow croaker (whole)	Yellow croaker	NIL	1. Wash and weigh. 2. Freeze. 3. Pack.	Individually wrapped with plastic, packed in cardboard box (20kg)
Frozen	PHI	Frozen cuttlefish (whole, tube or fillet)	Cuttlefish	NIL	1. Wash and grade. 2. Remove head. 3. Arrange in trays. 4. Glaze. 5. Blast/contact freeze. 6. Pack.	PE bag and carton box.
Frozen	PHI	Frozen milkfish (whole)	Milkfish *(Chanos chanos)*	NIL	1. Wash and grade. 2. Blast/ contact freeze. 3. Pack and store	PE bag and carton box.
Frozen	PHI	Frozen octopus	Octopus *(Octopus membraneceaous)*	NIL	1. Wash and grade 2. Freeze. 3. Pack and store.	PE bag and carton box.
Frozen	PHI	Frozen prawn (whole)	Prawn *(P. monodon)*	NIL	1. Wash and grade. 2. Blast/ contact freeze. 3. Pack.	PE bag and carton box.
Frozen	PHI	Frozen scallop meat	Scallop	NIL	1. Sort. 2. Shuck. 3. Wash. 4. Freeze and store.	PE bag and carton box.
Frozen	PHI	Frozen squid	Squid *(Lolligo sp.)*	NIL	1. Wash and grade 2. Freeze. 3. Pack and store	PE bag and carton box.
Frozen	PHI	Frozen tuna (whole)	Tuna *(Neothunnus macropterus)*	NIL	1. Wash. 2. Remove gut and blood. 3. Wash. 4. Glaze. 5. Blast/contact freeze. 6. Pack and store	Carton box.

Annex 1. Product Details (cont'd)

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Frozen	SIN	Frozen fish steak	Fish fillet (swordfish, moro shark, tuna, red snapper, mackerel)	NIL	1. Wash and scale. 2. Fillet manually. 3. Remove skin if required. 4. Pack individually or in blocks. 5. Freeze.	Individually wrapped in PE bag. Packed in carton.
Frozen	SIN	Frozen fish (whole or gutted)	Fish fillet (swordfish, moro shark, tuna, red snapper, mackerel)	NIL	1. Wash and scale. 2. Freeze and pack.	Individually wrapped in PE bag. Packed in carton.
Frozen	SIN	Frozen prawn meat	Penaeid prawn	NIL	1. Thaw, wash, dehead. 2. Peel and devein. 3. Pack and freeze.	PE bag in cardboard box, (1-2 kg)
Frozen	SIN	Frozen prawn (whole)	Penaeid prawns	NIL	1. Sort and wash. 2. Pack individually in trays. 3. Freeze by blast/ plate freezer for 4 - 6 hours at -40°C.	PE bag in cardboard box, (1-2 kg)
Frozen	SIN	Frozen squid (whole, tube or fillet)	Squid *(Loligo spp.)*, cuttlefish *(Sepia spp, Sepiola spp.)*	NIL	1. Thaw and wash. 2. Remove head, gut and skin. 3. Pack and freeze.	Cardboard box (2-20 kg block)
Frozen	THA	Frozen cuttlefish (whole, fillet or cuttlefish head)	Cuttlefish	NIL	1. Wash and dress. 2. Freeze by contact plate freezer, air blast freezer or IQF freezer and pack.	Plastic bag and carton box.
Frozen	THA	Frozen fish (whole or fillet)	Whole fish or fillet (red snapper, painted sweetlip, Malabar snapper, snake head fish, tilapia, catfish)	NIL	1. Freeze by air-blast or contact plate freezer and pack.	Plastic bag. Packed in carton box.
Frozen	THA	Frozen octopus (whole or gutted)	Octopus	NIL	1. Wash and dress. 2. Freeze by block freezer, contact plate freezer, air blast freezer or IQF freezer and pack.	Plastic bag. Packed in carton box.
Frozen	THA	Frozen shellfish meat	Baby clam or mussel meat	Water	1. Wash, cook, cool. 2. Remove shell. 3. Freeze by block freezer, contact plate freezer, air blast freezer or IQF freezer and pack.	Plastic bag. Packed in carton box.
Frozen	THA	Frozen shrimp meat	Shrimp *(Penaeus monodon, Penaeus merguensis)*	NIL	1. Boil, peel and cool. 2. Re-cook and cool, 3. Freeze in IQF freezer and pack.	Plastic bag or small polystyrene foam tray. Packed in carton.
Frozen	THA	Frozen shrimp (whole)	Shrimp *(Penaeus monodon, Penaeus merguensis, Metapenenaeus spp.)*	NIL	1. Wash and dress. 2. Freeze by block freezer, contact plate freezer, air blast freezer or IQF freezer.	Plastic bag or polystyrene tray. Packed in carton box.
Frozen	THA	Frozen squid (whole, tube, ring or head)	Squid	NIL	1. Wash and dress. 2. Freeze by block freezer contact plate freezer, air blast freezer or IQF freezer and pack.	Plastic bag. Packed in carton box.
Marinated	BRU	Chilled - sour salted fish	Mackerel *(Johnius spp)*	Chili, tamarind, salt, MSG, vinegar, chili powder	1. Fresh fish. 2. Clean and scale fish. 3. Remove guts and clean. 4. Drain. 5. Marinate with paste. 6. Pack and store.	Plastic bags

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Others	BRU	Barbequed fish	Fish	Salt, turmeric powder	1. Fresh fish. 2. Clean, remove gut, bones and head. 3. Mix with other ingredients. 4. Barbeque. 5. Pack.	Wax paper
Others	BRU	Prawn cracker Dried chip or stick. It is fried and eaten as snack.	Prawn	Tapioca flour, MSG, salt, pepper	1. Mince prawn. 2. Mix with other ingredients. 3. Form to rolls. 4. Steam then cool. 5. Slice then sundry. 6. Pack.	Plastic bag
Others	IND	Shrimp/ fish cracker Dried chip or stick. It is fried and eaten as snack.	Small shrimp or fish (yellow pike conger)	Salt, cassava flour, seasoning	1. Fresh shrimp or fish. 2. Remove skin and bone for fish, then grind. 3. Mix with other ingredients. 4. Form into round or cube shape. 5. Steam, then cool over night. 6. Slice thinly by machine (5-10 mm thickness). 7. Sundry then pack.	Plastic bag
Others	MAL	Fish cracker Dried chip or stick. It is fried and eaten as snack.	Fish	NA	1. Remove head, tail, viscera and bones. 2. Mince. 3. Mix with other ingredients. 4. Form, cook, and cool. 5. Slice, dry, cool and pack.	NA
Others	MAL	Fish satay Dried chip or stick. It is fried and eaten as snack.	Fish	Sugar, chili powder, soy sauce, ginger, salt	1. Dress and sun dry 2. Cool and roll 3. Dip in viscous sauce 4. Place in oven, cool and pack.	Pack in plastic pack
Others	MAL	Prawn cracker Ready-to-cook snack.	Prawn	Starch, salt, sugar, flavor enhancer	1. Fresh fish. 2. Remove head, tail, viscera, bones. 3. Mince. 4. Mix with other ingredients and form. 5. Cook then cool. 6. Slice, dry, cool. 7. Pack.	NA
Others	MYA	Fish cracker Ready-to-cook snack.	Fish	Tapioca, salt	1. Remove head, tail, viscera, and bones. 2. Mince. 3. Mix with other ingredients. 4. Form, then leave for 2 days. 5. Sundry for 1 day and pack.	250gm/pack
Others	PHI	Shrimp keropok Dried chip or stick. It is fried and eaten as snack.	Shrimp *(P. merguinses)*	Salt, MSG and rice.	1. Weigh and wash. 2. Pre-cook. 3. Grind and mix with other ingredients. 4. Steam. 5. Cut, dry then pack.	Airtight PE bags

Annex 1. Product Details (cont'd)

