

# Employment in the EU based on Farmed Norwegian Salmon

## Short version

SINTEF Fisheries and Aquaculture  
SINTEF Technology and Society  
Fafo Institute for Labour and Social Research

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# Introduction

SINTEF Fisheries and Aquaculture, SINTEF Technology and Society and Fafo Institute for Labour and Social Research have been assigned by the Norwegian Federation of Trade Unions (LO) in cooperation with European Federation of Trade Unions in the Food, Agriculture and Tourism Sectors (EFFAT) to undertake a study on the extent of employment within the European Union based on imports of farmed Atlantic salmon, with special focus on Norwegian salmon.

The scope of our study includes the following main elements:

- *Analysing the direct and indirect economic effects of Norwegian salmon in EU today, focusing both on the number of jobs created in the fish processing industry and the employment effects generated in other industries.*
- *Give a broader perspective on the effects induced by reducing the supply of Norwegian salmon, i.e. evaluate alternatives to Norwegian salmon and the potential effects on employment in the EU.*

SINTEF Fisheries and Aquaculture has together with Fafo collected data and calculated employment in the fish processing industry. SINTEF Fisheries and Aquaculture had the main responsibility for producing economic figures for input to the calculation of employment in other industries, and also had project management. SINTEF Technology and Society has been responsible for calculating economic and employment effects in other industries. Fafo has had the main responsibility for assessing consequences of reduced supply of Norwegian salmon to the EU. Project manager has been Senior adviser Ulf Winther (ulf.winther@sintef.no, +47 91 31 61 22).

This report (Report no.: SFH 80 A056030) is a short version of the report "Employment in the EU based on Farmed Norwegian Salmon" (ISBN 82-14-03543-0). A more thorough description of methods, results and references is found in the main report.

The study is financed by the Norwegian Fishery and Aquaculture Industry Research Fund, and has been conducted in the time period March to June 2005.

Many firms, institutions and individuals have contributed to this report through sharing their information with us. We would like to thank each of them for their cooperation.

Trondheim, Norway 6 June 2005

Karl Almås, president SINTEF Fisheries and Aquaculture

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# Executive summary

## Introduction and method

- SINTEF Fisheries and Aquaculture, SINTEF Technology and Society and Fafo Institute for Labour and Social Research have been assigned by the Norwegian Federation of Trade Unions (LO) in cooperation with European Federation of Trade Unions in the Food, Agriculture and Tourism Sectors (EFFAT) to undertake a study on the extent of employment within the European Union based on imports of farmed Atlantic salmon, with special focus on Norwegian salmon.
- The scope of our study includes the following main elements:
  - Analysing the direct and indirect economic effects of Norwegian salmon in the EU, focusing particularly on the number of jobs created in the fish processing industry's core activities, and the employment effects generated in other industries.
  - Give a broader perspective on the effects induced by reducing the supply of Norwegian salmon, i.e. evaluate alternatives to Norwegian salmon and the potential effects on employment in the EU.
- In general calculations are made for the year 2003 for EU 15 plus Poland and Estonia, which are taken to be representative for EU 25. A special focus has been made on EU in total, Denmark, France, Germany, Poland and UK
- Estimates for employment in the processing industry and key figures for calculation of employment in other industries are based on public available statistics (e.g. EUROSTAT), other available published data (e.g. studies), data from Kontali Analyse as well as data from interviews with firms, organisations and research institutions.

## Method

- Processing industry includes slaughtering, primary and secondary processing. Trading of farmed salmon, the Hotel/Restaurant/Catering market and processing in e.g. supermarkets are not included.
- Estimates for employment in the salmon farming industry in Scotland and Ireland and key figures for calculation of employment in other industries are based on national production surveys and data provided from Kontali Analyse.
- Our estimates for employment in the processing industry and farming industry are tested and/or discussed with representatives for the industry, organisations and research institutions.
- The total employment effects are determined through the use of an input-output model with fixed coefficients and a pool for intra EU import-export.
- This model describes the economic activities of 64 industries within 17 EU-countries, i.e. employment effects of Norwegian salmon in 64 industries are calculated.
- The model is based on specific data for processing of Norwegian salmon and Atlantic salmon collected from all EU-countries that have such activities.

## Executive summary

### Results processing total EU

- 230,000 tonnes (wfe) of Norwegian Atlantic salmon were processed in the EU salmon processing industry in 2003, of a total supply of salmon to processing of 380,000 tonnes in the EU.

