



## Small-Sized Fish Paste (*Prahoc*) Processing in Cambodia

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**Abstract** Small-sized fish paste call *Prahoc* in Khmer is one of the most popular fermented fish products used as a condiment in Cambodia. It is the main food for Cambodian people, especially the remote poor. *Prahoc* is typically made from small fish such as the common small cyprinids (*Henicorhynchus spp.*) in Khmer *Trei Reil*. It was originated as a way of preserving fish during the longer months when fresh fish was not available in plentiful supply. *Prahoc* is traditionally produced by mixing whole fish with salt at a ratio of 3:1-5:1, and fermented for 3-12 months or longer. Moreover, some problems relating with processing were found and determined to keep for base line information for the next researchers.

**Keywords** small-sized fish, low value fish, fish paste (*Prahoc*), processing techniques

### INTRODUCTION

Fisheries play a very significant role in providing income, employment and food security to million of rural poor in Cambodia (Zalinge et al., 2001). Hortle et al. (2004 & 2005) stated that thousands of tons of small-sized or low-marketed value fish are caught each year in the Cambodia Mekong basin and in the Tonle Sap. Otherwise, the small-sized fish are also used for producing fish, animal meal and for human consumption (Nam et al., 2005).

*Prahoc* is a crushed, salted and fermented fish paste made from mud fish/small-sized fish such as *Trey Riel*, *Trei Sleuk Reussey*, etc. (Hortle et al. 2004). It is used in Cambodian cuisine as a seasoning or a condiment. Because of its saltiness and strong flavor, it was used as an addition to many meals in Cambodian cuisine, such as soups. The nickname Cambodian cheese called *Prohoc* has a strong and distinct smell. *Prahoc* is usually eaten with rice in the countryside or poorer regions. Because it is easily stored and preserved, *Prahoc* is often given out for donations to victims of flood or drought by charities and other organizations (Tamimi, 2005). Despite the importance of *Prahoc* in daily food of Cambodia, its processing technologies are not yet well understood or documented. The purposes of this study are to review existing methodologies, determine problems and to analyze economic aspects of small-size fish paste production. The data that has been done is all useful and provided baseline information to improve the agricultural exploration in university and the whole Cambodia.

## METHODOLOGY

The study on *Prahoc* processing techniques were conducted in four major provinces namely; Kandal (KD), Kampong Chhnang (KG Chh), Battambang (BB), Siem Reap (SR) in addition to the area in Phnom Penh. The research instrument was represented by using standard semi-open questionnaires with 100 samples (20 samples of micro, small, medium, and large-scale per province/capital). The samples are purposively selected. The collected data was analyzed through SPSS version 12. For economic efficiency, the data was installed and analyzed in Microsoft Excel and the formula of Economic Efficiency = Total Revenue (TR) divided by Total Cost (TC) was used.

## RESULTS AND DISCUSSION

Based on the result obtained in the study, the types of *Prahoc* processing are divided into four scales. Those are micro, small, medium and large scale.

**Micro-scale:** The annual fish input is less than one ton. Production was done using a process usually by a household. The capital used is less than 100 USD. The *Prahoc* was used for home consumption and exchanged for food and other basic supplies. No license is required.

**Small-scale:** The annual *Prahoc* input is less than 50 tons. Fermented fish paste is made for commercial purposes. The capital is less than 10,000 USD. The permanent workers are about 3-6 persons and the casual workers are about 10-15 persons. A license to run the business is also required and is issued by either provincial or central government institutions.

**Medium-scale:** The annual *Prahoc* input is more 50 tons to 1,000 tons. It is being produced for commercial purposes by a hydrolysis process, and production involves large investment and relatively high operational costs. The capital is between 50,000-100,000 USD. The permanent workers are about 3-6 persons and the casual workers are about 20-25 persons. Operation requires a license from Ministry of Agriculture Fisheries and Forestry (MAFF), and Ministry of Industry Mine and Energy MIME.