Category	Country	Products	Main Materials	Sub-ingredients		Processing Method	Packaging Conditions
Others	PHI	Seaweed Cream colored, noodle-like gelatinous form. It is used for preparing gelatin products, pharmaceutical, dental, and cosmetic products.	Seaweed *(Gracilaria sp.)*	NIL	1. 2. 3. 4. 5. 6. 7.	Sort. Prepare solution. Bleach and wash. Dry using drying trays. Boil then freeze. Thaw then cut. Dry then pack.	PE bag and carton box
Others	SIN	Prepared cuttlefish Toasted dried cuttlefish seasoned with chili and spices. Ready-to-eat snack.	Dried cuttlefish (whole and fillet)	Seasoning liquid made up of chili and spices.	1. 2. 3. 4. 5.	Sort and remove tentacles. Soak in seasoning for about 8 hours. Toast. Mix in seasoning liquid. Dry and pack.	Plastic retail packet (25-50g/ pack)
Others	SIN	Prepared prawn cracker Toasted and seasoned prawn stick. Ready-to-eat snack.	Raw prawn stick/ cracker/ chip	Seasoning liquid	1. 2. 3. 4. 5.	Raw prawn stick/ cracker/ chip. Dry in dryer at 45∞C for about 8 hours. Toast in machine at 250∞C. Mix with seasoning liquid. Dry and pack.	Plastic retail packet (25g/ pack)
Others	THA	Fish satay Dried minced fish, seasoned, skewered and deep fried. Ready-to-eat snack.	Minced fish	Flour, soy sauce, sugar, sesame seeds, oil.	1. 2. 3. 4. 5.	Mix all ingredients. Form into round sheet. Sundry for 2-3 hours. Deep fry. Pack.	Plastic bag
Others	THA	Fish/ shrimp cracker Ready-to-eat snack.	Minced fish or shrimp	Tapioca flour, pepper, salt, sugar, garlic, water.	1. 2. 3. 4. 5. 6. 7.	Mix all ingredients, and knead. Form into roll shape. Steam for 1.5 hours. Cool overnight. Slice into thin piece with slicer. Sundry for 1 day. Deep fry and pack.	Airtight container
Powdered	MAL	Prawn dust Made from by-product of dried prawn.	Prawn	NA		NA	NA
Powdered/ Flaked	THA	Fish floss Light, flossy fish product with savory taste. It is eaten with rice or as ready-to-eat snack.	Tuna, mackerel or other marine fish	Soy sauce, sugar	1. 2. 3. 4. 5. 6.	Remove gut. Wash with 4% brine and drain. Cook or steam. Remove bones. Cook with soy sauce and sugar until dry. Place in puffing machine until fish meat become fibrous then pack.	Plastic bag or glass bottle
Powdered/ Flaked	THA	Fish powder Roasted and powdered fish floss. Mixed with spices and soya sauce, served with rice.	Lizard fish, sardine	NA	1. 2. 3. 4.	Remove gut and wash. Cook in smoker machine for 3 hours. Cool. Mince into powder and pack.	Glass bottle or plastic bag

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Smoked	IND	Smoked fish Ready-to-eat snack.	Milk fish *(Chanos-chanos)*, skipjack, catfish, ray	Salt	1. Remove entrails and gills and wash. 2. Soak in 10% brine for 30-60 minutes. 3. Cold smoke at 55-60°C for 4 hours. 4. Hot smoke at 75-80°C for 2 hours. 5. Cool the products at room temperature then pack.	Vacuum sealed plastic bag
Smoked	MAL	Smoked tuna Cooked in soup.	Tuna	Salt	1. Remove head and tail. 2. Cut into cubes and clean. 3. Soak in brine for 80 minutes. 4. Drain. 5. Smoke at 80°C to 90°C for 3 to 7 hours, based on type of fish and its cut. 6. Cool and pack.	Plastic bag
Smoked	MYA	Smoked fish	Catfish	NIL	1. Wash. 2. Smoke fish. 3. Cool and pack	Depend on buyer
Smoked	PHI	Smoked boneless milkfish It can be boiled, grilled or fried. Served with tomato.	Milkfish *(Chanos chanos)*	Salt	1. Wash and clean, remove bones. 2. Soak in brine and drain. 3. Cook in brine, drain and dry. 4. Smoke. 5. Cool and pack.	PE bag
Smoked	PHI	Smoked herring It can be boiled, grilled or fried. Served with tomato.	Herring *(Sardinella longiceps)*	Salt	1. Weigh and wash. 2. Soak in brine. 3. Pre-cook. 4. Dry. 5. Smoke. 6. Cool and pack.	PE bag
Smoked	PHI	Smoked mackerel	Mackerel	Salt	1. Weigh and wash. 2. Soak in brine. 3. Pre-cook. 4. Dry. 5. Smoke. 6. Cool and pack.	PE bag
Smoked	PHI	Smoked milkfish (whole) It can be boiled, grilled or fried. Served with tomato.	Milkfish *(Chanos chanos)*	Salt	1. Weigh and wash. 2. Soak in brine. 3. Pre-cook. 4. Dry. 5. Smoke. 6. Cool and pack.	PE bag
Smoked	PHI	Smoked roundscad	Roundscad	Salt	1. Weigh and wash. 2. Soak in brine. 3. Pre-cook. 4. Dry. 5. Smoke. 6. Cool and pack.	PE bag

Annex 1. Product Details (cont'd)

Category	Country	Products	Main Materials	Sub-ingredients	Processing Method	Packaging Conditions
Smoked	PHI	Smoked sardine It can be fried or served with noodle.	Sardine	Salt	1. Weigh and wash. 2. Soak in brine. 3. Pre-cook. 4. Dry. 5. Smoke. 6. Cool and pack.	PE bag
Smoked	PHI	Smoked tuna	Tuna	Salt	1. Weigh and wash. 2. Soak in brine. 3. Pre-cook. 4. Dry. 5. Smoke. 6. Cool and pack.	PE bag
Smoked	THA	Dried fish Smoked, crispy, brown product, used in Thai soup and chili paste.	Marine fish *(Saurida spp., Arius spp.)*, freshwater fish *(Krytopterus spp., clarias spp.,puntius spp., pangasius spp.)*	NA	1. Remove gut and clean. 2. For big fish, split fish from back. 3. Sundry or grill fish over fire for 4-12 hours. 4. Smoke in smoke house. 5. Dry under the sun for 1-2 days. 6. Pack and store.	Bamboo basket or paper wrapped

Annex 2

Annex 2. Problems Encountered in Products Surveyed

Category	Product	Country	Problems on Marketing and Quality Control
Boiled	Mackerel	CAM	Short shelf life
Boiled	Fish	IND	Sanitation, hygiene and short shelf life resulting in limited marketing
Boiled	Fish	IND	Sanitation, hygiene and short shelf life resulting in limited marketing
Boiled	Fish	MAL	NA
Boiled	Crab	MYA	Water quality
Boiled	Cooked fish	SIN	Post-cooking contamination Storage at room temperatures
Boiled	Steamed fish	THA	Need to improve processing method and extend storage life
Canned	Sardine, mackerel, tuna	IND	Supply of raw materials inconsistent The processing plants commonly do not have cold storage facilities therefore processors have to depend on the fishermen for constant fish supplies
Canned	Crab meat	IND	Raw material decomposed or changed color rapidly
Canned	Anchovy in sambal	MAL	NA
Canned	Fish in tomato sauce	MAL	NA
Canned	Canned fish	MYA	NA
Canned	Hilsa	MYA	NA
Canned	Sardine/ platu	MYA	NA
Canned	Mackerel	PHI	High cost of tin cans
Canned	Milkfish	PHI	High cost of tin cans
Canned	Sardine in tomato sauce	PHI	High cost of tin cans
Canned	Herring, French style	PHI	NA
Canned	Anchovy, French style	PHI	NA
Canned	Anchovy	PHI	High cost of tin cans
Canned	Tuna	PHI	High cost of tin cans
Canned	Shrimp/ anchovy in sambal sauce	SIN	NIL
Canned	Squid/ cuttlefish/ octopus	THA	High level of heavy metals such as cadmium
Canned	Baby clam	THA	High level of heavy metals such as cadmium found in the clam
Canned	Crab meat	THA	High level of food additives such as EDTA