	Salmon processing in EU supported by Norwegian salmon
	Full Time Equivalents (FTE)
In the salmon processing industry	8,100
Indirect employment in the EU	9,710
<b>Total employment in EU supported by Norwegian salmon</b>	<b>17,810</b>

- Total employment effect in the EU supported by Norwegian Atlantic salmon is estimated to 17,810 FTE (Full Time Equivalents) in 2003. Of this, 8,100 are directly employed in the processing industry, while 9,710 are indirect employment effects in the EU.
- Processing of farmed Atlantic salmon in total is estimated to support 31,260 FTEs in the EU, of which 14,210 in the processing industry and 17,050 in indirect employment.
- Indirect employment are the effect salmon processing has on the other industrial sectors. According to the calculations for Norwegian salmon there is a multiplier of 1,2 which means that the indirect effects are approximately 20% higher than the direct effects.
- Based on our assessment of available information and studies, as well as the nature of the model, we assess our results to be relatively conservative.

### Results processing total EU

- Induced consumption effects are not included in our calculations. Such effects can give a substantial rise in the number of indirect employment, but are not included here due to uncertainty of this kind of effects.
- In addition trading of farmed salmon, the Hotel/Restaurant/Catering market and processing in e.g. supermarkets are not included.
- The total input to salmon processing has had only a small increase in tonnage from 2003 to 2005, while the Norwegian share of input has increased with 20,000 tonnes only in 2004, and a further increase in 2005. However, because of increased efficiency in the processing industry there are probably only a small increase in total employment based on Norwegian salmon after 2003.
- In the fish processing industry there are a significant number of part time jobs (included seasonal workers), which are not calculated separately in this study but are included in the FTE figures.
- Other studies indicate that the total number of jobs, included part-time jobs, can be an additional 20 – 50 % of the FTE estimated. Applied to the number of FTE based on Norwegian salmon (8,100) this would give a total number of employees (full time and part time) of 9,700 – 12,200 in the EU salmon processing industry.
- The salmon processing industry is often located in rural areas or in other areas where alternative employment is not easily accessible.

## Executive summary

### Results processing focus countries

- The employment, in salmon processing and indirect employment, in the five focus countries Germany (D), Denmark (DK), France (F), Poland (POL) and UK are presented separately;

Salmon processing in focus countries Direct and indirect employment					
	D	DK	F	POL	UK
<b>Total employment supported by Norwegian salmon (FTE)</b>	<b>1,720</b>	<b>3,010</b>	<b>4,180</b>	<b>3,540</b>	<b>370</b>

- The total employment in EU supported by Norwegian salmon in UK is low, but is likely to have risen since 2003 due to a decrease in UK production of farmed salmon of about 40,000 tonnes since 2003, while import of Norwegian salmon to UK is expected to increase with approximately 17,500 tonnes wfe from 2003 until the end of 2005.
- Poland has had a significant increase in processing of farmed salmon, and employment (FTE) in salmon processing is estimated to have increased with 400 - 600 from 2003 to 2005. The share of Norwegian salmon in Poland is still almost 100 % so far in 2005.
- The five focus countries are the most important countries for processing of Norwegian salmon and represents 72 % of the total employment in EU supported by Norwegian salmon.

### Results salmon farming

- Total production (slaughtered) of farmed Atlantic salmon in the EU, represented by Scotland and Ireland, amounted to 180,400 tonnes wfe in 2003. This production is almost 100% of the salmon farming activity in the EU. Scottish production represents 162,000 tonnes and Irish production 18,400 tonnes.
- Salmon farming includes smolt and on-growing production.

	Salmon farming in EU Full Time Equivalents (FTE)		
	Total	Scotland	Ireland
Direct employment in the salmon farming industry	<b>1,830</b>	1,440	390

- Direct employment in salmon farming industry in the EU is estimated to 1,830 FTE in 2003.
- Scotland is by far the biggest EU producer of Atlantic salmon with a direct employment in the farming industry of 1,440 FTEs in 2003.
- Most probably the employment in Scottish salmon farming has been reduced from 2003 because of reduced production of about 40,000 tonnes wfe and increased efficiency in the industry.

# Definitions

## Definitions

- EU = EU 25
- FTE = Full Time Equivalent, i.e. one man-labour year.
- Processing industry = Processing industry includes slaughtering, primary and secondary processing. Trading of farmed salmon, the Hotel/Restaurant/Catering market and processing in e.g. supermarkets are not included.
- Salmon = Farmed Atlantic salmon.
- Indirect effects = all industries delivering goods directly to the processing industry and other industrial activities supporting these activities.
- Total Labour Costs = Sum of compensation of employees plus other labour costs, i.e. the total costs related to employees.
- WFE = Whole Fish Equivalent, i.e. whole fish that is starved and bled.

