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The commercial utilization of small perch (*Perca fluviatilis* L.) in Finnish inland fisheries

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A total of 89 fish-processing companies were interviewed to determine their attitude towards the use of under-utilized fresh-water fish species, their methods and the problems involved in processing. Small perch were used by 17 companies. The product groups were traditional Finnish fish pasty *kalakukko* (4 processors), other ready meals (2), canned fish (4), fish meat (3), fillets (2) and smoked fish products (2). The main reason why companies are not using small perch is the unreliable supply of raw material. According to the interviews, inland fisheries appear poorly organized and inefficient.

1. Introduction

Perch (*Perca fluviatilis* L.) is commonly found in Finnish coastal brackish waters, as well as in most lakes and rivers, except for some mountain areas in Northern Lapland. The density and size composition of the perch populations vary among areas (Lind 1976). Where the stocks are dense, the size of perch is usually small (Rask 1989).

The total catch of perch in Finland was about 20 000 tonnes in 1992. Ninety-six percent of the perch was harvested by recreational fishermen, and 70% from inland waters. Only 2% (242 tonnes) of the total inland catches was harvested in the commercial fisheries (Karttunen 1994, Leinonen 1994, Tuunainen 1994).

Commercial inland fishing in Finland is mostly based on vendace (*Coregonus albula* L.). There are strong fluctuations in the vendace stocks. When the density of the stock is low, fishermen seek alternative species which could be profitably harvested. The main proportion of perch is caught during the spawning season in May to June. During this period, perch may significantly contribute to the professional fishing, particularly since vendace catches are low in spring.

Large perch (over 250 grams) are processed by several companies in Finland, but the domestic market for small perch seems to be small. Small perch are mainly used as raw material for traditional Finnish fish pasty, *kalakukko*, in eastern Finland.

According to several Finnish fish product de-

velopment projects, excellent products can be obtained from under-utilized fish species. Nevertheless, large-scale commercial utilization of these species has not yet been successful in Finland. In this study, the problems involved in the processing and marketing of small perch from inland waters were investigated by interviewing fish processors.

2. Material and methods

The names of the fish processing companies that were interviewed were obtained from the register of the Central Statistical Office of Finland. This register was supplemented with small and new firms identified by regional fisheries district authorities and the Finnish Game and Fisheries Research Institute. A total of 103 companies processing fish from inland waters were identified, 89 of which were interviewed in August to November 1994. Background data of the entrepreneurship and detailed information of the problems concerning the processing of under-utilized fish species was collected with a structured questionnaire. The companies using small perch were grouped into the following six categories according to their products: Finnish fish pasty *kalakukko* producers, other ready meal producers, fish meat processors, and fillet, smoked fish and canned fish producers.

3. Results

3.1. Description of the processing companies interviewed

Of the 89 fish-processing companies interviewed, 35 used under-utilized fish species. Further, 17 processed small perch (Table 1). Twelve of these companies were located in eastern Finland, four in western Finland, and one in Lapland.

The companies using perch included four Finnish fish pasty producers, two other ready meal producers, three fish meat processors, two fillet producers, two smoked fish producers and four canned fish producers (Table 1). Finnish fish pasty *kalakukko* is a rye bread loaf in which the fish is baked. Ready meal producers further processed fish meat into fried products.

Half of the fish-processing companies were less than five years old (Table 1); companies producing fish pasties, however, were older. The yearly sales of half of the companies were less than one million Finnish marks. Only one large company(sales over FIM 10 million) processed small perch. Most companies (82%) employed less than 9 persons. Fish pasty, fish meat and canned fish producers, as well as one of the filleters, employed temporary workers in summer.

Almost 90% of small perch processors received less than 50% of their sales from under-utilized fish (Table 2). Only one fillet producer and one canned fish producer received all their sales from products made of under-utilized fish species. Vendace was the most important fish species for companies processing under-utilized fish species. Raw material was mostly purchased from fishermen and fish wholesalers and the products were mainly sold to retailers (Table 3).

Small perch were obtained from surrounding lake areas. Only the largest producer acquired fish from a wider area. One fourth of the perch-using companies sold their products within the home district, whereas the others sold also to surrounding districts or the capital city area. Only two companies sold their products throughout Finland.