Category	Product	Country	Problems on Marketing and Quality Control
Canned	Fish in tomato sauce	THA	Fish identity, parasites and labeling
Canned	Shrimp	THA	Decomposition, excessive use of food additives such as sulphites, EDTA. Mislabeling such as undeclared additive(s) used
Canned	Tuna	THA	Decomposition, high histamine level and mislabeling
Canned	Sardine in tomato sauce	THA	Fish identification and labeling
Comminuted	Fish ball	BRU	Stiff competition from imported product Lacked of hygiene and sanitary practices in plant Low demand of product for restaurants, supermarkets and open market.
Comminuted	Prawn burger	MAL	NA
Comminuted	Prawn dumpling	MAL	NA
Comminuted	Fish sausage	MAL	NA
Comminuted	Prawn sausage	MAL	NA
Comminuted	Prawn *wantan*	MAL	NA
Comminuted	Scallop flavor fish cake	MAL	NA
Comminuted	*Otak-otak*	MAL	NA
Comminuted	Fish cake	MAL	NA
Comminuted	Fish ball	MAL	NA
Comminuted	Cuttlefish ball	MAL	NA
Comminuted	Cuttlefish sausage and cocktail	MAL	NA
Comminuted	Fish burger	MAL	NA
Comminuted	Fish ball	MYA	NA
Comminuted	Fried fish cake	MYA	NA
Comminuted	Fish ball	PHI	Packaging
Comminuted	Surimi shrimp nugget	PHI	Packaging
Comminuted	Native sausage	PHI	Packaging
Comminuted	Squid ball	PHI	Packaging
Comminuted	Fish burger patties	PHI	Packaging
Comminuted	Surimi-shrimp patties	PHI	Packaging
Comminuted	Cuttlefish ball/ paste/ finger	SIN	NIL

Annex 2. Problems Encountered in Products Surveyed *(cont'd)*

Category	Product	Country	Problems on Marketing and Quality Control
Comminuted	*Chikuwa* (imitation crab stick)	SIN	NIL
Comminuted	Fish ball/ cake	SIN	NIL
Comminuted	Prawn ball/ finger	SIN	NIL
Comminuted	*Otah-otah*	SIN	NIL
Comminuted	Breaded fish finger, nugget	SIN	NIL
Comminuted	Surimi	THA	NA
Comminuted	Imitation crab meat	THA	NA
Cured	*Kench* style cured fish	PHI	Marketing and packaging
Dried	Chilled - sour salted fish	BRU	Infestation by flies
Dried	Salted fish	BRU	Infestation by flies during sundrying
Dried	Anchovy	BRU	NA
Dried	Anchovy	BRU	NA
Dried	Salted fish	CAM	Strong odor and short shelf life
Dried	Smoked fish	CAM	NA
Dried	Dried fish	CAM	Short shelf life especially in wet condition
Dried	Fish meal	CAM	NA
Dried	Small shrimp	CAM	NA
Dried	Stingray	CAM	NA
Dried	Squid	CAM	NA
Dried	Sea cucumber	CAM	NA
Dried	Anchovy	IND	Sanitation and hygiene during processing Handling of marketing channel Home industry use low quality salt
Dried	Fish	IND	Home industry use low quality salt
Dried	Marine catfish	IND	Sanitation & hygiene in processing Home industry use low quality salt Insect/ fly infestation during drying especially in rainy season
Dried	Shellfish	MAL	NA
Dried	Prawn	MAL	NA

Category	Product	Country	Problems on Marketing and Quality Control
Dried	Anchovy	MAL	NA
Dried	Cockle	MAL	NA
Dried	Cuttlefish	MAL	NA
Dried	Jelly fish	MAL	NA
Dried	Salted fish	MAL	Lack of quality control as turnover of product is based on demand
Dried	Various fish	MYA	NA
Dried	Shark	MYA	NA
Dried	Anchovy	MYA	Sand contamination during drying on the beach
Dried	Dried prawn	MYA	NA
Dried	Tilapia	MYA	NA
Dried	Jelly fish	MYA	NA
Dried	Sea cucumber	MYA	NA
Dried	Dried squid	MYA	NA
Dried	Prawn shell dust	MYA	NA
Dried	Squid	PHI	Packaging
Dried	*Siganid*	PHI	Packaging
Dried	Milkfish	PHI	Packaging
Dried	Lizard fish	PHI	Packaging
Dried	Shrimp	PHI	Packaging
Dried	Anchovy	PHI	Packaging
Dried	Shark fin	PHI	Packaging
Dried	Sea urchin	PHI	Packaging
Dried	Big-eyed scad	PHI	Packaging
Dried	Mullet	PHI	Packaging
Dried	Sea cucumber	PHI	Packaging
Dried	Fimbriated herring	PHI	Packaging
Dried	Deep-bodied herring	PHI	Packaging
Dried	Slipmouth	PHI	Packaging

Annex 2. Problems Encountered in Products Surveyed *(cont'd)*

Category	Product	Country	Problems on Marketing and Quality Control
Dried	Crevalle	PHI	Packaging
Dried	Round scad	PHI	Packaging
Dried	Abalone	PHI	High cost of raw material
Dried	Indian sardines	PHI	Packaging
Dried	Long-tailed nemipterid	PHI	Packaging
Dried	Short-bodied mackerel	PHI	Packaging
Dried	Eastern little tuna	PHI	Packaging
Dried	Hairtail	PHI	Packaging
Dried	Barracuda	PHI	Packaging
Dried	Striped mackerel	PHI	Packaging
Dried	Fish liver and fish roe	PHI	Packaging
Dried	Shark fin	SIN	
Dried	Sea cucumber	SIN	
Dried	Shrimp	THA	Discoloration of product and ammonia odor Mould and insect infestation during storage
Dried	Shellfish	THA	Processing and hygiene condition Need for improving packaging
Dried	Squid	THA	Quality control, packaging and processing techniques
Dried/Salted	Salted fish	THA	Mould and insect infestation during storage; need for improvement in packaging and storage conditions at the retail store
Fermented	Shrimp paste	BRU	Supply of raw material seasonal
Fermented	Shrimp paste	BRU	NA
Fermented	Mussel	BRU	NA
Fermented	Green mussel	BRU	Supply of raw materials especially anchovy
Fermented	Cured shrimp	BRU	Infestation by flies
Fermented	Crab	CAM	Odor
Fermented	Small shrimp or krill	CAM	Odor
Fermented	Fish	CAM	Odor

Category	Product	Country	Problems on Marketing and Quality Control
Fermented	Fermented fish	CAM	Odor
Fermented	Fish sauce (mixed species)	CAM	Low quality, not popular in other countries
Fermented	Shrimp paste	IND	Sanitation and hygiene
Fermented	Shrimp paste	IND	Sanitation and hygiene. Unapproved coloring (textile) were used
Fermented	Fish sauce	IND	Traditional method of fermentation is time consuming. Salt has an important role in the fermentation
Fermented	Fish	IND	Sanitation and hygiene. Packed product appearance not attractive and taste too salty
Fermented	Shrimp paste	MAL	NA
Fermented	Anchovy	MAL	Irregular supply of raw material. Processing premises lack sanitation. Need to hasten the fermentation period
Fermented	Pickled prawn	MAL	NA
Fermented	Prawn paste	MAL	NA
Fermented	Fermented mysis	MYA	Darkening of mysis during storage
Fermented	Fish sauce	MYA	Long fermentation period, flies infestation during processing. Poor hygienic condition
Fermented	Fermented fish	MYA	NA
Fermented	Fermented Fish	MYA	NA
Fermented	Fermented shrimp	MYA	NA
Fermented	Fish paste	PHI	Long fermentation period and rust on bottle caps
Fermented	Fish sauce	PHI	Long fermentation and rust on bottle caps
Fermented	Shrimp paste	PHI	Long fermentation and rust on bottle caps
Fermented	Fish sauce (muslim)	THA	NA
Fermented	Fish sauce	THA	Shortage of raw material
Fermented	Shrimp paste	THA	Sanitation
Fermented	Fermented fish	THA	Sanitation and packing
Fermented	Fermented fish	THA	Packaging material
Fish meal	Fish	MAL	NA
Fish meal	Fish manure	MAL	NA
Fish Meal	Fish meal	MYA	NA
Fish meal	Fish meal for animal feed	THA	Need to apply GMP system in factory