# Method

## Method, general and processing industry

### Year and countries covered by this study

- In general calculations are made for the year 2003 for EU 15 plus Poland and Estonia. The other eight countries becoming EU members in 2004 processes very small quantities of salmon and therefore the calculations gives a good picture of the total processing in the EU 25 (hereafter called the EU).
- The year 2003 is chosen because this is the most recent year with available statistics.
- Estimates and calculations have been made for all countries referred above, with a main focus on the EU, Denmark, France, Germany, Poland and UK.

### Employment in the processing industry and key figures for calculation of employment in other industries

- Our work is based on public available statistics (e.g. EUROSTAT), other available published data (e.g. studies) as well as data from interviews with firms, organisations and research institutions.
- In addition Kontali Analyse has provided figures for supply and demand of farmed Atlantic salmon to the EU; in total, split on country of origin and product. Kontali Analyse has also provided overviews of product transformation and product value/turnover for Norwegian farmed salmon.
- For quality assurance purposes our estimates are tested and/or discussed with representatives for the industry, organisations and research institutions.

## Method, processing industry

- Based on the referred sources of information we have estimated:
  - Number of full time employment (expressed as FTE – Full Time Equivalents) in the processing industry based on farmed Norwegian salmon and farmed salmon in total.
  - Processing industry includes slaughtering, primary and secondary processing. Trading of farmed salmon, the Hotel/Restaurant/Catering market and processing in e.g. supermarkets are not included.
  - Input information to calculation of employment in other industries:
    - **Total turnover** in processing industry in each country. Kontali figures are used as a basis, cross-checked with surveys and other information from each country.
    - **Labour costs** and **operational expenditure** as share of total turnover. The share is either provided directly from our sources (i.e. research institutions) in the actual countries or estimated when missing.
    - Operational expenditure split on origin (own country, rest of the EU, outside the EU). The split was made based on origin of the fish raw material and other costs.
  - Number of FTE were calculated for each country using the absolute figure for Labour costs, divided by average cost of labour per person per year. Average cost of labour for the salmon processing sector were estimated using EUROSTAT figures for Manufacturing and more accurate information derived from the fish processing industry.



# Method

## Method, salmon farming and supplier industries

### Employment in the salmon farming industry in Scotland and Ireland and key figures for calculation of employment in other industries

- Salmon farming includes smolt- and on-growing production. Slaughtering and transportation to processing plant or border are not included.
- Kontali Analyse has provided figures for slaughtered volumes (tonnes wfe) of farmed Atlantic salmon, prices achieved per kg wfe, and information about production cost in salmon farming. Together with information from national production surveys this formed the basis for the calculation of turnover.
- Using the same method as for the processing industry; share of **labour costs** and **operational expenditures** of total turnover were estimated, operational expenditure was split on origin and the number of FTEs were calculated.
- For quality assurance purposes our estimates are tested and/or discussed with representatives for the industry.

### Indirect Employment

- The total effects are determined through the use of an input-output model with fixed coefficients and a pool for intra EU import-export.
- The input or the supply side of the model are production in a country and import to that country, while the output or the demand side of the model consists of input for domestic production, private consumption, other final deliveries, and export.

## Method, indirect employment

- Each country's import from EU is endogenous and a function of input to domestic production, private consumption, and other final deliveries.
- Export to EU is a function of aggregated EU demand.
- This model describes the economic activities of 64 industries within 17 EU-countries, i.e. employment effects of Norwegian salmon in 64 supplier industries are calculated.
- The model is based on specific data for processing of Norwegian salmon and Atlantic salmon collected from all EU-countries that have such activities.
- Data from National Accounts for all the 17 EU-countries are input to the model as well. Some of the data are from Eurostat, and some directly from each country.
- For the construction of salmon processing industry in the model, we have combined data on fish processing industry in the National Accounts from Denmark, Sweden, Netherlands, Belgium, Poland, Estonia, UK, and Germany with the collected specific data from the industry it self.
- Firstly, the employment in the supplier industries in a normal situation is estimated, which means import of Norwegian salmon to the EU before effects of antidumping measures in 2005. Secondly, the effect on the EU-economy without any import of Norwegian salmon at all, is calculated. By a comparison of these two calculations we get figures for reduction of employment in the EU due to no import of Norwegian salmon.

## Effects in the processing Industry

### Employment

- Total supply (import and own production) of farmed Atlantic salmon to the EU was 609,000 tonnes wfe in 2003. Of this we have estimated that 380,000 tonnes wfe are processed (excl. slaughtering) by the salmon processing industry in the EU.
- Norway exported 360,000 tonnes wfe to the EU in 2003, of this 230,000 tonnes wfe were processed in the EU.