3.2. Problems involved in processing small perch

Over 80% of the firms processing small perch expressed supply problems (Table 4). The supply of perch was sufficient only in spring, with smaller amounts available also in autumn and winter. The unstable supply was partially compensated by deep-freezing raw material. One processor was not pleased with the price variation, and other companies considered the costs of collecting and transporting perch to be too high. Overall, inland fisheries appeared poorly organized and inefficient.

Of the companies, 70% did not have any problems with the quality of raw material (Table 4). One smoked fish company said that the quality of small perch varied in spring and four processors that the quality varied among suppliers or lakes. One suggested that the inland fishermen were not educated enough to chill their catches to ensure good quality.

None of the processors had problems with the intermediate storing of raw material (Table 4). Sixty-five percent of companies mainly processed fish manually. Processing fish meat, frying and effective filleting requires machinery; only two companies had difficulties with these. Canned fish producers had sufficient production capacity. Three quar-

Table 1. Background information on the interviewed fish-processing companies.

	Companies using undervalued fish	Companies utilizing small perch							Interviewed companies, total
		Fish pasty	Other ready meals	Fish meat	Fillets	Smoked products	Canned products	Total	
Established:									
1990–94	17	–	1	2	1	1	2	7	45
1980–89	12	3	–	1	1	1	1	7	24
1950–79	2	–	–	–	–	–	1	1	13
Earlier	3	1	1	–	–	–	–	2	5
Unknown	1	–	–	–	–	–	–	–	2
Total	35	4	2	3	2	2	4	17	89
Sales, millions FIM/year:									
Under 0.1	9	–	–	–	2	–	1	3	18
0.1–0.5	11	2	–	2	–	1	1	6	24
0.51–1	1	–	–	–	–	–	–	–	11
1.1–2	7	1	1	–	–	1	1	4	15
2.1–5	3	1	–	–	–	–	1	2	7
5.1–10	2	–	–	1	–	–	–	1	4
10.1–50	–	–	–	–	–	–	–	–	4
Over 50	1	–	1	–	–	–	–	1	2
Unknown	1	–	–	–	–	–	–	1	4
Number of permanent employees:									
1	9	–	–	1	1	1	1	4	35
2	10	1	1	1	1	1	1	4	25
3–9	12	2	–	–	–	–	2	6	19
10–25	3	1	–	1	–	–	–	2	7
26–50	0	–	–	–	–	–	–	0	1
Over 50	1	–	1	–	–	–	–	1	2

Table 2. The most important field of business and fish species processed (based on value) for the interviewed fish-processing companies.

	Companies using undervalued fish	Companies utilizing small perch							Interviewed companies, total
		Fish pasty	Other ready meals	Fish meat	Fillets	Smoked products	Canned products	Total	
Main field of business:									
Wholesaling	7	–	1	1	–	–	–	2	19
Processing	12	2	1	2	–	–	2	7	39
Retailing	8	2	–	–	–	1	–	3	8
Fish farming	1	–	–	–	–	1	–	1	2
Other fish business	5	–	–	–	2	–	1	3	7
Other business	2	–	–	–	–	–	1	1	4
Total	35	4	2	3	2	2	4	17	89
Main fish species:									
Perch and other fresh water species	8	–	1	1	–	–	1	3	10
Baltic herring	1	–	1	–	–	–	–	1	5
Rainbow trout	12	–	–	1	1	2	–	4	39
Whitefish	1	–	–	1	–	–	–	1	10
Salmon	–	–	–	–	–	–	–	–	2
Vendace	13	4	–	–	1	–	3	8	22
Imported fish	–	–	–	–	–	–	–	–	1
The share of processed under-utilized fish of the total sales:									
100	2	–	–	1	–	–	1	2	
50–99	1	–	–	–	–	–	–	–	
10–49	13	2	1	1	–	–	1	5	
Under 10	15	2	1	1	2	2	2	10	
Unknown	2	–	–	–	–	–	–	–	

ters of fish pasty producers said that the demand of fish pasties exceeded capacity. One of the producers clarified the problem: "in winter we could make more fish pasties, but there are no fish, and in summer when demand is high, we do not have the time to make more". The smoked fish companies said that the demand for their products was seasonal.

Marketing was not a problem for the fish pasty

Table 3. Most important purchasing sources and distribution channels for the interviewed fish-processing companies.