Annex 2. Problems Encountered in Products Surveyed *(cont'd)*

Category	Product	Country	Problems on Marketing and Quality Control
Fish meals	Fish meal for animal feed	PHI	Nil
Frozen	Fish	BRU	Products become dry on storage
Frozen	Crab	CAM	NIL
Frozen	Shrimp	CAM	NIL
Frozen	Shrimp	IND	Low quality and non-uniform of raw material Antibiotic residues used during shrimp culture
Frozen	Crab	IND	Raw material decomposed or changed color rapidly
Frozen	Fish	IND	Low quality of raw material
Frozen	Frog	IND	Potential of contamination of raw material by *salmonella*
Frozen	Prawn	MAL	NA
Frozen	Fish	MAL	NA
Frozen	Cuttlefish	MAL	NA
Frozen	Cuttlefish	MYA	NA
Frozen	Surimi	MYA	NA
Frozen	Sea water prawn	MYA	NA
Frozen	Fresh water prawn	MYA	NA
Frozen	Frozen fish fillet (barramundi)	MYA	NA
Frozen	Salt water fish (assorted)	MYA	NA
Frozen	*Novashi* ebi	MYA	NA
Frozen	Ribbon	MYA	NA
Frozen	Red snapper	MYA	NA
Frozen	Yellow croaker	MYA	NA
Frozen	Long tongue sole	MYA	NA
Frozen	*Rohu*	MYA	NA
Frozen	Frozen squid ring	MYA	NA
Frozen	Boiled hard clam	MYA	NA
Frozen	Hilsa	MYA	NA

Category	Product	Country	Problems on Marketing and Quality Control
Frozen	Prawn/ shrimp	PHI	Product quality
Frozen	Octopus	PHI	Product quality
Frozen	Squid	PHI	Product quality
Frozen	Milkfish	PHI	Product quality
Frozen	Tuna	PHI	Product quality
Frozen	Scallop	PHI	Product quality
Frozen	Cuttlefish	PHI	Product quality
Frozen	Fillet/ steak	SIN	NIL
Frozen	Prawn/ shrimp	SIN	NIL
Frozen	Fish	SIN	NIL
Frozen	Prawn/ shrimp meat	SIN	NIL
Frozen	Squid/ cuttlefish	SIN	NIL
Frozen	Cooked shrimp	THA	Decomposition, high level of microbial content, drug residues (antibiotics) and filthiness
Frozen	Cuttlefish	THA	Decomposition and high level of microbial content
Frozen	Fish	THA	Decomposition and high level of microbial content
Frozen	Octopus	THA	High level of microbial content and heavy metals
Frozen	Raw shrimp	THA	High level of microbial content, drug residues (antibiotics, cultured shrimp), filth
Frozen	Shellfish	THA	High level of heavy metals
Frozen	Squid	THA	High level of heavy metals
Marinated	Chilled - sour salted fish	BRU	Short shelf life
Other	Fish cracker	MAL	NA
Others	Prawn cracker	BRU	NIL
Others	Barbequed fish	BRU	Short storage life
Others	Cracker (fish/ shrimp cracker)	IND	Processors sometimes use textile coloring agent
Others	Fish *satay*	MAL	NA
Others	Prawn cracker	MAL	NA
Others	Fish cracker	MYA	NA
Others	Seaweed	PHI	Marketing, packaging

Annex 2. Problems Encountered in Products Surveyed *(cont'd)*

Category	Product	Country	Problems on Marketing and Quality Control
Others	Shrimp *keropok*	PHI	Market competition
Others	Prawn stick/ cracker/ chip	SIN	NIL
Others	Prepared cuttlefish	SIN	NIL
Others	Fish *satay*	THA	Need to apply GMP system in factory
Others	Fish/ shrimp cracker	THA	Need to apply GMP system in factory
Powder	Prawn dust	MAL	NA
Powdered/flaked	Fish floss	THA	Need to apply GMP system in factory
Powdered/flaked	Fish powder	THA	Need to implement GMP/HACCP system in factory
Smoked	Fish	IND	Short shelf life of product. Mould and slime growth during distribution of product
Smoked	Tuna	MAL	NA
Smoked	Smoked fish	MYA	NA
Smoked	Mackerel	PHI	Mould and bacterial spoilage
Smoked	Milkfish	PHI	Mould and bacterial spoilage
Smoked	Herring	PHI	Mould and bacterial spoilage
Smoked	Round scad	PHI	Mould and bacterial spoilage
Smoked	Sardines	PHI	Mould and bacterial spoilage
Smoked	Tuna	PHI	NIL
Smoked	Boneless milkfish	PHI	Mould and bacterial spoilage
Smoked	Dried fish	THA	Improper packaging. Infestation during sun drying

Annex 3

Annex 3. Target Country for Export

Category	Product	Country	Problems on Marketing and Quality Control
Boiled	Boiled mackerel	CAM	NA
Boiled	Boiled fish *(ikan pindang badeng)*	IND	NA
Boiled	Boiled fish *(ikan pindang naya)*	IND	NA
Boiled	Boiled fish	MAL	NA
Boiled	Cooked crab	MYA	SIN
Boiled	Cooked fish	SIN	NIL
Boiled	Steamed fish	THA	AUS, EU, USA
Canned	Canned crab meat	IND	EU, USA
Canned	Canned sardine, mackerel, tuna	IND	HK, JPN, TAI
Canned	Canned anchovy in sambal	MAL	AUS, BRU, CAN, PHI, SIN, USA
Canned	Canned fish in tomato sauce	MAL	BRU, CAN, CHN, GHA, IND, PHI, SIN, TAI, THA, UK, USA
Canned	Canned fish in tomato sauce	MYA	NA
Canned	Canned hilsa in tomato sauce	MYA	NA
Canned	Canned sardine in tomato sauce	MYA	NA
Canned	Bottled anchovy 'French Style'	PHI	NA
Canned	Canned anchovy in oil	PHI	NA
Canned	Bottled herring 'French Style'	PHI	NA
Canned	Canned mackerel in tomato sauce	PHI	NA
Canned	Canned/ bottled milkfish	PHI	APE, AUS, AUT, BAH, CAN, GER, GUA, KUW, NIRE, NOR, SA, SIN, UE, UK, USA, WI
Canned	Canned/ bottled sardine Available in three types: French style, in oil, in tomato sauce	PHI	APE, AUS, AUT, BAH, CAN, DEN, GUA, MAL, NET, NZ, SA, SWI, TAI, UK
Canned	Canned tuna in brine	PHI	AUS, AUT, BAH, BEL, CAN, CYP, DEN, FIN, FRA, GER, GOZ, GUA, IRE, ISR, KUW, LEB, MOZ, NET, NOR, NZ, PUE, USA, SA, SIN, SWE, SWI, THA, UK
Canned	Canned baby clam in brine	THA	CAN, EU, USA
Canned	Canned crab meat in brine	THA	CAN, EU, USA
Canned	Canned shrimp/ anchovy in sambal sauce	SIN	NA
Canned	Canned mackerel in tomato sauce	THA	EU, UAE, SA

Category	Product	Country	Problems on Marketing and Quality Control
Canned	Canned sardine in tomato sauce	THA	EU, UAE, SA
Canned	Canned shrimp in brine	THA	CAN, EU, USA
Canned	Canned squid, cuttlefish, octopus in oil, brine, ink or tomato sauce	THA	EU
Canned	Canned tuna in oil, brine, water or curry	THA	AUS, CAN, EU, UAE, USA
Comminuted	Cuttlefish ball	MAL	NA
Comminuted	Cuttlefish cocktail/ sausage	MAL	NA
Comminuted	Fish ball	MAL	NA
Comminuted	Fish burger	MAL	NA
Comminuted	Fish cake	MAL	NA
Comminuted	Fish sausage	MAL	NA
Comminuted	*Otak-otak*	MAL	NA
Comminuted	Prawn burger	MAL	NA
Comminuted	Prawn dumpling	MAL	NA
Comminuted	Prawn sausage	MAL	NA
Comminuted	Prawn wantan	MAL	NA
Comminuted	Scallop-flavored fish cake	MAL	NA
Comminuted	Fish ball	MYA	NA
Comminuted	Fried fish cake	MYA	NA
Comminuted	Cuttlefish ball/ paste/ finger	SIN	EU, HK
Comminuted	Fish ball	PHI	NA
Comminuted	Native sausage	PHI	NA
Comminuted	Squid ball	PHI	NA
Comminuted	Surimi shrimp nugget	PHI	NA
Comminuted	Surimi-shrimp patty	PHI	NA
Comminuted	Breaded fish finger/ nugget	PHI	NA
Comminuted	*Chikuwa* (imitation crab stick)	SIN	EU, AUS