	Full Time Equivalents (FTE) 2003						Total
	D	DK	F	POL	UK	Other	
In salmon processing based on Norwegian Salmon	780	1,370	1,900	1,610	170	2,270	8,100
In salmon processing based on total salmon	920	1,710	2,800	1,610	4,290	2,880	14,210

- The total number of employment (FTE) in the EU processing industry based on Norwegian farmed salmon is estimated to be 8,100 in 2003.
- As the estimates are not based entirely on statistical data exact accuracy cannot be calculated. Based on our assessment of available information and studies, we assess our results to be relatively conservative.
- In 2004 the total supply of farmed Atlantic salmon to the EU did not change significantly from year 2003. Norwegian supply, however, increased by approximately 20,000 tonnes wfe, while the Scottish and Irish supply decreased.

### Employment

- First six months of 2005 the total supply to the EU is expected to increase approximately 3-5 % from 2004. The Norwegian share is expected to be unchanged. (ref.: Kontali Analyse).
- If we assume that the share of total supply going to processing remains unchanged, this implies that the Norwegian input to processing has increased from 2003. However, because of increased efficiency in the processing industry there are probably only a small increase in total employment based on Norwegian salmon after 2003.
- Some countries had a reduction in employment from 2003 to 2005. E.g. sources in Denmark has stipulated a reduction of 150 – 250 FTE from 2003 to 2005.
- Poland has had a significant increase in processing of farmed salmon during the last three years and direct employment (FTE) in 2005 based on farmed salmon in total is estimated to be 2,000 – 2,200. The share of Norwegian salmon in Poland is still almost 100 % so far in 2005.
- UK stands out among the countries. It is the only country with a salmon farming activity, and their figures include slaughtering and packing in the primary processing. UK therefore has a larger extend of primary processing compared to the other EU countries.
- Employment in FTE does not give full credit to the importance of total employment in the salmon processing industry since part time jobs are not visualised.

## Effects in the processing Industry

### Employment

- In the fish processing industry there are a significant number of part time jobs (included seasonal workers), which are not calculated separately in this study but are included in the FTE figures.
- Other studies indicate that the total number of jobs, included part-time jobs, can be an additional 20 – 50 % of the FTE estimated. Applied to the number of FTE based on Norwegian salmon (8,100) this would give a total number of employees (full time and part time) of 9,700 – 12,200 in the EU salmon processing industry
- The salmon processing industry is often located in rural areas or in other areas where alternative employment is not easily accessible.

### Turnover

- The total turnover in the EU processing industry based on Norwegian farmed salmon was 1,315 mill Euro in 2003.

	Total turnover (mill Euro) 2003						
	D	DK	F	POL	UK	Other	Total EU
<b>Salmon processing based on Norwegian Salmon</b>	190	250	370	90	25	390	1,315
Salmon processing based on total salmon	225	310	540	90	650	485	2,300

## Farming in Scotland and Ireland

### Employment and turnover

- Total production (slaughtered) of farmed Atlantic salmon in the EU, represented by Scotland and Ireland, amounted to 180,400 tonnes wfe in 2003. Of this Scottish production represents 162,000 tonnes and Irish production 18,400.
- Salmon farming includes smolt and on-growing production.

Salmon farming in the EU	
Full Time Equivalentents (FTE) 2003	
In salmon farming in Scotland	1,440
In salmon farming in Ireland	390

- The total number of employment (FTE) in the EU production of farmed salmon was estimated to 1,830 in 2003.
- The turnover in the EU production of farmed salmon was estimated to 512 mill Euro in Scotland and 56 mill Euro in Ireland in 2003.
- The most recent production surveys undertaken by the two countries state the total number of employees, full-time and part-time, to be approximately 1,600 in Scotland (unpublished results) and 520 in Ireland for 2003.
- The total EU production of Atlantic salmon decreased with 12 % from 180,400 tonnes wfe in 2003 to approximately 158,000 tonnes in 2004. The Scottish production was reduced with approximately 25,000 tonnes, while the Irish production was reduced with 6,300 tonnes.