**Large-scale:** The annual fish paste input is more than 1,000 tons. *Prahoc* is being produced for commercial purposes by a company process and production involves large investment and high operational costs. The capital is more than 100,000 USD. The permanent workers are about 10 persons and casual workers are about 25-50 persons. A license is required from Ministry of Agriculture Fisheries and Forestry (MAFF), Ministry of Industry Mine and Energy (MIME) and Ministry of Commercial (MoC). This scale has had only in Battambang province.

These four categories of *Prahoc* industries are according to the definition set by MIME (2003) on the enterprises. However, investor and laborers in these studies were not exactly numbered because the system of processing in Cambodia is not yet clarified.

Fish is the raw material for production of *Prahoc*, then salt. As shown in Table 1, fish species commonly utilized for *Prahoc* are those of *Trei Reil cyprinid henicorhynchus Trei sleuk reussey* and other fishes were also used such as bagrid catfishes (*Kanchos*), barb (*Chpin*), Thai river sprat (*Bandoul Ampov*), perchlet (*Kanhchras Thom*), carps (*Linh, Khnorng Veng, Srakar Sdarm, Kros, Angkok Prak, Chanteas Phluk and Kaek*) and elephant paradiseus fish (*Kompeus*), river catfish (*Pra*). However, *Trei Kompleanh* species is only being used in Battambang and Siem Reap provinces.

**Table 1 Amount of fish for *Prahoc* production**

Kinds of fish	Name of provinces and capital					Total (%)
	PP	KD	KG Chh	BB	SR	
<i>Trei Reil</i> (70-95%)	20	20	20	20	0	80
<i>Trei Sleuk Reussey</i> (5-10%)	20	13	9	17	0	59
<i>Trei Kompleanh</i> (100%)	0	0	0	20	20	40
Other fishes (5-20%)	20	20	19	20	0	79

Table 2 showed the percentage of the amount of salt in *Prahoc* production per ton of fresh fish. About 45% of the producers responded that the salt appropriate for producing *Prahoc* is 300 kg per ton of fresh small-sized fish. Most of the producers (67%) obtained 450 kg net production of *Prahoc* from the fresh fish in one ton. On the other hand, 17% of producers able to produced 550 kg of *Prahoc* per ton of fresh fish.

**Table 2 Salt using for *Prahoc* production**

Amount of <i>Prahoc</i> Production	Amount of salt					Total (%)
	150	200	250	300	350	
≤ 350	0	7	5	2	0	14
≤ 450	3	6	11	37	10	67
≤ 550	1	4	6	6	0	17
≤ 650	0	2	0	0	0	2

*Prahoc* processing techniques differs depending on the location of factory and the scale of production. Beddows (1985) illustrated that method of processing is fish preservation and a concentrated form of fermented fish (Hortle, 2007). Fish are beheaded and cleaned well to prevent spoiling from their own microorganisms in the slim, gut and gills on their bodies. These microorganisms as well as the enzymes in the fish tissues, bring about putrefying changes in fish when it dies (Parry and Pawsey, 1973). Salt is used as preservative to prevent spoilage and to stabilize fermentation. The smell of *Prahoc* also differs according to the amount of salt used. Watanabe (1982) showed that the characteristic smell of fermented fish is the result of enzymatic and microbiological activity in the fish muscle. Rahayu (1992) recorded that the first salting step takes several weeks to develop its characteristic flavor and texture, and this is followed by a maturation phase. Only one producer in Kampong Chhnang province said that they used chemical substance like insecticides to preserve fish. Unfortunately, these chemicals are taken without any strict control over the safe dosage level. Hence the product, though protected from insects, could be harmful to consumers. In this stage, it is in line with Azeza (1986) and Kofi (1992).

***Prahoc* processing chain for micro scale in the province and capital**



**Fig. 1 *Prahoc* Cha-eang processing**



**Fig. 2 *Prahoc* Sach processing**