Annex 3. Target Country for Export *(cont'd)*

Category	Product	Country	Problems on Marketing and Quality Control
Comminuted	Fish ball/ fish cake	SIN	AUS, CHN, EU, USA
Comminuted	*Otah-otah*	SIN	NIL
Comminuted	Prawn ball, prawn finger	SIN	HK
Comminuted	Squid ball	SIN	AUS, EU
Comminuted	Imitation crab meat	THA	AUS, EU, JPN, USA
Comminuted	Surimi	THA	JPN, USA
Cured	Kench style cured fish	PHI	NA
Dried	Chilled - sour salted fish	BRU	NA
Dried	Salted fish	BRU	Nil
Dried	Sun-dried anchovy	BRU	NA
Dried	Sun-dried fish	BRU	NA
Dried	Dried fillet fish	CAM	AUS, MAL, SIN, THA, USA, VIE
Dried	Dried shrimp	CAM	MAL
Dried	Dried squid	CAM	NA
Dried	Dried stingray fillet	CAM	NA
Dried	Fish meal	CAM	NA
Dried	Salted fish	CAM	SIN, VIE
Dried	Smoked fish	CAM	AUS, CHI, THA, MAL, SIN, USA, VIE
Dried	Sun-dried sea cucumber	CAM	NA
Dried	Dried catfish	IND	NA
Dried	Salted and dried anchovy	IND	CHN, HK, JPN, SIN, TAI
Dried	Salted and dried fish	IND	AFR
Dried	Dried anchovy	MAL	AUT, BRU, FRA, HK, JPN, KAM, NET, NZ, PHI, SA, SIN, THA, UK, USA
Dried	Dried cockle	MAL	NA
Dried	Dried cuttlefish	MAL	BRU, SIN, THA, USA
Dried	Dried jellyfish	MAL	AUT, CAN, CHN, HK, JPN, KOR, SIN, TAI, UK, USA
Dried	Dried prawn	MAL	AUT, BRU, HK, JPN, SIN, THA, UK, USA

Category	Product	Country	Problems on Marketing and Quality Control
Dried	Dried shellfish	MAL	SIN, KOR
Dried	Salted fish	MAL	AUT, BRU, FIJI, HK, KOR, NET, PHI, SIN, TAI, THA, USA
Dried	Dried anchovy	MYA	NA
Dried	Dried fish (whole)	MYA	NIL
Dried	Dried jelly fish	MYA	JPN
Dried	Dried prawn	MYA	SIN
Dried	Dried shark fin	MYA	HK
Dried	Dried sea cucumber	MYA	HK, SIN
Dried	Dried squid	MYA	KOR
Dried	Dried tilapia (whole)	MYA	SIN
Dried	Prawn shell dust	MYA	SIN
Dried	Abalone	PHI	AUS, HK, JPN
Dried	Anchovy	PHI	AUS, GUA, HK, JPN, KOR, SA, SIN, USA
Dried	Barracuda	PHI	NA
Dried	Big-eyed scad	PHI	NA
Dried	Crevalle	PHI	NA
Dried	Eastern little tuna	PHI	NA
Dried	Fimbriated herring	PHI	AUS, CAN, KUW, SA, SIN, USA
Dried	Fimbriated herring	PHI	AUS, CAN, KUW, SA, SIN, USA
Dried	Fish liver, fish roe	PHI	NA
Dried	Hairtail	PHI	NA
Dried	Indian sardine	PHI	NA
Dried	Lizard fish	PHI	NA
Dried	Long-tailed nemipterid	PHI	NA
Dried	Milkfish	PHI	AUS, BAH, CAN, GER, GUA, HK, ITA, JPN, KUW, LEB, NET, NOR, NZ, OMA, PNG, SA, SIN, TAI, TTP, UK, USA
Dried	Mullet	PHI	NA
Dried	Round scad	PHI	NA
Dried	Sea cucumber	PHI	NIL

Annex 3. Target Country for Export *(cont'd)*

Category	Product	Country	Problems on Marketing and Quality Control
Dried	Sea urchin	PHI	NA
Dried	Shark fin	PHI	FRA, HK, TAI
Dried	Short bodied mackerel	PHI	AUS, CAN, KUW, SA, SIN, USA
Dried	Shrimp	PHI	NA
Dried	Siganid	PHI	NA
Dried	Slipmouth	PHI	NA
Dried	Squid	PHI	NA
Dried	Striped mackerel	PHI	NA
Dried	Sea cucumber	SIN	HK, TAI
Dried	Shark fin	SIN	HK, TAI
Dried	Salted fish	THA	FRA, HK, JPN, MAL, SIN, USA
Dried	Shellfish	THA	CAN, EU, HK, SIN, USA
Dried	Shrimp	THA	ARG, AUA, BRA, CAN, EU, HK, JPN, MAL, UAE, NZ, ROM, RUS, SA, SIN, SWI, TW, USA
Dried	Squid	THA	CAN, EU, HK, JPN, MAL, UAE, ROM, RUS, SA, USA
Fermented	Cured shrimp *(cincaluk)*	BRU	NA
Fermented	Fermented anchovy	BRU	NA
Fermented	Fermented shrimp paste *(belacan)*	BRU	NIL
Fermented	Shrimp paste *(belacan)*	BRU	NA
Fermented	Fermented mussel	BRU	NA
Fermented	Fermented crab	CAM	NA
Fermented	Fermented fish (head and stomach removed)	CAM	NA
Fermented	Fermented fish (whole)	CAM	THA
Fermented	Fermented small shrimp	CAM	NA
Fermented	Fish sauce	CAM	NA
Fermented	Fermented fish	IND	NA
Fermented	Fermented shrimp paste *(petis)*	IND	NA

Category	Product	Country	Problems on Marketing and Quality Control
Fermented	Fermented shrimp paste *(terasi)*	IND	CHN, HK, JPN, SIN, TAI, THA
Fermented	Fish sauce	IND	NA
Fermented	Fermented anchovy	MAL	AUS, HK, NZ, UK, USA
Fermented	Pickled prawn	MAL	NA
Fermented	Prawn paste	MAL	NA
Fermented	Shrimp paste	MAL	AUS, BRU, CAN, HK, IND, NET, NZ, PHI, SA, SIN, THA, UK, USA
Fermented	Fermented fish *(nagpi yecho)*	MYA	NA
Fermented	Fermented fish *(ngachin)*	MYA	NIL.
Fermented	Fermented mysis	MYA	NA
Fermented	Fermented shrimp	MYA	NA
Fermented	Fish sauce	MYA	NA
Fermented	Fish paste	PHI	NA
Fermented	Fish sauce	PHI	NA
Fermented	Shrimp paste	PHI	AUT, BAH, CAN, FRA, GER, GUA, HK, ITA, JPN, KOR, KUW, NOR, NZ, PNG, SPA, SWI, UK, USA
Fermented	Fermented fish *(plasom)*	THA	EU, HK, USA
Fermented	Fermented fish *(pla ra)*	THA	NA
Fermented	Fermented shrimp	THA	CAN, EU, USA
Fermented	Fish sauce *(budu)*	THA	AUS, CAN, EU, HK, JPN, SA, SIN, USA
Fermented	Fish sauce *(nam pla)*	THA	NA
Fish meal	Fish meal	MAL	AUS, BRU, INA, IND, NET, SIN, SRI, TAI, THA, UAE
Fish meal	Fish manure	MAL	JPN, NZ, SIN, THA, UK
Fish meal	Fish meal	MYA	THA
Fish meal	Fish meal	THA	NA
Fish meal	Fish meal	PHI	NA
Frozen	Frozen whole fish and shrimp	BRU	NIL
Frozen	Frozen crab meat	CAM	MAL
Frozen	Frozen shrimp meat	CAM	HK, SIN
Frozen	Frozen crab	IND	CHN, HK, JPN, KOR, MAL, SIN, TAI