### Employment and turnover

- A further reduction in Scottish production is expected for year 2005, Kontali stipulates the production in 2005 to be 120,000-125,000 tonnes wfe.
- Most probably the employment in Scottish salmon farming is reduced from 2003 because of reduced production( in volume) and increased efficiency in the industry.
- For the processing industry in UK the reduction in domestic production of salmon is compensated with increased import of salmon. UK has increased its import of Norwegian salmon with 3,000 tonnes wfe in 2004 and further with 4,000 tonnes the first four months of 2005 (ref. Norwegian Export Council). If the increase continues throughout the year, it gives a total expected increase of 17,500 tonnes wfe from 2003 until the end of 2005. This corresponds to an increase of almost 100%.
- If we assume that most of this fish is processed, this implies that processing based on Norwegian salmon has got an increased share of the employment in UK processing industry since 2003.

## Indirect employment effects

### Indirect employment effects from salmon processing

- The effect of processed Norwegian salmon on direct employment is presented earlier and amounted to 8,100 FTEs in 2003.
- In the five focus countries the effects are as presented in the table. The calculations for each country are taking into consideration the indirect economic and employment effects in all EU countries.

	Full Time Equivalents (FTE) 2003						EU Total
	D	DK	F	POL	UK	Other	
Indirect employment in EU based on Norwegian Salmon	940	1,640	2,280	1,930	200	2,720	9,710

- The indirect employment effects in the EU industry based on Norwegian salmon amounts to 9,710 FTEs in addition. This is pure production effects in the supplying industry and other industrial activities supporting these industries.
- Indirect employment are the effect salmon processing has on the other industrial sectors. According to the calculations for Norwegian salmon there is a multiplier of 1,2 which means that the indirect effects are approximately 20% higher than the direct effects.
- This multiplication is also used for calculating indirect employment effects in the EU based on total amount of salmon, resulting in indirect employment effects of 17,050 FTEs.

### Indirect employment effects from salmon processing

- Based on our assessment of available information and studies, as well as the nature of the model, we assess our results to be relatively conservative.
- Among the industries, which have large effects from salmon processing, we find: Sale, Maintenance and Wholesale trade, Land transport and Supporting transport activities, Other business activities and different Manufacturing industries like Fabricated metal products, Textiles and Other food products.
- Induced consumption effects are not included in our calculations. Such effects can give a substantial rise in the number of indirect employment, but are not included here due to uncertainty of this kind of effects.

# Possible consequences in the EU of reduced supply of Norwegian salmon

## Possible consequences

- In this short version of the report we will only indicate some of the issues to be discussed further in the main report.

### Can reduced supply of Norwegian salmon be replaced with increased supply from the EU countries?

- Reduced supply of Norwegian salmon can only to some extent be replaced by supply from Scotland, Ireland, Iceland and the Faeroe Islands. These countries are believed to have limitations for significantly increasing the tonnage of farmed salmon. Most of the Canadian production goes to USA.
- In the medium and long run, only Chile seems to have the potential to increase the supply of farmed salmon to the EU. Chile, however, has a very high degree of filleting.

### Can fresh salmon be replaced with frozen fillets from Chile as input in the processing industry?

- “Just-in-time” deliveries and fresh raw materials are essential for smoked salmon and other value-added products in the medium- and upper-quality segments.
- Frozen fillets may, however, be used in the first price segment of smoked salmon.
- Some of the firms have branded their products as Norwegian salmon and therefore will not apply Chilean inputs.
- Especially in firms, which recently had sizeable investments in modern filleting equipment, there would probably be high costs connected with changing raw material from fresh gutted fish to frozen fillets instead.
- There are challenges concerning logistics when using frozen fillets from Chile which will be discussed in the main report.

## Possible consequences

### Will it be profitable to replace Norwegian salmon with fresh Chilean fillets?

- Although production costs in farming may be lower in Chile than in Europe, transport costs still would contribute to relatively high prices on airborne fresh Chilean salmon fillets. If a system with return-freight is established, cost may be reduced. If prices on European salmon rise over a certain level, imports of fresh Chilean salmon fillets probably will take place.

### Will regional relocation of the supply of farmed salmon as well as the supply of smoked salmon and other value-added products take place?

- If Chilean farmed salmon is given better foothold in the EU market - this might result in reduced market shares for farmed salmon from the Faeroe Islands, Iceland, Ireland, Norway and Scotland.
- Salmon processing firms may move to countries which have no - or lower trade barriers towards EU and no antidumping measures towards Norwegian salmon (so-called tariff-jumping). This is, however, more likely for firms using frozen salmon than for firms using fresh salmon.
- To compensate for potentially higher costs of raw materials, salmon processing may also relocate within the EU to countries with relative low labour costs, for instance to the Eastern part (the Baltic countries, Poland).
- Several farming and processing firms in Chile, Norway, UK and other EU member countries are subsidiaries of multinational enterprises. These enterprises are not only already established in different markets, but also have the necessary experience when further relocation of activities is an option.