	Companies using undervalued fish	Companies utilizing small perch							Interviewed companies, total
		Fish pasty	Other ready meals	Fish meat	Fillets	Smoked products	Canned products	Total	
Purchase source:									
Fishermen	14	–	2	2	–	1	2	7	29
Own fishing	6	–	–	–	1	–	1	2	13
Fish farm	5	–	–	–	1	–	–	1	19
Own fish farm	1	–	–	–	–	1	–	1	2
Wholesaler	7	3	–	1	–	–	1	5	21
Import firm	1	–	–	–	–	–	–	–	1
Own import	1	1	–	–	–	–	–	1	2
Total	35	4	2	3	2	2	4	17	89
Sold to:									
Wholesalers	4	–	–	1	–	–	1	2	14
Industry or processors	2	–	–	1	1	–	–	2	2
Retailers	14	3	1	–	1	1	2	8	30
Kitchens and restaurants	5	–	1	1	–	–	–	2	10
Consumers	10	1	–	–	–	1	1	3	31
Fodder users	–	–	–	–	–	–	–	–	1

Table 4. Problems for the companies processing small perch.

	Companies utilizing small perch						
	Fish pasty	Other ready meals	Fish meat	Fillets	Smoked products	Canned products	Total
Supply:							
No problem	–	–	–	1	1	1	3
Seasonal lack of fish	4	1	3	1	1	3	13
Other problems	–	1	–	–	–	–	1
Quality of raw material:							
No problem	2	1	2	2	2	4	12
Seasonal variation	–	–	–	–	1	–	1
Variation by supplier	2	1	1	–	–	–	4
Production process:							
No problem	4	1	2	2	2	3	14
Machines	–	1	–	–	–	1	2
Regulations	–	–	1	–	–	–	1
Mainly manual process	4	–	–	1	2	4	11
Mainly mechanical process	–	1	3	1	–	–	5
50% of both methods	–	1	–	–	–	–	1
Firm's production capacity:							
Appropriate	1	–	1	–	1	4	7
Under capacity	3	1	–	1	–	–	5
Over capacity	–	1	2	1	1	–	5
Marketing:							
No problem	4	1	–	2	–	2	9
Poor marketing	–	1	2	–	–	2	5
Seasonal demand	–	–	–	–	2	–	2
Prices too low	–	–	1	–	–	–	1
Importance of the appreciation of undervalued fish:							
Not important	1	–	–	–	1	1	3
Cannot say	2	–	1	1	–	–	4
Of a little influence	1	2	–	1	1	3	8
Very important	–	–	2	–	–	–	2

and fillet producers (Table 4). The problem with fish meat was that the price was not competitive and consumer appreciation of product was low. One ready meal producer said that the marketing chain is well organized, but there are still problems with consumer retailing. The opinions of canned fish pro-

ducers supported this observation.

Of the 54 companies not using under-utilized fish, one quarter said it was due to the irregular supply. Other important reasons were handling and financial difficulties, time constraints, and marketing problems. Quality, demand or storage were not considered a problem.

4. Discussion

Inland fish processors were a very heterogeneous group. Fish processing often supplemented other businesses. The heterogeneity of the target group meant special research method requirements. Traditional approaches based on standard industrial classification (Central Statistical Office of Finland 1988) or on fish species (Hildén *et al.* 1991, Setälä *et al.* 1994) are far too aggregated to give appropriate information for analysis. The classification based on product groups or processing methods was more useful.

Presently, using under-utilized fish is not of marked importance to Finnish fish processors. Perch is widely available in inland waters, but the irregular supply of raw material, the harvest and transportation costs were critical to the processing decision. Since industrial processing requires stable and large volumes of raw material, only one large processor used under-utilized fish species. Large processing volumes require widely organized gathering and/or import of raw material.

The price of perch decreases remarkably in spring (Nylander & Setälä 1995). According to an interview survey of perch fishermen in the Archipelago sea, the main perch fishing area on the coast, one third of them would invest more in perch fisheries if they could attain a more stable and assured price.

Finland joined the European Union at the beginning of 1995. In the EU, demand of fish products exceeds supply. Fresh water fish and especially small perch (5–200 g) are in demand (Tamazouzt *et al.* 1993). An uneven supply of perch also makes for export difficulties. However, the higher profits of export markets may make perch fishery more attractive.

The development of cheap processing machinery would enable fishermen to invest in fish processing in order to supplement low fishing incomes. If perch is processed on an industrial scale, one must concentrate on solving the problems of uneven supply and the fish gathering system. Thus the development of under-utilized fish species processing requires research focusing on the function and economics of the whole chain of fishing, transporting, processing and marketing activities in close co-operation with the fish-processing industry.

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