Annex 3. Target Country for Export *(cont'd)*

Category	Product	Country	Problems on Marketing and Quality Control
Frozen	Frozen fish fillet	IND	CHN, HK, JPN, SIN, TAI, USA
Frozen	Frozen frog leg	IND	EU, JPN, KOR, MAL, SIN
Frozen	Frozen shrimp meat	IND	CHN, HK, JPN, KOR, MAL, PHI, SIN, TAI
Frozen	Frozen cuttlefish	MAL	AUS, BRU, GER, HK, ITA, JPN, NZ, SIN, SPA, TAI, THA, USA
Frozen	Frozen fish	MAL	AUS, BEL, CHR, FRA, GER, HK, IND, JPN, KAM, PHI, SIN, THA, UK
Frozen	Frozen prawn	MAL	AUS, AUT, BEL, BRU, CAN, CYP, DEN, FRA, GER, HK, ITA, JPN, KOR, MAU, NET, NZ, SIN, UK
Frozen	Frozen boiled hard clam	MYA	JPN
Frozen	Frozen cuttlefish	MYA	JPN
Frozen	Frozen fish (assorted salt water fish)	MYA	CHN, MAL
Frozen	Frozen fish fillet (barramundi)	MYA	AUS, SIN
Frozen	Frozen fresh water prawn (with shell)	MYA	GER, HK, HOL, SIN
Frozen	Frozen hilsa (whole)	MYA	HK, MAC, MAL, QUT, SIN, UAE, UK
Frozen	Frozen long tongue sole (whole)	MYA	CHN
Frozen	Frozen *Novashi ebi*	MYA	JPN
Frozen	Frozen red snapper (whole)	MYA	AUS
Frozen	Frozen ribbon fish (whole)	MYA	CHN, VIE
Frozen	Frozen *rohu* (whole)	MYA	INA, SAU, UAE, UK
Frozen	Frozen seawater prawn (with shell)	MYA	CHN, GER, HK, HOL, JPN, SIN, THA, UK
Frozen	Frozen squid ring	MYA	JPN
Frozen	Frozen surimi	MYA	JPN
Frozen	Frozen yellow croaker (whole)	MYA	CHN
Frozen	Frozen cuttlefish (whole, tube or fillet)	PHI	HK, JPN, USA
Frozen	Frozen milkfish (whole)	PHI	SIN, USA
Frozen	Frozen octopus	PHI	HK, JP
Frozen	Frozen prawn (whole)	PHI	AUS, CAN, GUA, HAW
Frozen	Frozen scallop meat	PHI	HK, JPN
Frozen	Frozen squid	PHI	JPN, HK, USA

Category	Product	Country	Problems on Marketing and Quality Control
Frozen	Frozen tuna (whole)	PHI	CAN, DEN, GUA, HK, ISR, ITA, JPN, KOR, OKI, SIN, THA, TTP, USA
Frozen	Frozen fish steak	SIN	EU, HK, JPN, UAE, USA
Frozen	Frozen fish (whole or gutted)	SIN	EU, HK, JPN, UAE, USA
Frozen	Frozen prawn meat	SIN	NIL
Frozen	Frozen prawn (whole)	SIN	EU, JPN, TAI, USA
Frozen	Frozen squid (whole, tube or fillet)	SIN	EU, HK, JPN, TAI, USA
Frozen	Frozen cuttlefish (whole, fillet or cuttlefish head)	THA	AUS, CAN, EU, JPN, USA
Frozen	Frozen fish (whole or fillet)	THA	AUS, CAN, EU, JPN, USA
Frozen	Frozen octopus (whole or gutted)	THA	AUS, CAN, EU, JPN, USA
Frozen	Frozen shellfish meat	THA	AUS, CAN, EU, JPN, USA
Frozen	Frozen shrimp meat	THA	AUS, CAN, EU, JPN, USA
Frozen	Frozen shrimp (whole)	THA	AUS, CAN, EU, JPN, USA
Frozen	Frozen squid (whole, tube, ring or head)	THA	AUS, CAN, EU, JPN, USA
Marinated	Chilled - sour salted fish	BRU	NIL
Others	Barbequed fish	BRU	NIL
Others	Prawn cracker	BRU	NIL
Others	Shrimp/ fish cracker	IND	CHN, EU, HK, JPN, KOR, SIN, TAI
Others	Fish cracker	MAL	NA
Others	Fish satay	MAL	NA
Others	Prawn cracker	MAL	NA
Others	Fish cracker	MYA	NA
Others	Shrimp keropok	PHI	NA
Others	Seaweed	PHI	ARG, AUS, CAN, CHI, DEN, FRA, GER, HK, IRE, JPN, KOR, KUW, MOZ, NET, NZ, OKI, POR, SA, SPA, SWE, TAI, THA, UK
Others	Prepared cuttlefish	SIN	EU, HK, JPN
Others	Prepared prawn cracker	SIN	HK, JPN, MAL
Others	Fish satay	THA	NA

Annex 3. Target Country for Export *(cont'd)*

Category	Product	Country	Problems on Marketing and Quality Control
Others	Fish/ shrimp cracker	THA	EU, USA
Powder	Prawn dust	MAL	NA
Powdered/ flaked	Fish floss	THA	EU, USA
Powdered/ flaked	Fish powder	THA	EU, USA
Smoked	Smoked fish	IND	HK, JPN, SIN, TAI
Smoked	Smoked tuna	MAL	JPN
Smoked	Smoked fish	MYA	NA
Smoked	Smoked boneless milkfish	PHI	NA
Smoked	Smoked herring	PHI	AUS, CAN, GUA, KUW, SA, USA
Smoked	Smoked mackerel	PHI	NA
Smoked	Smoked milkfish (whole)	PHI	GUA, KUW, USA
Smoked	Smoked round scad	PHI	CAN, GUA, KUW, NZ, SA, SIN, UK, USA
Smoked	Smoked sardine	PHI	AUT, CAN, GUA, KUW, NZ, USA
Smoked	Smoked tuna	PHI	NA
Smoked	Dried fish	THA	AUS, EU, USA

Target Country for Export

Code	Country
APE	Arabian Peninsula States
ARG	Argentina
AUS	Australia
AUT	Austria
BAH	Bahrain
BEL	Belgium
BRA	Brazil
BRU	Brunei
CAN	Canada
CHI	Chile
CHN	China
CHR	Christmas Island
CYP	Cyprus
DEN	Denmark
EU	European Union
FIJI	Fiji Islands
FIN	Finland
FRA	France
GER	Germany
GHA	Ghana
GOZ	Gozo (Malta)
GRE	Greece
GUA	Guam
HAW	Hawaii
HK	Hongkong
HOL	Holland
INA	India
IND	Indonesia
IRE	Ireland
ISR	Israel
ITA	Italy
JPN	Japan
KAM	Kampuchea

Code	Country
KOR	Korea
KUW	Kuwait
LEB	Lebanon
MAL	Malaysia
MAU	Mauritius
MOZ	Mozambique
NA	Data not available
NET	Netherlands
NIL	Not for export
NIRE	Northern Ireland
NOR	Norway
NZ	New Zealand
OKI	Okinawa
OMA	Oman
PHI	Philippines
PNG	Papua New Guinea
POR	Portugal
PUE	Pueto Rico
ROM	Romania
RUS	Russia
SA	Saudi Arabia
SIN	Singapore
SPA	Spain
SRI	Sri Lanka
SWE	Sweden
SWI	Switzerland
TAI	Taiwan
THA	Thailand
TTP	Trust territory of the pacific
UAE	United Arab Emirates
UK	United Kingdom
USA	United States of America

Annex 4

ANNEX 4 COUNTRY COORDINATORS AND RESPONDENTS

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Boiled	Fish	IND	Fisheries Statistic of Indonesia, 1996-1997. Kumpulan Hasil-Hasil Penelitian Teknologi Pasca Panen Perikanan, Puslitbangkan, Jakarta, 1992. Petunjuk Teknis Pengolahan Pindang dengan Bahan Bakar Briket Batubara, BBPMHP, Jakarta, 1994
Boiled	Fish	IND	Fisheries Statistic of Indonesia, 1996-1997. Kumpulan Hasil-Hasil Penelitian Teknologi Pasca Panen Perikanan, Puslitbangkan, Jakarta, 1992. Petunjuk Teknis Pengolahan Pindang dengan Bahan Bakar Briket Batubara, BBPMHP, Jakarta, 1994.
Boiled	Fish	MAL	FAO Fisheries Rep. NO. 4 Quezon City - 1961; FAO Workshop on development of Small Scale Processing Industry in Fishing Village, Penang, Malaysia, (29/6-1/7/85)
Boiled	Cooked crab	MYA	Newer Mingee Enterprise
Boiled	Steamed fish	THA	Marine Fisheries Research Department. 1996. Southeast Asian Fish Products. 106 P. / Fisheries Statistics and Information, Fisheries Economics Division. Statistics of Fisheries Factory 1996. Report No. 10/1998. 37 P
Canned	Crab meat	IND	Fisheries Statistic of Indonesia. 1996-1997
Canned	Sardine, mackerel, tuna	IND	Fisheries Statistic of Indonesia. 1996-1997 Pengolahan Tuna Kaleng, Ditjen. Perikanan, Jakarta. 1994/1995
Canned	Canned fish	MYA	Makro Co. Ltd
Canned	Sardine/ platu	MYA	Makro Co. Ltd
Canned	Hilsa	MYA	Makro Co. Ltd
Canned	Tuna	PHI	Southeast Asian Fish Products 1996. Avery Processing Handbook for the Philippines
Canned	Anchovy	PHI	Southeast Asian Fish Products 1996. Avery Processing Handbook for the Philippines
Canned	Anchovy "French Style" (Bottled)	PHI	Southeast Asian Fish Products 1996. Avery Processing Handbook for the Philippines
Canned	Herring "French Style" (Bottled)	PHI	Southeast Asian Fish Products 1996. Avery Processing Handbook for the Philippines
Canned	Sardine in tomato sauce	PHI	Southeast Asian Fish Products 1996. Avery Processing Handbook for the Philippines
Canned	Milkfish	PHI	Southeast Asian Fish Products 1996. Avery Processing Handbook for the Philippines
Canned	Mackerel	PHI	Southeast Asian Fish Products 1996. Avery Processing Handbook for the Philippines
Comminuted	Fish cake, fish ball	BRU	Fisheries Statistics in Brunei 1980-1984
Comminuted	Fish ball	MAL	Berita Nelayan Bil.31 (Fisherman News); Risalah MARDI No 14 (Panduan Usahawan) (MARDI Pamphlet) PDS fish recipe
Comminuted	Fried fish cake	MYA	Makro Co. Ltd
Comminuted	Fish ball	MYA	Makro Co. Ltd

Category	Product	Country	Reference in Literature
Comminuted	Surimi shrimp nugget	PHI	Production of Surimi -Shrimp Value Added Products. ASEAN-CANADA Fisheries Post Harvest Technology Project Phase 2. 1995
Comminuted	Fish burger patty	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Comminuted	Squid ball	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Comminuted	Native sausage	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Comminuted	Surimi-shrimp patty	PHI	Production of Surimi -Shrimp Value Added Products. ASEAN-CANADA Fisheries Post harvest Technology Project Phase 2. 1995
Comminuted	Fish ball	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Cured	Kench style	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Chilled - sour salted fish	BRU	Fisheries Statistics in Brunei 1980-1984
Dried	Chilled - sour salted fish	BRU	Fisheries Statistics in Brunei 1980-1984
Dried	Salted fish	BRU	Fisheries Statistics in Brunei 1980-1984
Dried	Anchovy	BRU	Fisheries Statistics in Brunei 1980-1984
Dried	Salted fish	CAM	Department of Fisheries
Dried	Smoked fish	CAM	Department of Fisheries
Dried	Dried fish	CAM	Department of Fisheries
Dried	Small shrimp	CAM	Department of Fisheries
Dried	Stingray	CAM	Department of Fisheries
Dried	Squid	CAM	Department of Fisheries
Dried	Sea cucumber	CAM	Department of Fisheries
Dried	Fish meal	CAM	Department of Fisheries
Dried	Marine catfish	IND	Fisheries Statistic of Indonesia. 1996-1997
Dried	Anchovy	IND	Fisheries Statistic of Indonesia. 1996-1997 Petunjuk Teknis Pengolahan Teri Nasi Kering Beku dan Fillet Nila Merah Beku, BBPMHP, Jakarta, 1994
Dried	Fish	IND	Fisheries Statistic of Indonesia. 1996-1997. Kumpulan Hasil-Hasil Penelitian Pasca Panen Perikanan, Puslitbangkan, Jakarta, 1992
Dried	Cuttlefish	MAL	FAO workshop on development of small scale processing industry in fishing villages, Penang, Malaysia (29/6- 1/7/85)
Dried	Jellyfish	MAL	Berita Nelayan (Fishermen News), No 26
Dried	Prawn	MAL	Report on FAO/KATA Regional Training Center on Fish Processing Technology. 1961

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Category	Product	Country	Reference in Literature
Dried	Salted fish	MAL	Teknologi Makanan (Food Technology), Vol 4, No 1 (April 1985); Infofish Marketing digest 2/83; Report on FAO/EPTP Regional Training Center on fish Processing Technology. 1961
Dried	Tilapia	MYA	Planning and statistics, Department of Fisheries
Dried	Various fish	MYA	Planning and statistics, Department of Fisheries
Dried	Anchovy	MYA	Planning and statistics, Department of Fisheries
Dried	Dried prawn	MYA	Planning and statistics, Department of Fisheries
Dried	Prawn shell dust	MYA	Planning and statistics, Department of Fisheries
Dried	Jellyfish	MYA	Planning and statistics, Department of Fisheries
Dried	Squid	MYA	Planning and statistics, Department of Fisheries
Dried	Sea cucumber	MYA	Planning and statistics, Department of Fisheries
Dried	Striped mackerel	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Anchovy	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Shrimp	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Lizard fish	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Milkfish	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Hairtail	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Squid	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Indian sardine	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Shark fin	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Abalone	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Sea cucumber	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Mullet	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Big-eyed scad	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Sea urchin	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Fimbriated herring	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Deep-bodied herring	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Slipmouth	PHI	Southeast Asian Fish Products, 2nd Edition, 1991

Category	Product	Country	Reference in Literature
Dried	Crevalle	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Round scad	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Barracuda	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Long-tailed nemipterid	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Short-bodied mackerel	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Dried	Salted fish	THA	Marine Fisheries Research Department. 1996. Southeast Asian Fish Products. 106 P. / Fisheries Statistics and Information, Fisheries Economics Division. Statistics of Fisheries Factory 1996. Report No. 10/1998. 37P
Dried	Shellfish	THA	Marine Fisheries Research Department. 1996. Southeast Asian Fish Products. 106 P. Fisheries Statistics and Information, Fisheries Economics Division. Statistics of Fisheries Factory 1996. Report No. 10/1998. 37P
Dried	Shrimp	THA	Marine Fisheries Research Department. 1996. Southeast Asian Fish Products. 106 P. Fisheries Statistics and Information, Fisheries Economics Division. Statistics of Fisheries Factory 1996. Report No. 10/1998. 37P
Dried	Squid	THA	Marine Fisheries Research Department. 1996. Southeast Asian Fish Products. 106 P. / Fisheries Statistics and Information, Fisheries Economics Division. Statistics of Fisheries Factory 1996. Report No. 10/1998. 37P
Fermented	Green mussel	BRU	Fisheries Statistics in Brunei 1980-1984
Fermented	Cured shrimp	BRU	Fisheries Statistics in Brunei 1980-1984
Fermented	Mussel	BRU	Fisheries Statistics in Brunei 1980-1984
Fermented	Shrimp paste	BRU	Fisheries Statistics in Brunei 1980-1984
Fermented	Shrimp paste	BRU	Fisheries Statistics in Brunei 1980-1984
Fermented	Fish sauce (mixed species)	CAM	Department of Fisheries
Fermented	Fish	CAM	Department of Fisheries
Fermented	Fish	CAM	Phon Ny, 1993. Department of Fisheries
Fermented	Crab	CAM	Department of Fisheries
Fermented	Small shrimp/ krill	CAM	Department of Fisheries
Fermented	Fish	IND	Fisheries Statistic of Indonesia. 1996-1997. Pengujian Teknologi Pengolahan Tradisional (Ikan kering/ Peda), BBPMHP, Jakarta, 1993
Fermented	Fish sauce	IND	Fisheries Statistic of Indonesia. 1996-1997. Kumpulan Hasil-Hasil Penelitian Pasca Panen Perikanan, Puslitbangkan, Jakarta, 1992
Fermented	Shrimp paste	IND	Fisheries Statistic of Indonesia. 1996-1997. Kumpulan Hasil-Hasil Penelitian Pasca Panen Perikanan, Puslitbangkan, Jakarta, 1992

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Category	Product	Country	Reference in Literature
Fermented	Shrimp paste	IND	Fisheries Statistic of Indonesia. 1996-1997. Kumpulan Hasil-Hasil Penelitian Pasca Panen Perikanan, Puslitbangkan, Jakarta, 1992
Fermented	Anchovy	MAL	Berita Nelayan (Fishermen News), No 17, 32; Teknologi Makanan (Food Technologiy), Vol. 3, No 2 (Oct.1984); FAO workshop on development of small scale Processing Industry in Fishing Villages, Penang, Malaysia (29/6 - 1/7/85)
Fermented	Pickled prawn	MAL	Berita Nelayan Bil.23, (Fishermen News) Teknologi Makanan (Food Technology), Vol. 4, Bil, 1 (April.1985); FAO workshop on development of small scale Processing Industry in Fishing Villages, Penang, Malaysia (29/6 - 1/7/85)
Fermented	Prawn paste	MAL	FAO workshop on development of small scale processing industry in fishing villages, Penang, Malaysia (29/6 - 1/7/85)
Fermented	Shrimp paste	MAL	Berita Nelayan (Fishermen News), No 10; Teknologi Makanan (Food Technology), Vol. 3, No, 1 (April.1984); Report on FAO/ BOTA Regional Training Center on Fish Processing Technology 1961
Fermented	Mysis	MYA	C.S.O. 1998 (Mya)
Fermented	Fish	MYA	Department of Fisheries
Fermented	Fish sauce	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Fermented	Shrimp paste	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Fermented	Fish paste	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Fermented	Fish	THA	Phithakpol B., Reungmaneepaitoon S., Varanyanond W., Wood H.1995. The Traditional Fermented Foods of Thailand. Fisheries Statistics of Thailand. Fisheries Economic Division, Department of Fisheries
Fermented	Fish	THA	Phithakpol B., Reungmaneepaitoon S., Varanyanond W., Wood H.1995. The Traditional Fermented Foods of Thailand. Fisheries Statistics of Thailand. Fisheries Economic Division, Department of Fisheries
Fermented	Fish sauce (muslim)	THA	Phithakpol B., Reungmaneepaitoon S., Varanyanond W., Wood H.1995. The Traditional Fermented Foods of Thailand. Fisheries Statistics of Thailand. Fisheries Economic Division, Department of Fisheries
Fermented	Fish sauce	THA	Phithakpol B., Reungmaneepaitoon S., Varanyanond W., Wood H.1995. The Traditional Fermented Foods of Thailand. Fisheries Statistics of Thailand. Fisheries Economic Division, Department of Fisheries
Fermented	Shrimp paste	THA	Phithakpol B., Reungmaneepaitoon S., Varanyanond W., Wood H.1995. The Traditional Fermented Foods of Thailand. Fisheries Statistics of Thailand. Fisheries Economic Division, Department of Fisheries
Fish meal	Fish manure	MAL	FAO workshop on development of small scale processing industry in fishing villages, Penang, Malaysia (29/6 - 1/7/85)
Fish meal	Fish meal	MYA	Planning and statistics, Department of Fisheries
Fish meal	Fish meal (for animal feed)	PHI	Southeast Asian Fish Products, 2nd Edition, 1991

Category	Product	Country	Reference in Literature
Fish meal	Fish meal (for animal feed)	THA	DOF.1995. Fisheries Statistics of Thailand. Fisheries Statistics Sub-Division, Fisheries Economics Division, Department of Fisheries, 1995
Frozen	Fish	BRU	Fisheries Statistics in Brunei 1980-1984
Frozen	Shrimp	CAM	Department of Fisheries
Frozen	Crab	CAM	Department of Fisheries
Frozen	Frog	IND	Fisheries Statistic of Indonesia. 1996-1997. Petunjuk Praktis Pengolahan Paha Kodok Beku, BBPMHP, Jakarta, 1986
Frozen	Shrimp	IND	Fisheries Statistic of Indonesia. 1996-1997. Kumpulan Hasil-Hasil Penelitian Pasca Panen Perikanan, Puslitbangkan, Jakarta, 1992
Frozen	Crab	IND	Fisheries Statistic of Indonesia. 1996-1997
Frozen	Fish	IND	Fisheries Statistic of Indonesia. 1996-1997. Kumpulan Hasil-Hasil Penelitian Pasca Panen Perikanan, Puslitbangkan, Jakarta, 1992
Frozen	Fish	MAL	Berita Nelayan (Fishermen News), 24/3/1981
Frozen	Sea water prawn	MYA	Planning and statistics, Department of Fisheries
Frozen	Long tongue sole	MYA	Planning and statistics, Department of Fisheries
Frozen	Rohu	MYA	Planning and statistics, Department of Fisheries
Frozen	Ribbon	MYA	Planning and statistics, Department of Fisheries
Frozen	Frozen squid ring	MYA	Planning and statistics, Department of Fisheries
Frozen	Boiled hard clam	MYA	Planning and statistics, Department of Fisheries
Frozen	Barramundi fillet	MYA	Minzarni Co. Ltd
Frozen	Novashi ebi	MYA	Sonlife Yangon Co, Ltd.
Frozen	Surimi	MYA	Planning and statistics, Department of Fisheries
Frozen	Fresh water prawn	MYA	Planning and statistics, Department of Fisheries
Frozen	Salt water fish (assorted)	MYA	Planning and statistics, Department of Fisheries
Frozen	Hilsa	MYA	Planning and statistics, Department of Fisheries
Frozen	Red Snapper	MYA	Planning and statistics, Department of Fisheries
Frozen	Cuttlefish	MYA	Planning and statistics, Department of Fisheries
Frozen	Yellow croaker	MYA	Planning and statistics, Department of Fisheries
Frozen	Milkfish	PHI	Southeast Asian Fish Products, 2nd Edition, 1991

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Category	Product	Country	Reference in Literature
Frozen	Tuna	PHI	Development of Quality Standards for Handling and Grading of Cephalopods. Asean Canada Fisheries Post Harvest Technology Project Phase II
Frozen	Scallop	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Frozen	Cuttlefish	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Frozen	Octopus	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Frozen	Squid	PHI	Development of Quality Standards for Handling and Grading of Cephalopods. Asean Canada Fisheries Post Harvest Technology Project Phase II
Frozen	Prawn/ shrimp	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Powdered/Flaked	Fish powder	THA	DOF.1993. Processing of Fishery Products. Department of Fisheries, 1993
Powdered/Flaked	Fish floss	THA	DOF.1993. Processing of Fishery Products. Department of Fisheries, 1993
Smoked	Fish	IND	Fisheries Statistic of Indonesia. 1996-1997. Petunjuk Teknis Pengolahan Ikan Asap, BBPMHP, Jakarta, 1986
Smoked	Tuna	MAL	FAO workshop on development of small scale Processing Industry in Fishing Villages, Penang, Malaysia (29/6 - 1/7/85)
Smoked	Boneless milkfish	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Smoked	Tuna	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Smoked	Sardine	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Smoked	Round scad	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Smoked	Herring	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Smoked	Milkfish	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Smoked	Mackerel	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Smoked	Dried fish	THA	Marine Fisheries Research Department. 1996. Southeast Asian Fish Products. 106 P. / Fisheries Statistics and Information, Fisheries Economics Division. Statistics of Fisheries Factory 1996. Report No. 10/1998. 37P
Others	Barbequed fish	BRU	Fisheries Statistics in Brunei 1980-1984
Others	Prawn cracker	BRU	Fisheries Statistics in Brunei 1980-1984
Others	Fish/ shrimp cracker	IND	Fisheries Statistic of Indonesia. 1996-1997. Petunjuk Teknis Penggunaan Flavour Udang Pada Pengolahan Kerupuk, BBPMHP, Jakarta, 1994. Petunjuk Teknis Diversifikasi Pengolahan Bahan Baku Fish Jelly Product (Pempek Palembang dan Kerupuk Indramayu), BBPMHP, Jakarta, 1996
Others	Prawn cracker	MAL	Berita Nelayan (Fishermen News). No 13, 25, 19; Risah MARDI No 8 (MARDI Pamphlet)

Category	Product	Country	Reference in Literature
Others	Fish cracker	MYA	Ministry of Industry
Others	Seaweed	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Others	Shrimp kroepeck	PHI	Southeast Asian Fish Products, 2nd Edition, 1991
Others	Fish/ shrimp cracker	THA	DOF.1993. Processing of Fishery Products. Department of Fisheries, 1993
Others	Fish satay	THA	DOF.1993. Processing of Fishery Products. Department of Fisheries, 1993

Southeast Asian Fish Products

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This book is based on an ASEAN wide survey of products processed and consumed in the region. The participating countries are Brunei Darussalam, Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Singapore and Thailand.

Results of the products surveyed are organized according to 11 main categories. They are boiled, canned, comminuted, cured, dried, fermented, fish meal, frozen, powdered, smoked and others.

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